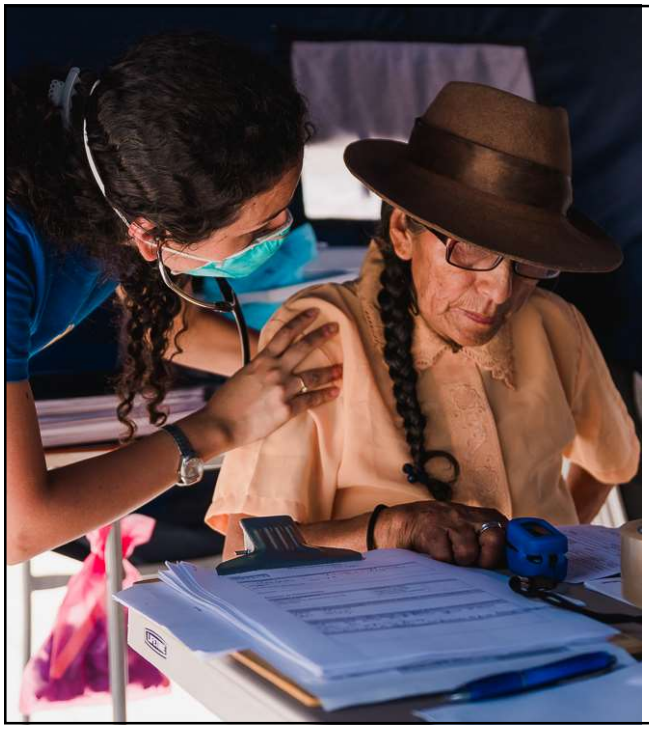

TB, DISPARITY, AND THE FUTURE OF HEALTH CARE DELIVERY

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27TH NATIONAL TB CONFERENCE &
13TH NATIONAL CONFERENCE ON LABORATORY ASPECTS OF TUBERCULOSIS

ATLANTA, GEORGIA
JUNE 13, 2023

1

Screening patients with a portable "backpack" x-ray in Mexicali, Mexico, 2021

This talk will demonstrate how understanding and addressing the social determinants of TB are critical in the struggle to eliminate TB and are the foundation of equitable healthcare delivery in communities.

Objectives:

1. Describe the history of the social determinants of health in TB program development.
2. Describe how a recognition of the importance of addressing social determinants of TB as part of a broader health equity agenda will lead to better health outcomes.
3. Describe how comprehensive TB care delivery can serve as a platform for care delivery for other diseases

2

GLOBAL TUBERCULOSIS BURDEN

10.6 MILLION PEOPLE FELL ILL WITH TB

6.4 MILLION REPORTED HAVING ACCESS TO CARE

4.2 million undiagnosed

In 2021

ABOUT 1.6 MILLION PEOPLE DIED FROM TB

INCLUDING 187,000 PEOPLE WITH HIV

4,300+ people dead every day

TB is the leading killer of people with HIV and a major cause of deaths related to antimicrobial resistance

In 2021

ABOUT 0.5 MILLION PEOPLE FELL ILL WITH DRUG-RESISTANT TB

ONLY **ONE IN THREE PEOPLE** HAD ACCESS TO **TREATMENT**

OF THOSE TREATED, ONLY 60% WERE TREATED SUCCESSFULLY

~20% DR-TB patients cured

World Health Organization

Data from 2021

HOW FAR ARE WE FROM ACHIEVING OUR GLOBAL TB ELIMINATION GOALS?

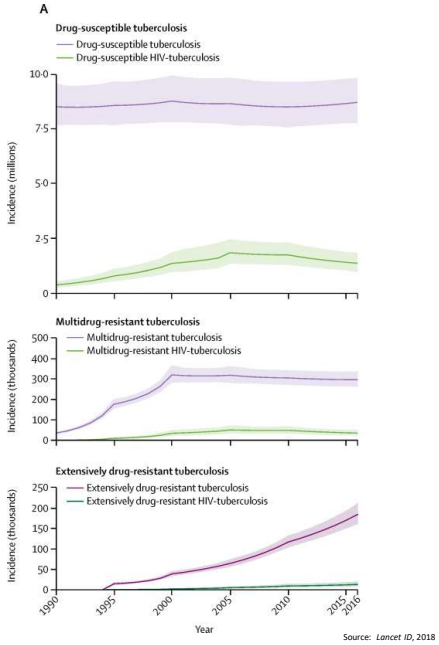
3

Decline of TB incidence is slow: We will not meet global goals

Drug-sensitive TB *declined*
1.3% per annum from 2006-2016
(age standardized)

MDR-TB *declined*
2.1%per annum from 2006-2016
(age standardized)

XDR-TB *increased*
7.9% per annum from 2006-2016
(age standardized)



Source: *Lancet ID*, 2018

4

Why are we in this situation?

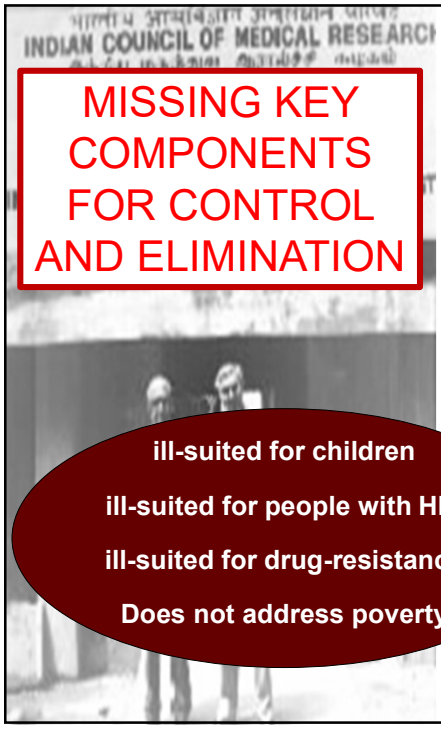
Concern over cost led to an over-simplified global approach: the DOTS strategy

1. Political commitment
2. Diagnosis with sputum-smear microscopy
3. Standardized short-course chemotherapy
4. Regular supply of high-quality drugs
5. Standardized recording and reporting

SIMPLE
EASY
LOW COST

DOTS- sure cure for TB.

5



MISSING KEY COMPONENTS FOR CONTROL AND ELIMINATION

ill-suited for children

ill-suited for people with HIV

ill-suited for drug-resistance

Does not address poverty

Basic principles of epidemic control for TB

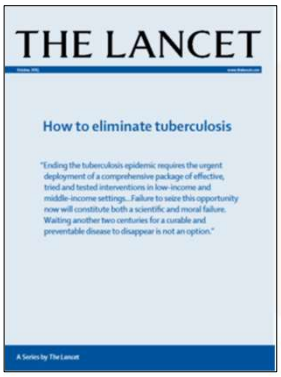
- Search actively for newly infected people among the contacts of current patients using a sensitive test (X-ray)
- Start therapy quickly for people with disease; give the safest, most effective multi-drug therapy in the shortest time
- Ensure adherence to therapy with supports
- Treat all contacts that do not yet have disease with post-exposure prophylaxis
- Ensure proper infection control

6

ZERO TB Initiative

Increasingly there is a consensus that TB rates will only be driven down through a comprehensive program that recognizes the biological and social dimensions of TB

2015



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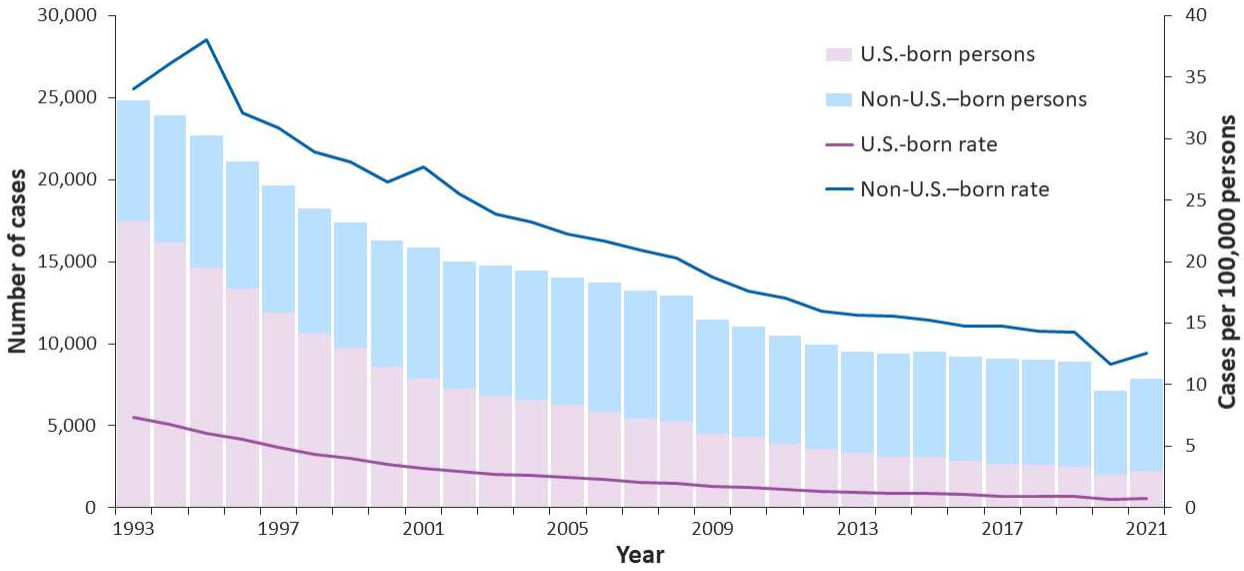
TB Cases and Incidence Rates by Origin of Birth,* United States, 1993–2021



*Persons born in the United States, certain U.S. territories, or elsewhere to at least one U.S. citizen parent are categorized as U.S.-born. All other persons are categorized as non-U.S.–born.

8

TUBERCULOSIS

THE QUINTESSENTIAL BIO-SOCIAL DISEASE

Photo: Pep Bonet/Open Society Institute

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- The situation of workers during the industrial revolution in England resulted in the push for the creation of a sanitary commission (1837), raising concern over the sanitary conditions of the laboring population (1842).
- This was not, in the words of Rene Dubos, "built on scientific doctrine." Rather, it arose from the understanding that "illness was, in large measure, the penalty of bad living and social injustice."

Source: Dubos R and J Dubos. The White Plague: Tuberculosis, Man, and Society. New Brunswick: Rutgers University Press. 1996 [1952], p.209.

Photo: https://i.dailymail.co.uk/1s/2019/09/13/10/18434796-7459955-image-a-3_1568366450263.jpg

10

Photograph of a Glasgow slum
by Thomas Annan, 1868

Photo source: https://www.bl.uk/victorian-britain/articles/the-working-classes-and-the-poor

- In *The Conditions of the Working-Class in England in 1844*, Friedrich Engels, the son of a Prussian textile mill owner who had been sent to Manchester England to supervise his father's factory, outlined the following reasons for disease:
  - Poverty
  - Air pollution (which he believed caused "inflammation")
  - Lack of sewerage
  - Lack of quality food with low nutrition ("food desert")
  - Overcrowded living conditions
  - Lack of access to physicians
  - Child labor
  - "atomization" of society where people don't help each other
- Later, similar ideas were raised by the great physician and father of the field of Social Medicine, Rudolph Virchow, on his *Report on the Typhus Epidemic in Upper Silesia*

11

La Miseria
by Cristobal Rojas, 1886

- During this 19th century, the period of the Industrial revolution, rates of TB grew to very high levels – 200 to 500 per 100,000 people
- The disease was said to account for the death of 25% of the inhabitants of Europe, and a similar number of lives in Massachusetts and New York.
- While there was some understanding that it could be passed from person to person and within families – that there was some biological basis to the disease, from the earliest period it was clear that TB, like many other diseases had a strong social dimension: **it was the interaction between the biological and the social that led to disease.**

Sources:
1. Holmberg SD. The rise of tuberculosis in America before 1820. Am Rev Respir Dis 1990;142:1228-32
2. Dubos R and J Dubos. The White Plague: Tuberculosis, Man, and Society. New Brunswick: Rutgers University Press. 1996 [1952], p.203.

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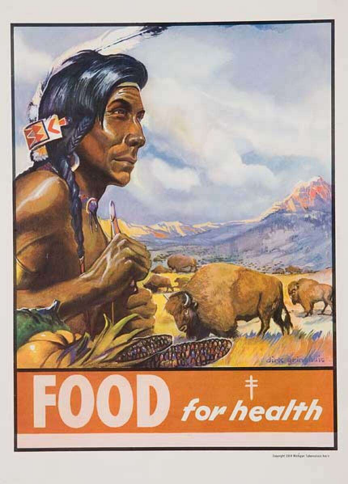
Food/Nutrition

- Thomas McKeown suggested that the drop in rates of TB between the mid nineteenth and mid-20th century was due to improved living conditions, housing, food.
- Papworth Village Settlement in England; social experiment 1918-1943; after being released from sanitorium people with TB disease were given employment, food, and medical care. They saw a *dramatic* decrease in TB incidence among children under five who were born in the settlement: zero cases in the intervention arm versus 1,217 cases (per 100,000 person years)
- During the WWII, rates of TB went up when there were food shortages
- Study of Russian and British POWs in Germany: British POWs received extra calories from the Red Cross (which included animal protein). Russian POWs had a 13-fold increased incidence of TB compared to British POWs



Sources:
1. T. McKeown, R.G. Record. Reasons for the decline of mortality in England and wales during the nineteenth century. Popul Stud, 16 (2) (1962), pp. 94-122;
2. J.P. Cegielski, D.N. McMurray. The relationship between malnutrition and tuberculosis: evidence from studies in humans and experimental animals. Int J Tuberc Lung Dis, 8 (3) (2004), pp. 286-298;
3. Bhargava A, M. Pai, M. Bhargava, B.J. Marais, D. Menzies. Can social interventions prevent tuberculosis? the papworth experiment (1918–1943) revisited. Am J Respir Crit Care Med, 186 (5) (2012), pp. 442-449
4. A. Cochrane. Tuberculosis among prisoners of war in Germany. Br Med J, 2 (4427) (1945), pp. 656-658

13

- **Undernourished individuals are also more likely to have greater severity of TB.** In India patients who were severely undernourished had 11% more of their lungs affected on chest X-ray (95% CI: 4.0–13.3) and more lung cavitation (a rate of 4.6 times more; 95% CI, 1.5–14.1) compared to those with a normal BMI. (Hoyt et al, PLoS One, 14(3), 2019)
- A study in Latvia of 995 MDR-TB patients found that **those who were underweight were significantly more likely to be both smear and culture positive** compared to patients with a normal body weight (OR 2.2 for both). (Podewils et al. Epidemiol Inf, 139(1), 2010)
- **Patients who are underweight at time of diagnosis (defined as being 10% or more below ideal body weight) had a 19.1% chance of relapse**, compared to only a 4.8% likelihood of relapse among those who were not underweight when diagnosed with TB ($p < 0.001$). (Khan et al. Am J Respir Crit Care, 174(3), 2006)
- A South African study found that **for every kg decrease in weight at the start of treatment, odds of survival decreased by 7.5%** ($P < 0.01$) among those with extensively drug-resistant TB. (Kvasnovsky, Cegielski, Erasmus et al. J Acquired Immune Defic Syndromes, 57(2), 2011)

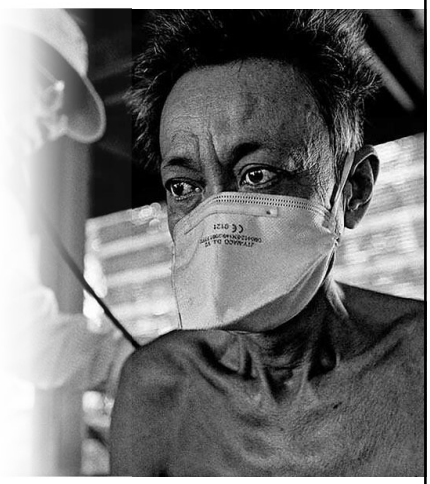


Photo: Adapted from James Nachtway TED.com

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Housing

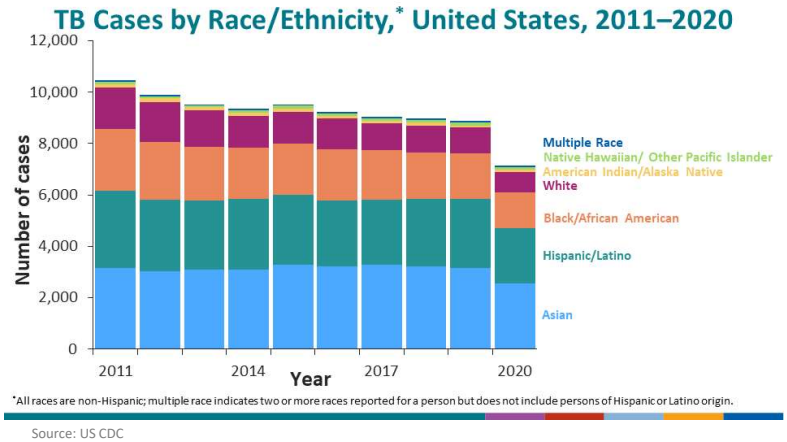
- Chalmers (1913) showed that **in every age-group the rate of TB mortality in Glasgow was lower in bigger houses compared to smaller houses**; Similarly, Peters (1933) showed that **mortality was 340% greater in a one-apartment house than a four-apartment dwelling** (not directly even linked to overcrowding vs volume). (Stein, L. Tubercle 35(8), 1954)
- Chapman and Dyerly found an **association between the risk of tuberculin conversion in children living in the house of an infectious tuberculosis case and the number of cubic feet per person in the house** (Stein L. Br J Soc Med, Vol 6, 1952)
- From 1982 to 1991**, tuberculosis notification rates in London boroughs increased by 12 percent** for each percentage increase in the number of persons living in overcrowded accommodations. (Mangtani P, et al. BMJ, Vol 310, 1995)
- In the Bronx, New York, **children less than age 5 years living in severely crowded areas were about five times more likely to develop tuberculosis** (adjusted for HIV status) than children living in areas with limited or no crowding (Drucker E. et al. Lancet, Vol 343, 1994)

Picture: https://www.loc.gov/resource/ds.06489/

15

Race

- In a study of the employees of the New York City board of education, race was the strongest risk factor for tuberculosis infection in each age group, after control for SES (Reichman LB, O'Day R. Am Rev Respir Dis, Vol 117, 1978)



Source: US CDC

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Poverty

- Retrospective study in Liverpool, England, that examined the notifications of all forms of tuberculosis by council ward over a six year period and correlating this with four indices of poverty found that the rate of tuberculosis was correlated with all measures of poverty. This link was independent of race or ethnicity. (Spence et al, BMJ, 1993)

Photo: BBC News/Getty

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Air quality

- Data on tuberculosis incidence, climate (i.e., precipitation, atmospheric pressure, relative humidity, temperature, and wind speed), and air quality (inhalable particulate matter, sulfur dioxide, and nitrogen dioxide concentrations) in Beijing from 2004 to 2016 were collected and systematically analyzed based on a structural equation model. The tuberculosis incidence was negatively correlated with the concentration of inhalable particulate matter, sulfur dioxide, or nitrogen dioxide.
- Meta analysis showed: Long-term exposure to PM_{10}, SO_2 or NO_2 is associated with increased odds of tuberculosis. (Zhang and Zhang, Annals of Epi, Volume 37, 2019)

18

TUBERCULOSIS PROGRAMS

HAVE SHAPED THE PARADIGM FOR COMMUNITY-BASED CARE-DELIVERY

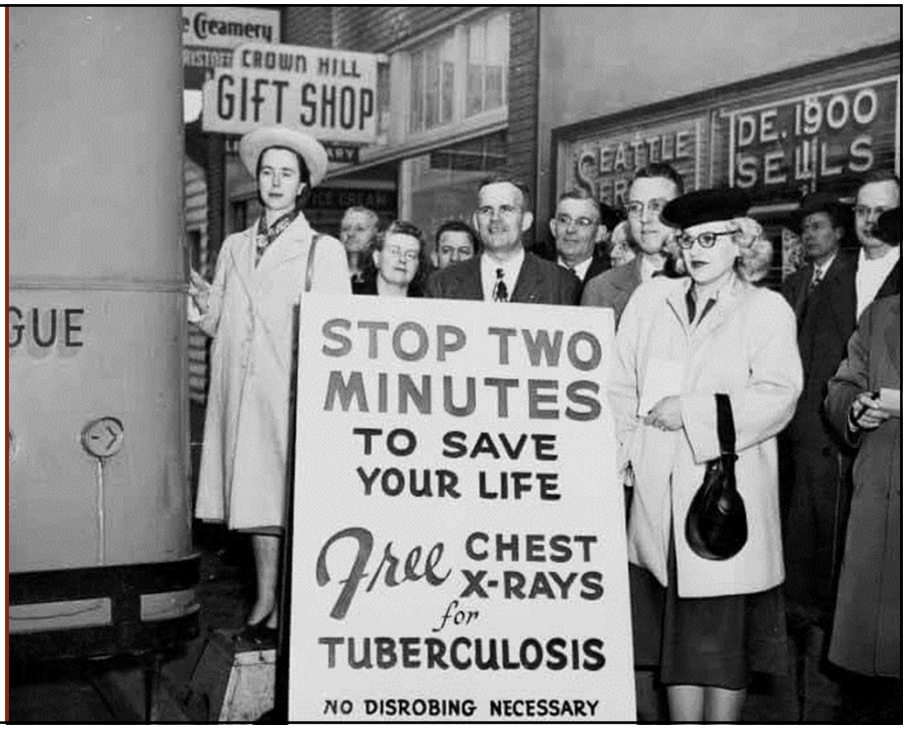
Photo: Partners In Health/Russia

19

Photo: University of Washington Library

1

SEARCH for people with TB disease and infection *in the community*



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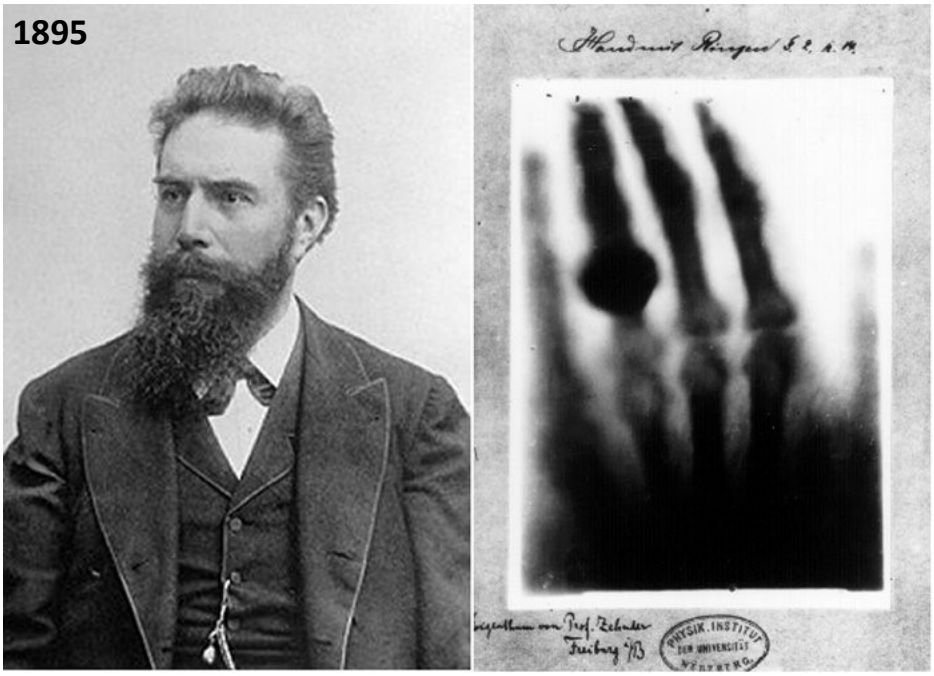
Active case finding using a sensitive diagnostic



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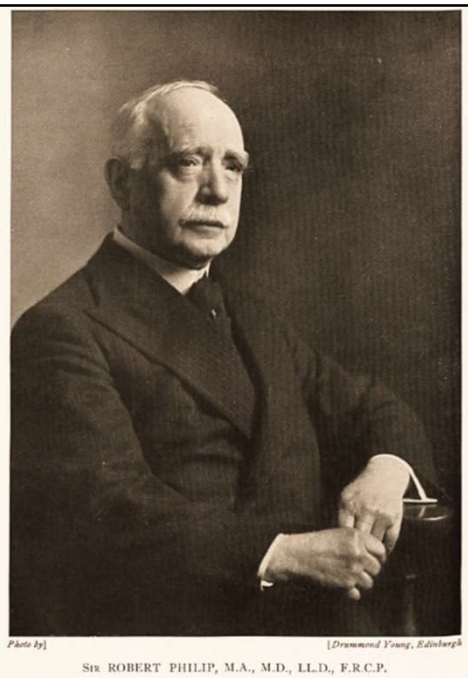


Photo by] [Drummond Young, Edinburgh

SIR ROBERT PHILIP, M.A., M.D., LL.D., F.R.C.P.

Edinburgh Medical Journal

May 1937

THE EDINBURGH TUBERCULOSIS SCHEME

1887-1937.

FIFTY years ago, in 1887, Sir Robert Philip, then a young graduate in medicine, laid in Edinburgh the foundations of a scheme having from its beginning and as its ultimate goal an object no less ambitious than the control and extinction of tuberculosis in this and other civilised communities throughout the world.

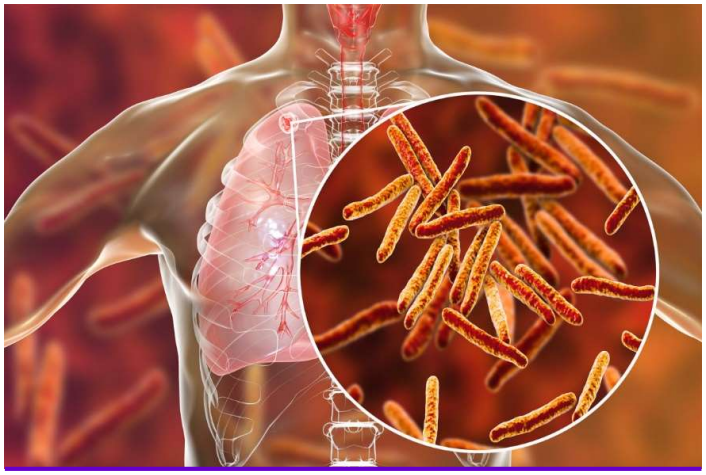
22

Active case finding using a sensitive diagnostic (x-ray) was a critical tool for finding active cases and stopping transmission of TB

- Was used in Edinburgh, Scotland, in the early 20th century.
- It was used in the US and Europe extensively in the 1930s, 1940s, and 1950s to drive down rates of TB. Large numbers of close contacts and other contacts of TB patients were screen and many cases were found
- This not only contributed to finding new cases, but to decreased mortality (early case detection)

Source: Golub et al. 2005

23

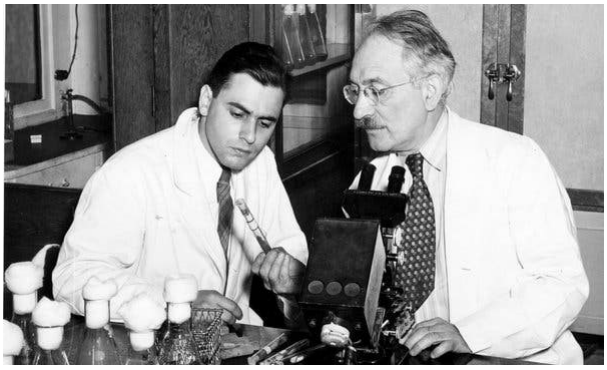


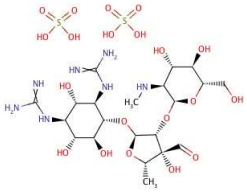
2 TREAT TB disease correctly

USE THE CORRECT MEDICINES WITH LEAST SIDE EFFECTS OVER THE SHORTEST PERIOD OF TIME DELIVERED IN THE COMMUNITY

24

Selman Waxman and Albert Schatz





1943 — Streptomycin isolated in laboratory by Selman Waxman and Albert Schatz, the graduate student working with him

1944 — Given to the first human TB patient in November 1944

1948 — BMRC trials → drug resistance to streptomycin observed

1955 — BMRC drug resistance survey in UK → resistant strains transmitted

Multidrug regimens were needed

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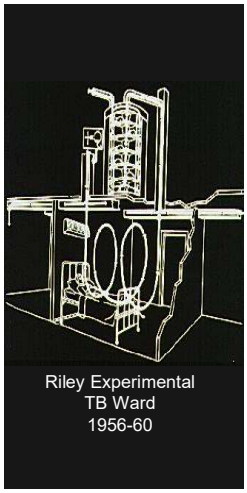
Rapid diagnosis of TB, determination of resistance, and correct treatment regimens are critical to prevent transmission



Riley Experimental TB Ward 1956-60

When patients were started on an *effective* treatment regimen, they were less infectious even after as little as 24 hours of treatment

Relative infectivity of patients*:

– Susceptible TB

- 61 *Untreated* (29 GPs) **100%**
- 29 Treated (1 GP) **2%**

*all smear positive patients (people coughing up bacteria)

Source: Richard Riley, et al. Am J Hyg 1959; 70:185-196. (reprinted as "classic" Am J Epidemiol 1995; 142:3-14)

Early treatment with the correct regimen will stop transmission

26

Treatment at home is safe and led to good outcomes

Photo: Pep Bonet/Open Society Institute

When patients were started on an *effective* treatment regimen at home they had better outcomes

- 5 year study in Chennai (Madras) India showed that relapse rates of people treated at home was 7% versus 10% in the sanatorium.
- Also showed that the incidence of active tuberculosis and of tuberculous infections was no greater in the contacts of patients treated at home than in the contacts of patients treated in sanatorium, either in the first year or over the subsequent four years. The major risk to the contacts resulted from exposure to the patient before diagnosis.

Treatment at home/in the community is safe and effective

Source:
1. Dawson, Devadatta, Fox et al. Bull World Health Organ, 1966.
2. Kamat, Dawson and Devadatta, Bull World Health Organ, 1966.

27

3

PREVENT TB infection from becoming active disease

TREATING TB INFECTION IS AN ESSENTIAL PART OF STOPPING TRANSMISSION AND DISEASE

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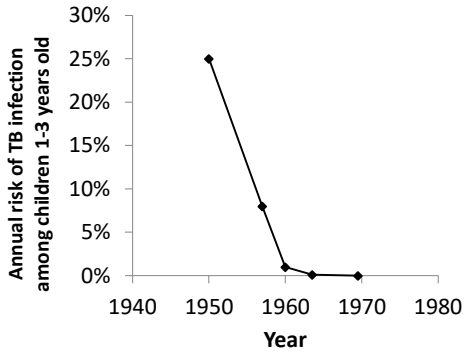
Preventive therapy and the decline in TB transmission in Alaska



Between 1950 and 1960, the US Public Health Service built health facilities, started **active case finding**, **treatment of all forms of disease**, and **treatment of TB infection**

Kaplan, Fraser, and Comstock. Am Rev Resp Crit Care. 1972

~8 to 10% of contacts will get TB during the first two years after exposure to an individual with active disease

Today, it is estimated that ~20-30 million close contacts should receive treatment each year

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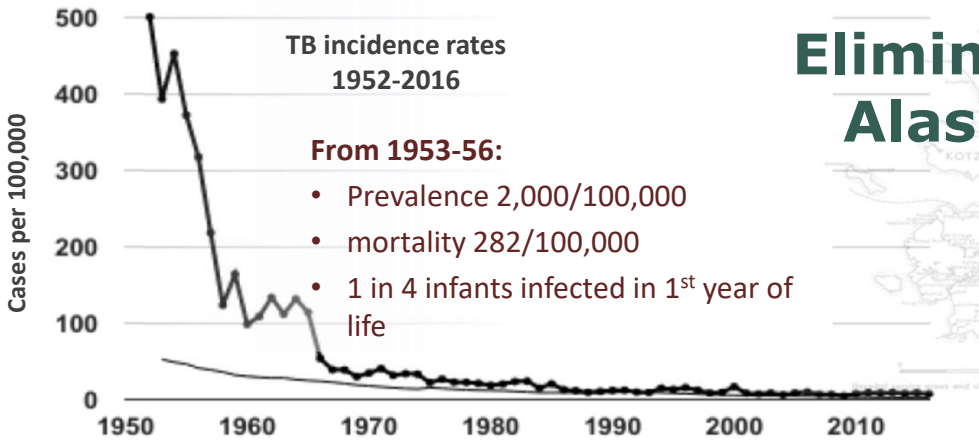


TB incidence rates 1952-2016

Eliminating TB: Alaska, USA

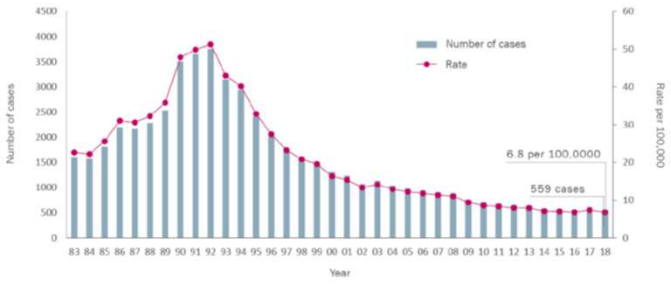
From 1953-56:

- Prevalence 2,000/100,000
- mortality 282/100,000
- 1 in 4 infants infected in 1st year of life

Photo: http://bethel.akleg.gov/
Data: Kaplan, Fraser, and Comstock. 1972

30

Tackling TB in New York City (1988)



1983-1992:
Overall increase: **134%**
Average annual increase: **11%**

1992-2003:
Overall decrease: **70%**
Average annual decrease: **10%**

2003-2018:
Overall decrease: **51%**
Average annual decrease: **4%**

Community-based active case finding, treatment of all forms of TB, and treatment of TB infection (TB preventive treatment)

NYC Health
CDC Centers for Disease Control and Prevention

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Basic principles of community-based TB epidemic control

1. Search actively for people with new infection or disease among the close contacts of current patients or in high-burden community settings (using a sensitive test like x-ray)
2. Start the correct therapy quickly for people with disease; give the safest, **most effective** multi-drug therapy in the **shortest time;** deliver care to people in the communities where they live and work
3. Ensure adherence to therapy with supports and food assistance
4. Screen and treat all infected contacts that do not yet have disease with post-exposure treatment
5. Ensure proper infection control

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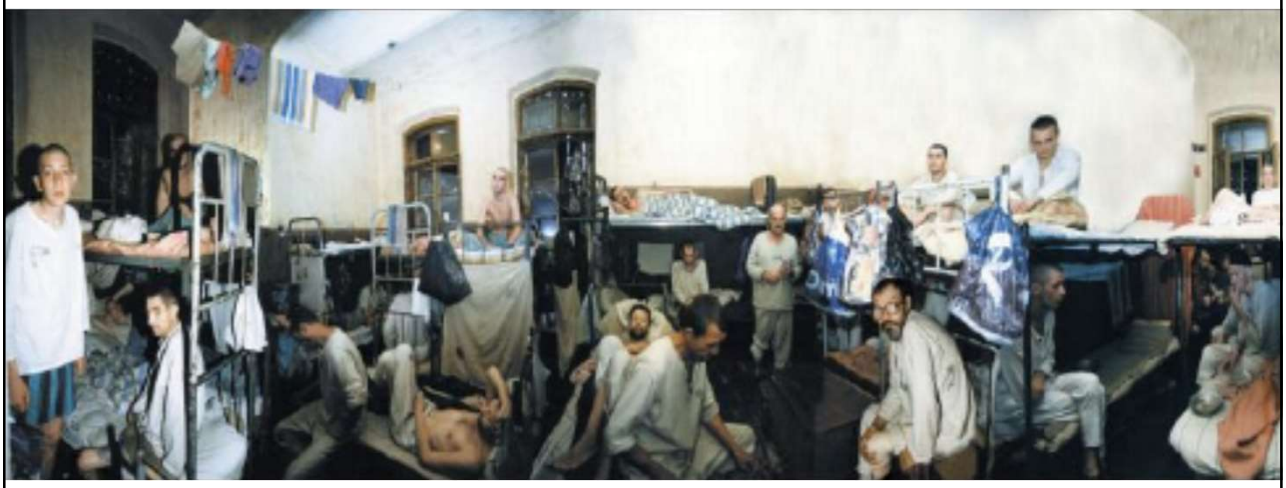
PATIENT-CENTERED COMMUNITY-BASED CARE DELIVERY IN WESTERN SIBERIA: LINKING PRACTICE TO EQUITY



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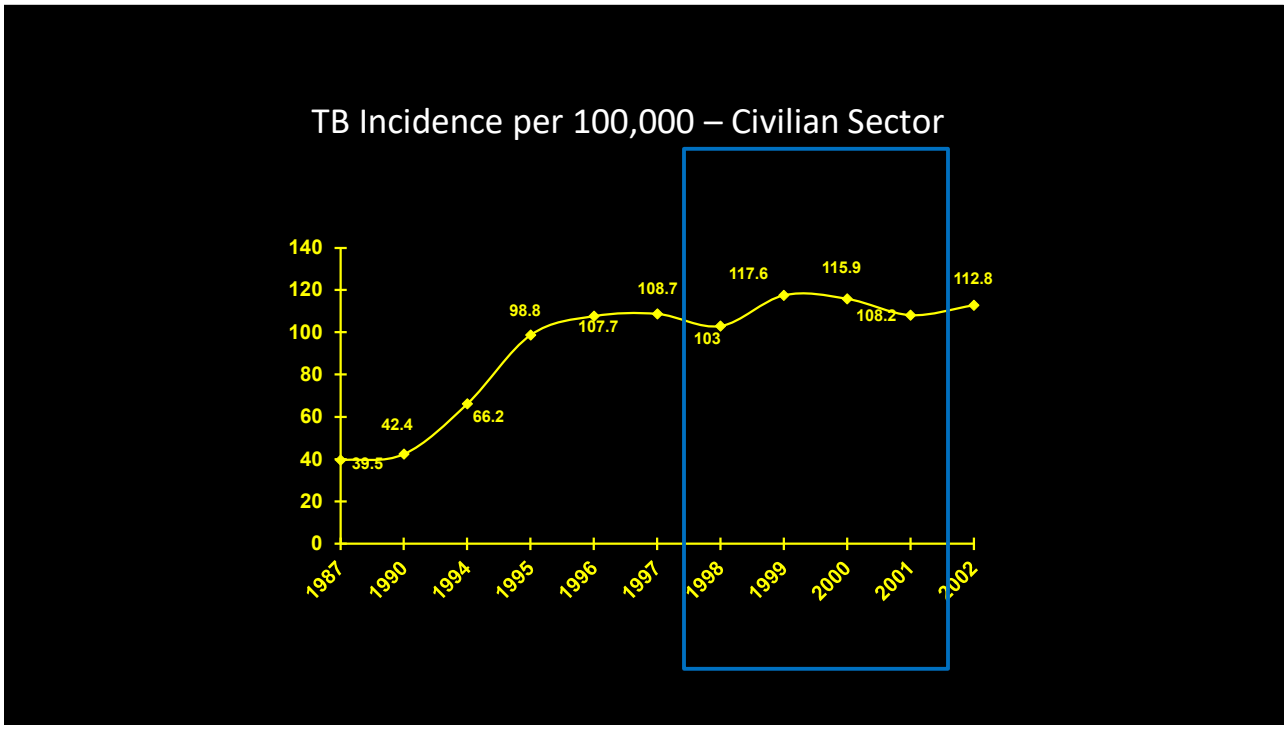
TB Incidence per 100,000 – Civilian Sector
140
120
100
80
60
40
20
0
39.5
42.4
66.2
98.8
107.7
108.7
103
117.6
115.9
108.2
112.8
1987
1990
1994
1995
1996
1997
1998
1999
2000
2001
2002

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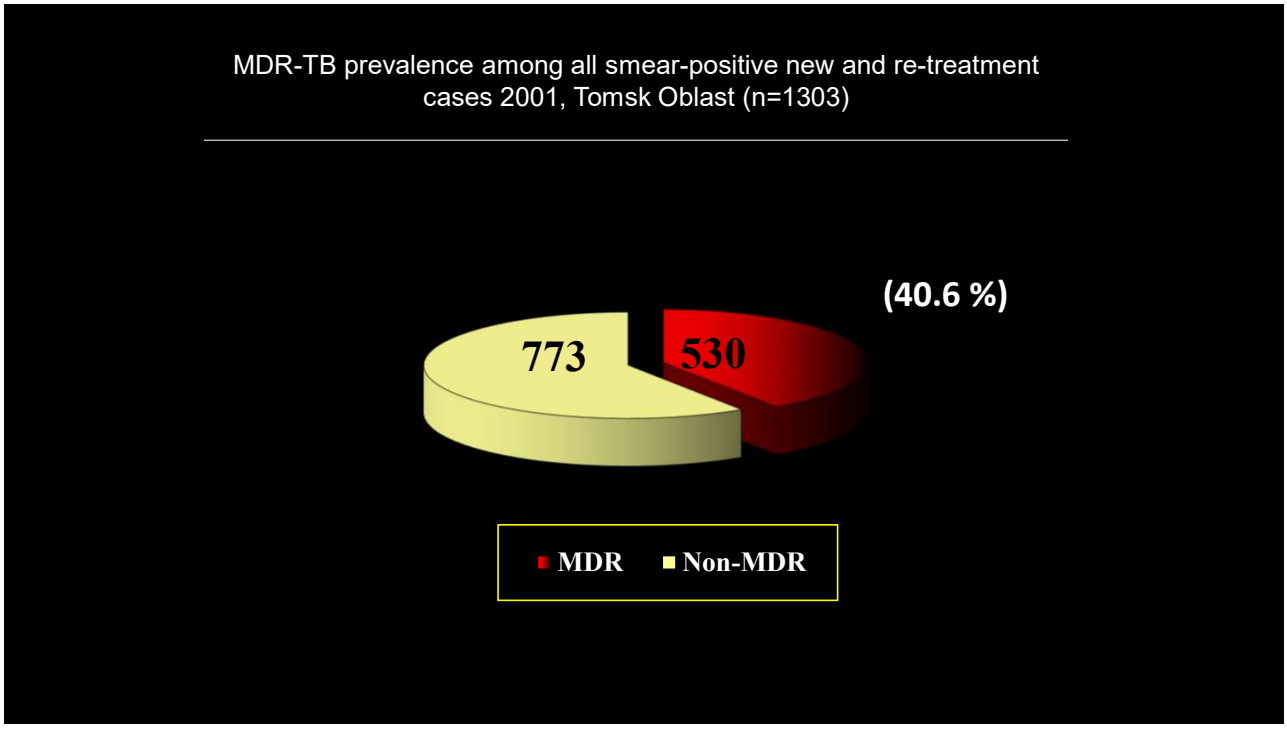
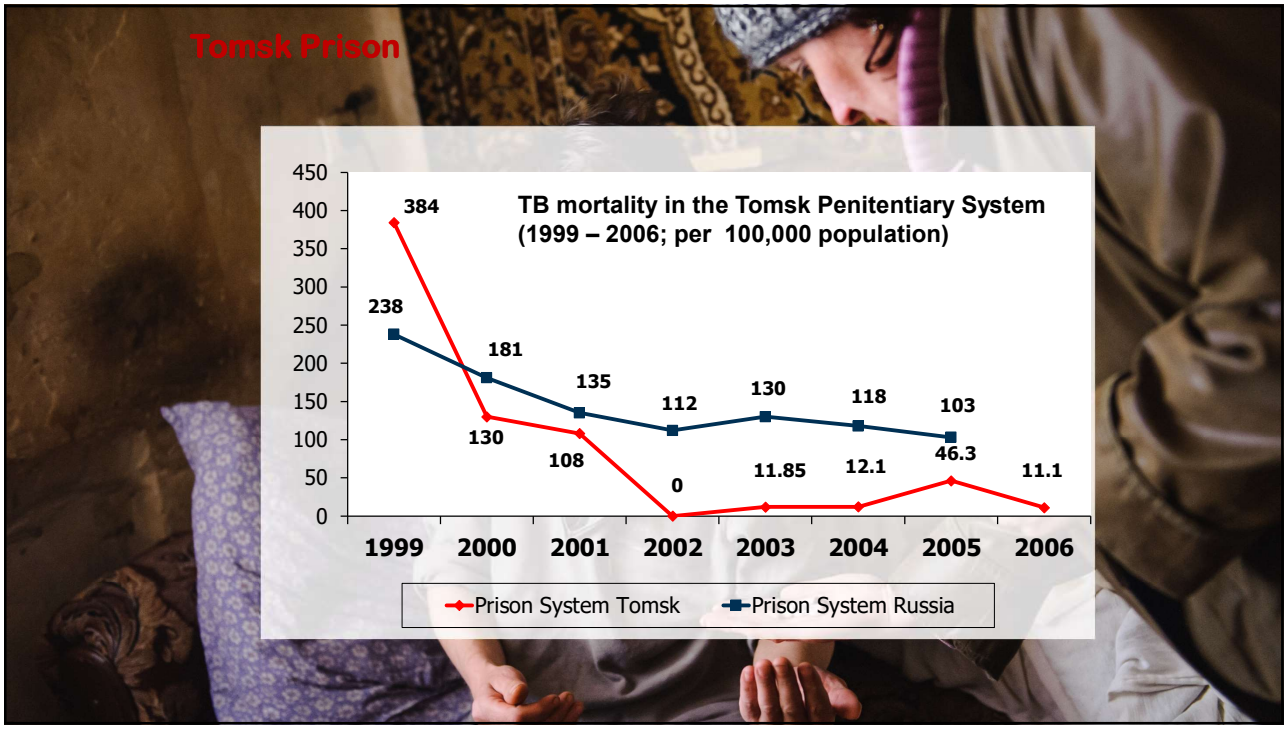

MDR-TB prevalence among all smear-positive new and re-treatment cases 2001, Tomsk Oblast (n=1303)
(40.6 %)
773
530
MDR
Non-MDR

36



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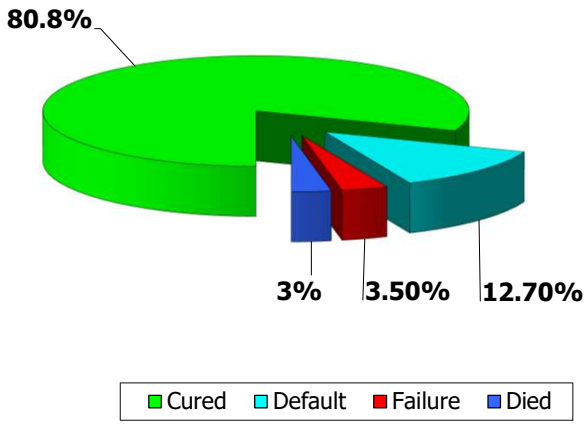
MDR-TB Patient Treatment Outcomes
Tomsk Oblast Prison Sector (2000 – 2004)
N=110



Source: Tomsk Oblast TB Services

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Challenges faced by patients

- Poverty, poor living conditions, poor nutrition
- Alcohol and drug-use disorders
- Long distances between medical center and patients' homes in both urban and rural places (lack of transport)
- Other priorities: children, job, family problems etc.

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Programmatic Challenges

- 18-24 month-long course of treatment
- Twice-daily drug intake of 4-7 medications
- Side effects common: almost all patients experience side effects, and about 10% of patients experience severe side effects
- Some patients have severe comorbidities (e.g. diabetes and alcoholism), which worsen the tolerance of the medications

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PROGRAMMATIC SOLUTIONS

- Improvement of facilities AND choice of treatment site
- Food assistance for patients

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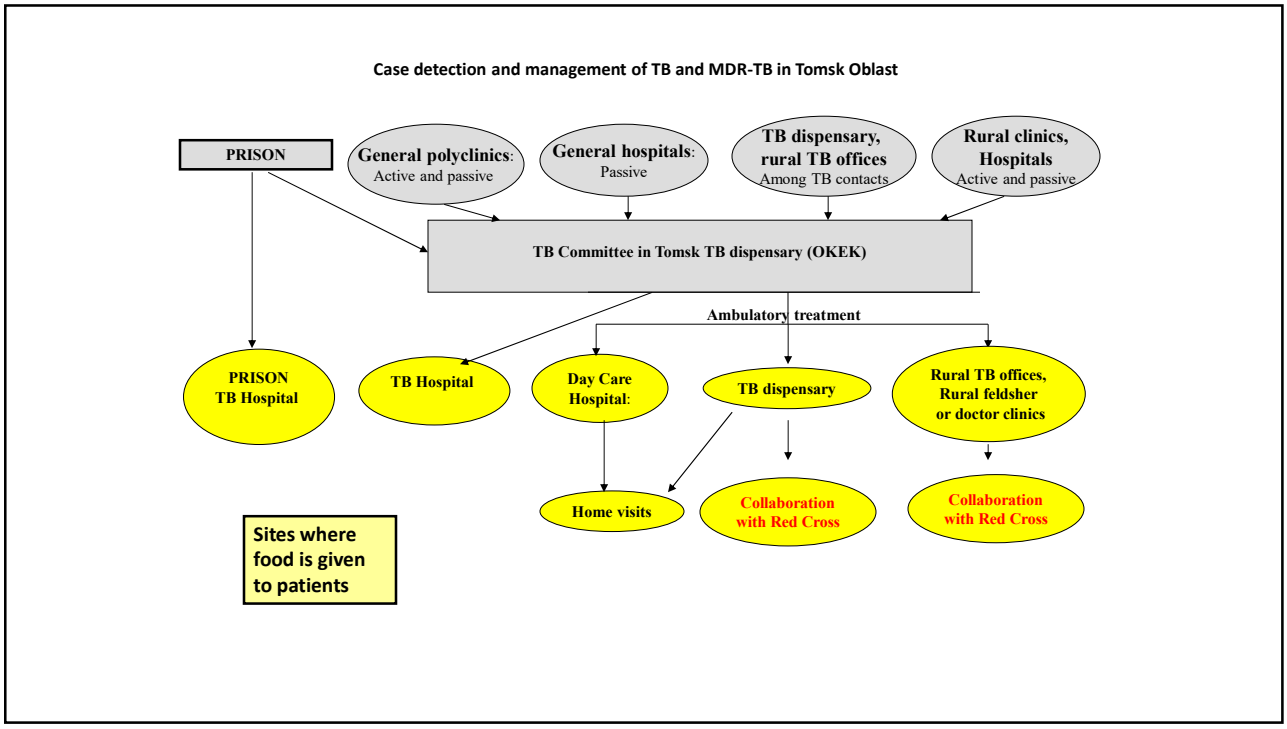

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PROGRAMMATIC SOLUTIONS

- Improvement of facilities AND choice of treatment site
- Food assistance for patients
- Transportation assistance for patients and health workers
- Food assistance for patients
- Improved adverse events management (provision of ancillary medications)
- Improvement of working hours at medical facilities to make it more convenient for patients
- Engagement of volunteers, enablers and incentives to support treatment
- Rapid search patients unable to take their medicines

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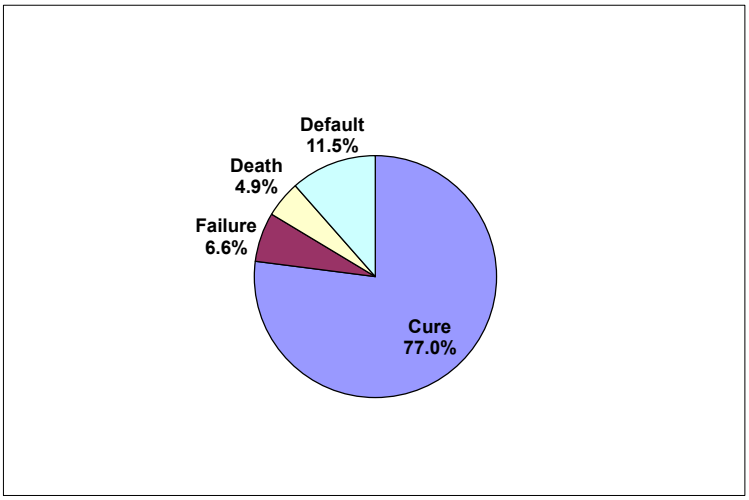
TREATMENT OUTCOMES OF FIRST COHORT (N=244)
TOMSK, RUSSIA



Source: Shin et al., IJTLD 2006

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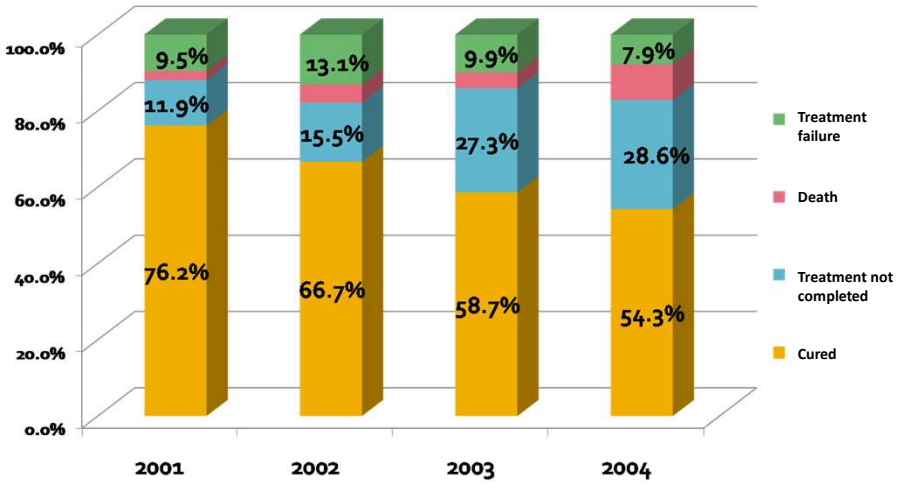
Treatment Outcomes, Civilian Sector
Tomsk Oblast, Russian Federation



Source: Tomsk Oblast TB Services, Analysis by Dr. D Taran, PIH Moscow

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TREATMENT DELIVERY

THE WAR ON TUBERCULOSIS: DOTS IN NEWARK, NJ, USA

Am J Nursing, July 2010

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Accompaniment: "Sputnik" program

- Some patients require assistance to finish treatment
- Need a system of accompaniment to help overcome barriers to treatment (this is different from DOT)
  - Social supports
  - Nutritional supports
  - Family support
- One *Sputnik* will look after five to seven patients
- Changes the onus of responsibility for adherence from the patient ("non-compliant") to the program (programmatic gap)

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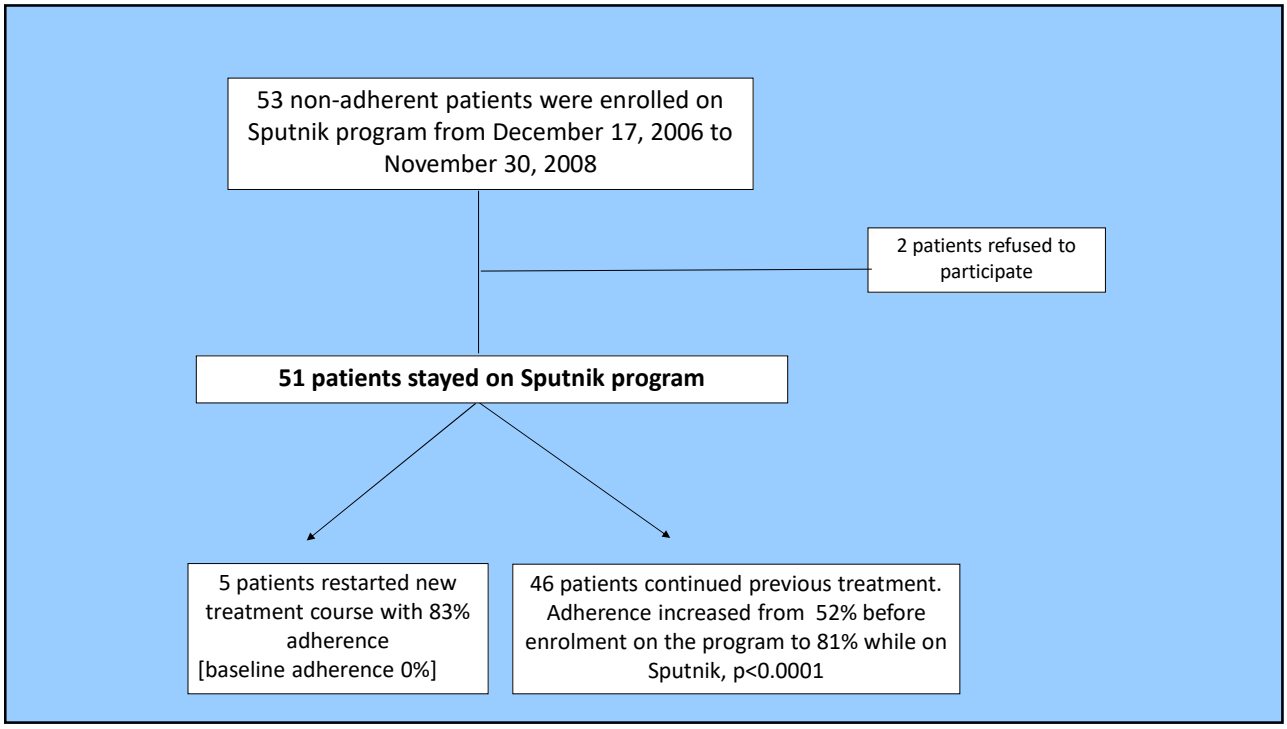

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Table 3 Treatment outcomes for all patients referred to the Sputnik program ($n = 53$) divided by MDR-TB vs. all others

	Patients receiving treatment for MDR-TB ($n = 38$) n (%)	All other patients ($n = 15$) n (%)	Total ($n = 53$) n (%)
Cured/treatment completed*	27 (71.1)	9 (60.0)	36 (67.9)
Failure	2 (5.3)	1 (6.7)	3 (5.7)
Died†	2 (5.3)	1 (6.7)	3 (5.7)
Transfer out	1 (2.6)	1 (6.7)	2 (3.8)
Default‡	6 (15.8)	3 (20.0)	9 (17.0)

Note: No deaths were due to TB; most were due to violent crimes
"Default" includes the 2 patients who refused to participate in the program

Source: Gelmanova et al., IJTLD 2011

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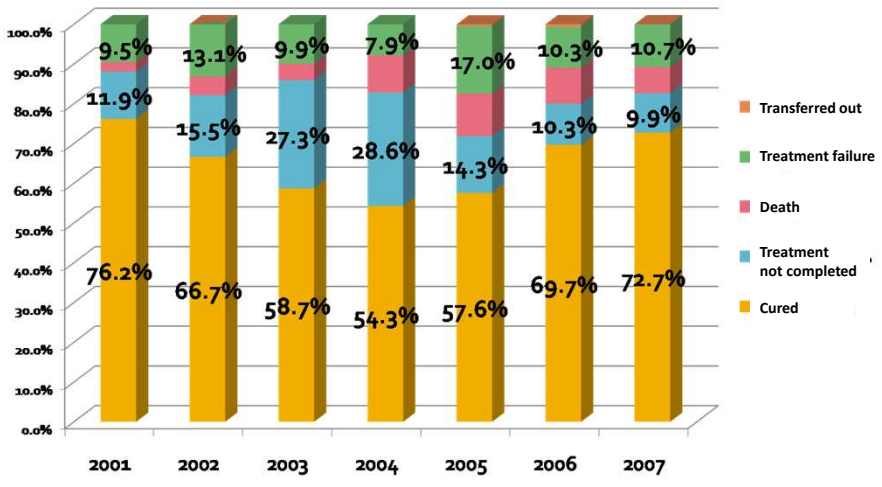
Treatment Outcomes, Civilian Sector
Tomsk Oblast, Russian Federation
2001-2007



Source: Tomsk Oblast TB Services, Analysis by Dr. D Taran, PIH Moscow

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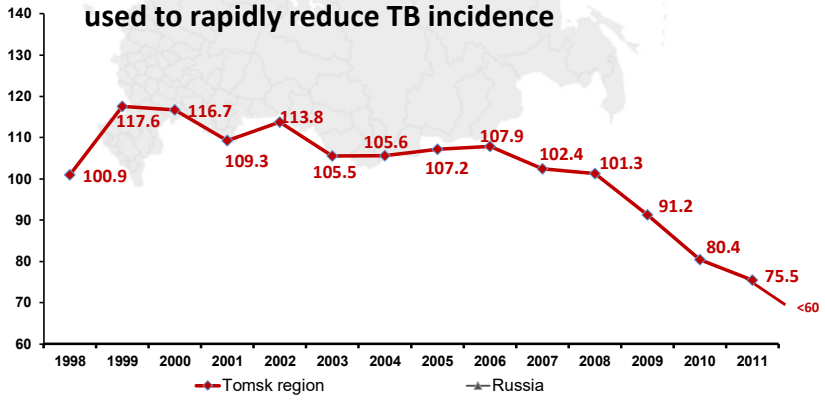
In Tomsk, Russia, a comprehensive strategy was used to rapidly reduce TB incidence



Source: Tomsk Oblast TB Services

Partners In Health

Open Society Institute

Bill & Melinda Gates foundation

Lilly Global Health Partnership

The Global Fund To Fight AIDS, Tuberculosis and Malaria

USAID From the American People

55

CAN THE TB CARE DELIVERY PLATFORM BE A MODEL FOR EQUITABLE CARE DELIVERY FOR OTHER DISEASES?

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ZERO TB Initiative

SEARCH
SEARCH ACTIVELY · TEST PROPERLY

TREAT
TREAT EFFECTIVELY · SUPPORT THROUGH TREATMENT

PREVENT
PREVENT EXPOSURE · TREAT EXPOSURE

Platform for high quality community-based care delivery for TB and DR-TB

Community-based health delivery platform

- Links the clinic with patients in the communities where they live
- Essential to finding cases early or even before infected people progress to disease

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BUILDING A PLATFORM FOR COMMUNITY-BASED CARE DELIVERY

Community-based care delivery for TB

Community-based care delivery for diseases

HIV
Hepatitis C
Diabetes
Heart Disease
Hypertension
Mental health disorders
Autism
Cancer
Post-operative care

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We have an opportunity to shift the global TB care delivery paradigm in a way that will simultaneously strengthen health systems

	Tuberculosis	Health systems strengthening/Biosecurity
SEARCH	Find people sick with TB or exposed to TB using effective tests (e.g. mobile x-ray; genetic tests).	Community-based screening platform to isolate cases, limit and contain exposure, and stop transmission in communities and place where people live and work.
TREAT	Rapid deployment of the correct medicine and support the sick. This requires testing of strains, access to medicines, and a system for community-based care delivery and adverse events monitoring.	Community-based delivery of treatment in order to prevent hospitals from becoming overburdened. This includes developing systems for home monitoring, creating "virtual hospitals", and systems to support the sick.
PREVENT	Prevent people from being exposed to TB and treating people who have been exposed so that they do not become sick with TB. Providing supports that prevent disease and support treatment.	Develop systems to provide vaccines or preventive therapy, support social interventions that reduce disease.

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EXAMPLE:

CAN THE TB PLATFORM BE USED TO DELIVER CARE FOR DIABETES?

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Rising rates of diabetes are a concern for health systems

Number of adults (20–79 years) with diabetes worldwide

North America & Caribbean
- 2045 63 million
- 2030 56 million
- 2019 48 million

33% increase

- 1 in 6 adults in this Region is at risk of type 2 diabetes
- 43% of global diabetes-related health expenditure occurs in this Region

WORLD
- 2045 700 million
- 2030 578 million
- 2019 463 million

51% increase

South & Central America
- 2045 49 million
- 2030 40 million
- 2019 32 million

55% increase

- 2 in 5 people with diabetes were undiagnosed
- Only 9% of global diabetes-related health expenditure for diabetes is spent in this Region

Europe
- 2045 68 million
- 2030 66 million
- 2019 59 million

15% increase

- 1 in 6 live births are affected by hyperglycaemia in pregnancy
- The Region has the highest number of children and adolescents (0–19 years) with type 1 diabetes – 297,000 in total

Africa
- 2045 47 million
- 2030 29 million
- 2019 19 million

143% increase

- 3 in 5 people with diabetes are undiagnosed
- 3 in 4 deaths due to diabetes were in people under the age of 60

Middle East & North Africa
- 2045 108 million
- 2030 76 million
- 2019 55 million

96% increase

- 1 in 8 people have diabetes
- 1 in 2 deaths due to diabetes were in people under the age of 60

South-East Asia
- 2045 153 million
- 2030 115 million
- 2019 88 million

74% increase

- 1 in 5 adults with diabetes lives in this Region
- 1 in 4 live births are affected by hyperglycaemia in pregnancy

Western Pacific
- 2045 212 million
- 2030 197 million
- 2019 163 million

31% increase

- 1 in 3 adults with diabetes lives in this Region
- 1 in 3 deaths due to diabetes occur in this Region

Source: International Diabetes Federation Atlas, 9th Edition, 2019

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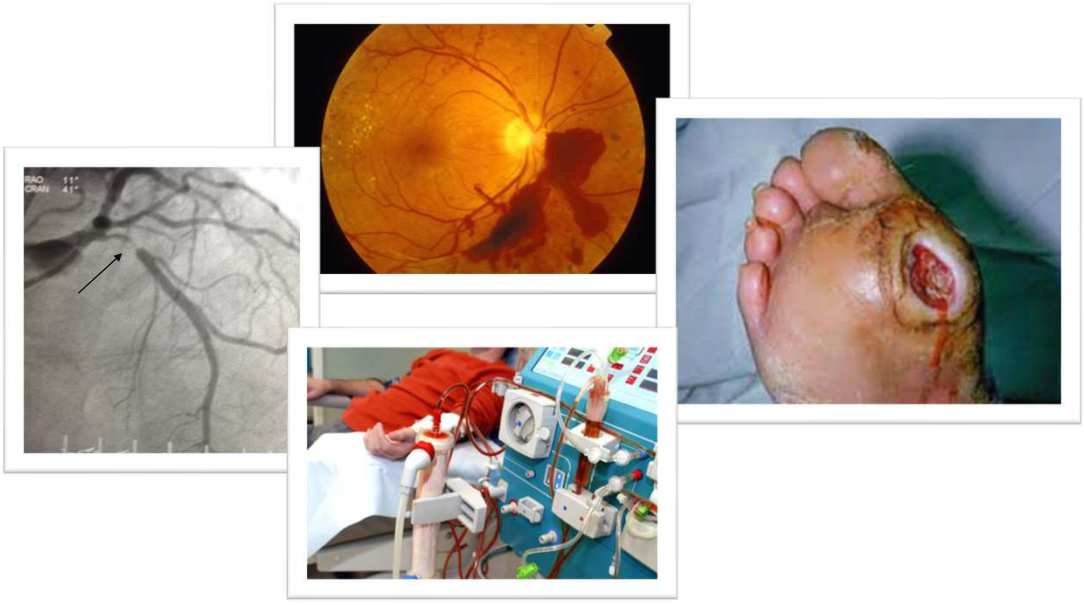
The cost of inaction:



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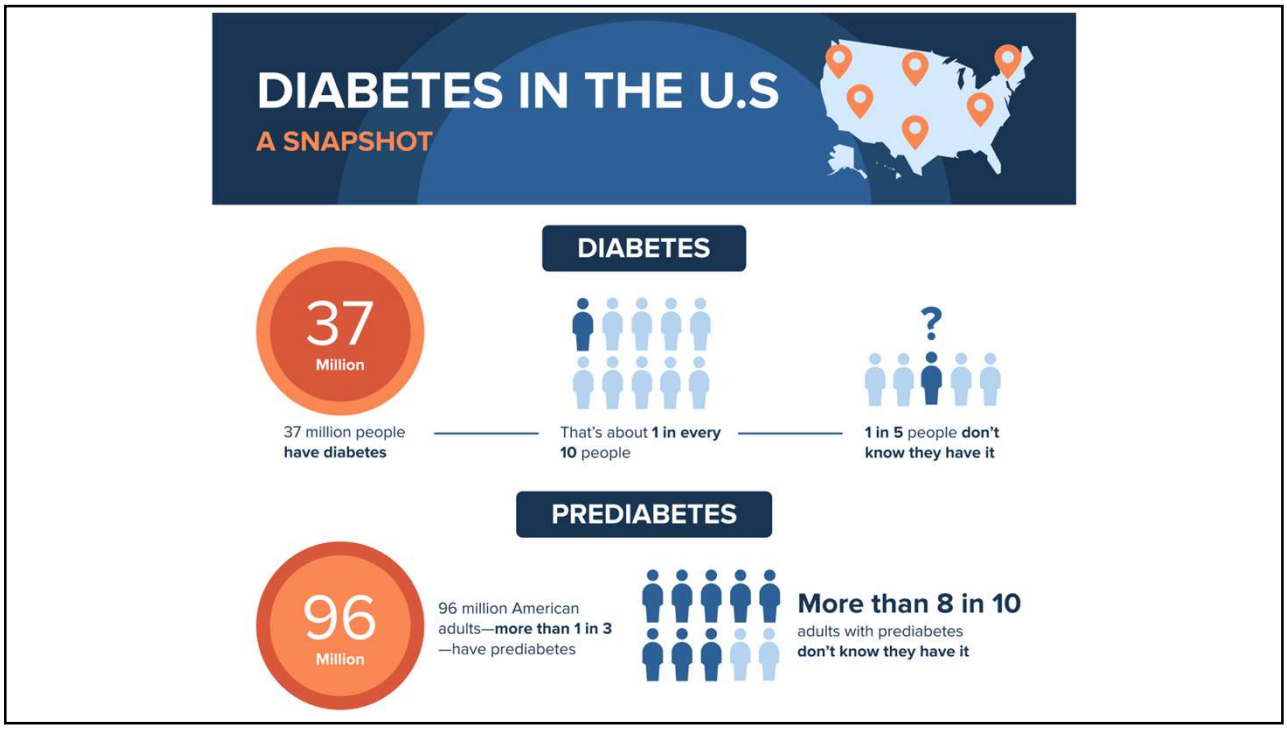
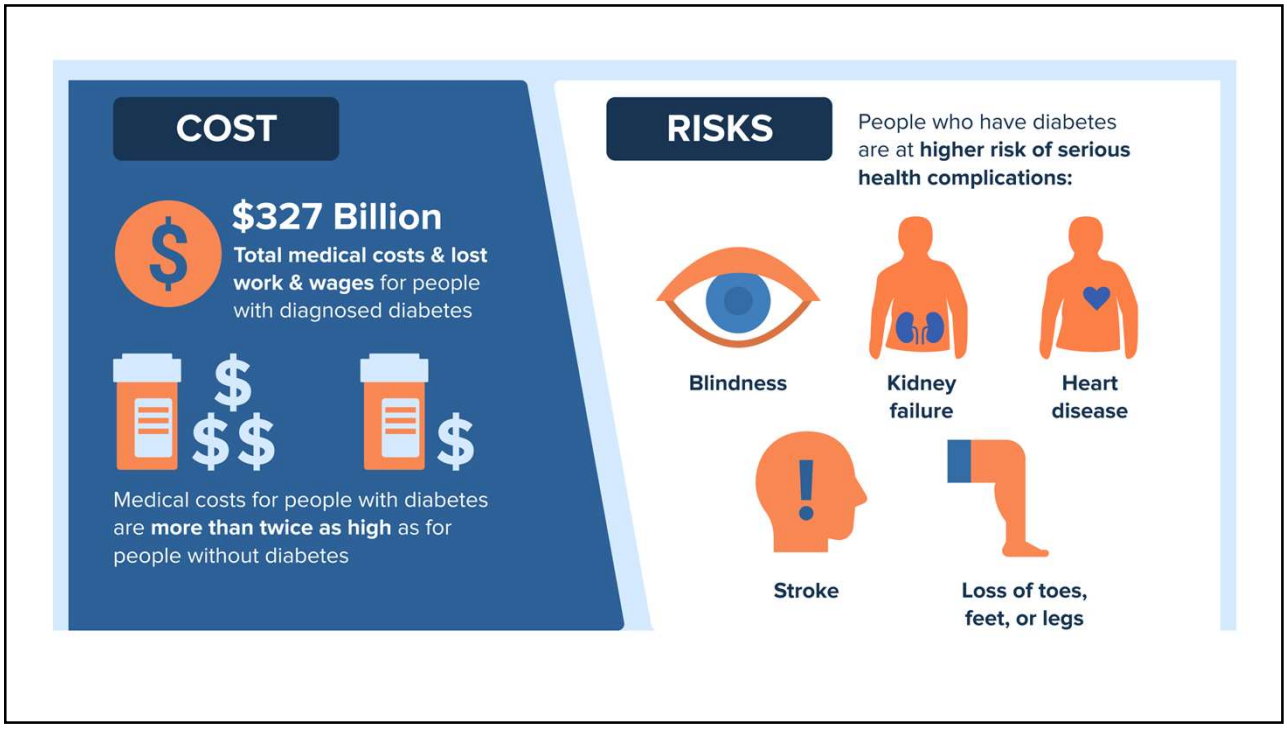

DIABETES IN THE U.S
A SNAPSHOT
DIABETES
37
Million
37 million people have diabetes
That's about 1 in every 10 people
1 in 5 people don't know they have it
PREDIABETES
96
Million
96 million American adults—more than 1 in 3—have prediabetes
More than 8 in 10
adults with prediabetes don't know they have it

63


COST
$327 Billion
Total medical costs & lost work & wages for people with diagnosed diabetes
Medical costs for people with diabetes are more than twice as high as for people without diabetes
RISKS
People who have diabetes are at higher risk of serious health complications:
Blindness
Kidney failure
Heart disease
Stroke
Loss of toes, feet, or legs

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POVERTY & DIABETES

By Income Level

Adults with a family income below the federal poverty level (FPL) have the highest prevalence of diabetes.

US Adults 18 or Older With Diagnosed Diabetes, by Family Income Level, 2018–2019

Family Income Level	Percentage
Less than 100% FPL	14.1
100%–299% FPL	10.8
300%–499% FPL	7.8
500% FPL or more	5.6

Data source: 2018–2019 National Health Interview Survey.

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POVERTY & DIABETES

Data from Taiwan (2000-2005)

- Compared with their middle-income counterparts, the adjusted odds ratio (OR) for the poor population incidentally identified as having diabetes through hospitalization was 2.2 ($P < 0.001$).
- Poor persons with diabetes were less likely to visit any diabetes clinic (OR, 0.4; $P < 0.001$).
- The ORs for the poor population with diabetes to receive tests for glycated hemoglobin, low-density lipoprotein cholesterol, triglycerides, and retinopathy were 0.6 (0.4–0.9), 0.4 (0.2–0.7), 0.5 (0.4–0.8), and 0.4 (0.2–0.9), respectively.
- **Poverty is associated not only with higher diabetes incidence but also with inequality of diabetes care** in a northeast Asian population, despite universal health coverage.

Photo: South China Morning Post/AFP

Source: Hsu et al. Diabetes Care, Vol 35(11), 2012

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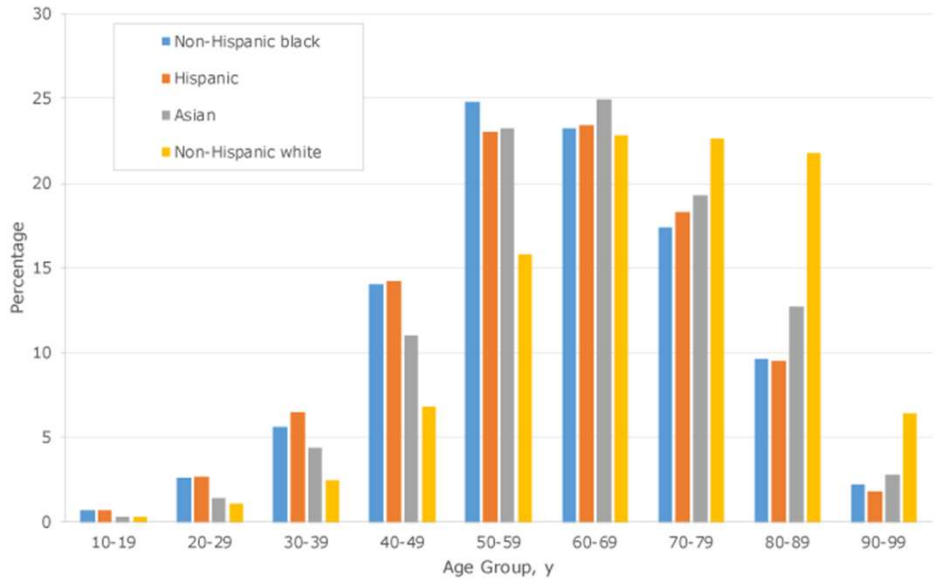
RACE & DIABETES



Age distribution by sex, race, and ethnicity among patients with type 2 diabetes among 576,306 unique patients aged 10 to 100 years who had visited an emergency department at least once from 2011 through 2015 in New York City.

Data source: New York State Department of Health Statewide Planning and Research Cooperative System

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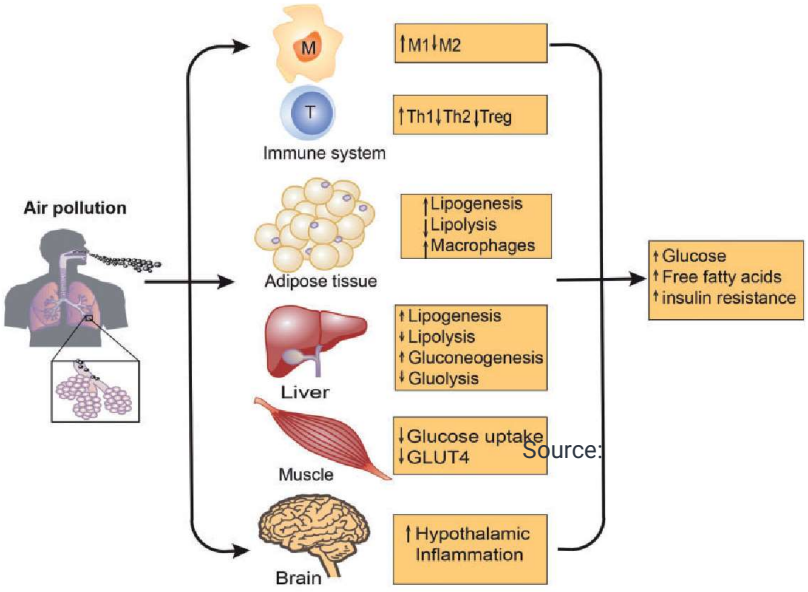
AIR POLLUTION & DIABETES



Source:

1/5th of the global burden of type 2 diabetes is attributable to $PM_{2.5}$ pollution.

Source: GBD 2019 Diabetes and Air Pollution Collaborators. Lancet Planetary Health, 2019.

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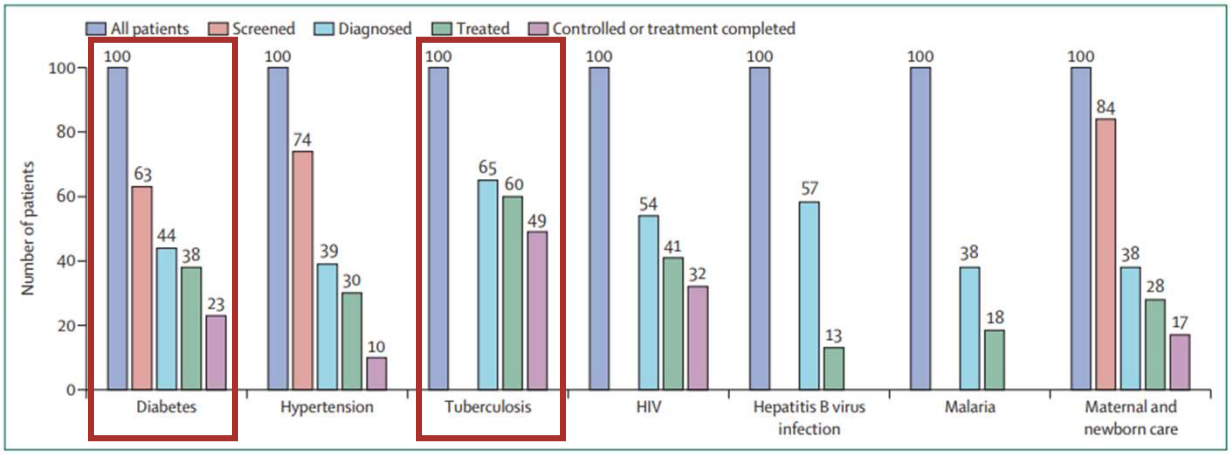

Figure 2: **Cascade of care for different health conditions**
Figure shows that the diagnostic gap is the largest gap for five of the six conditions. For hepatitis B virus infection, the only study is of Australia. Further details regarding the data shown are included in the appendix (pp 4–5).

Source: Lancet Commission on Diagnostics, 2021

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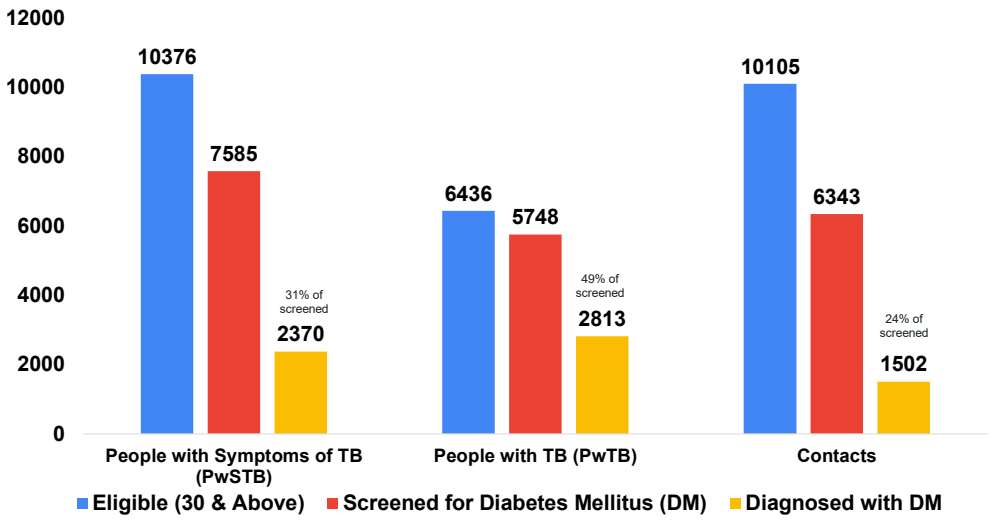
Diabetes Screening in Chennai, India (2020-2022)



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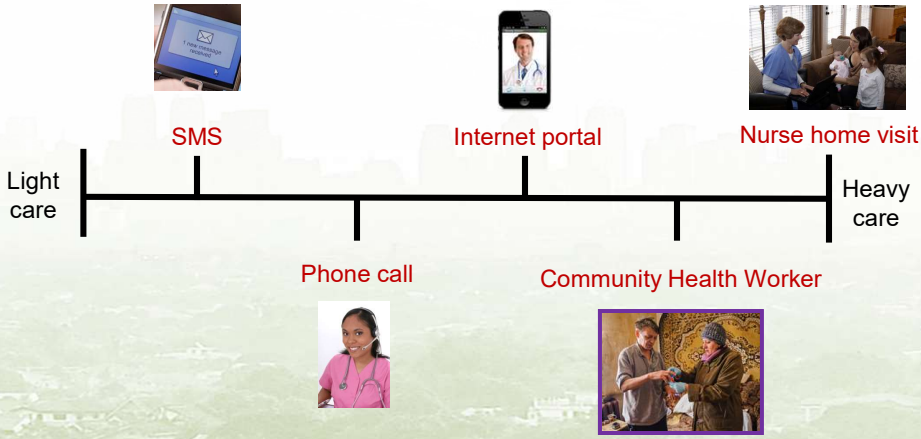
Delivering care across a spectrum for chronic diseases will require changing the systems we use for care-delivery



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Summary of key ideas

1. Systems designed to address TB have been shaped around the social determinants of disease and the recognition that TB and many other diseases are *bio-social* phenomena. This means that medicines alone are often not enough to stop morbidity and mortality.
2. Successful TB programs are designed around the patients and addressing their social needs. This not only supports equity in access and treatment, but leads to better health outcomes.
3. TB care delivery – with its focus on *search-treat-prevent* – can serve as a platform for care delivery for other diseases.

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FDR P
"We are the ones we have been waiting for."
-JUNE JORDAN
Thank you
@s_keshavjee

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