


Epidemiology of TB

Kathryn Yoo, MPH
September 13, 2023

TB Intensive
September 13 – 15, 2023
Richmond, TX

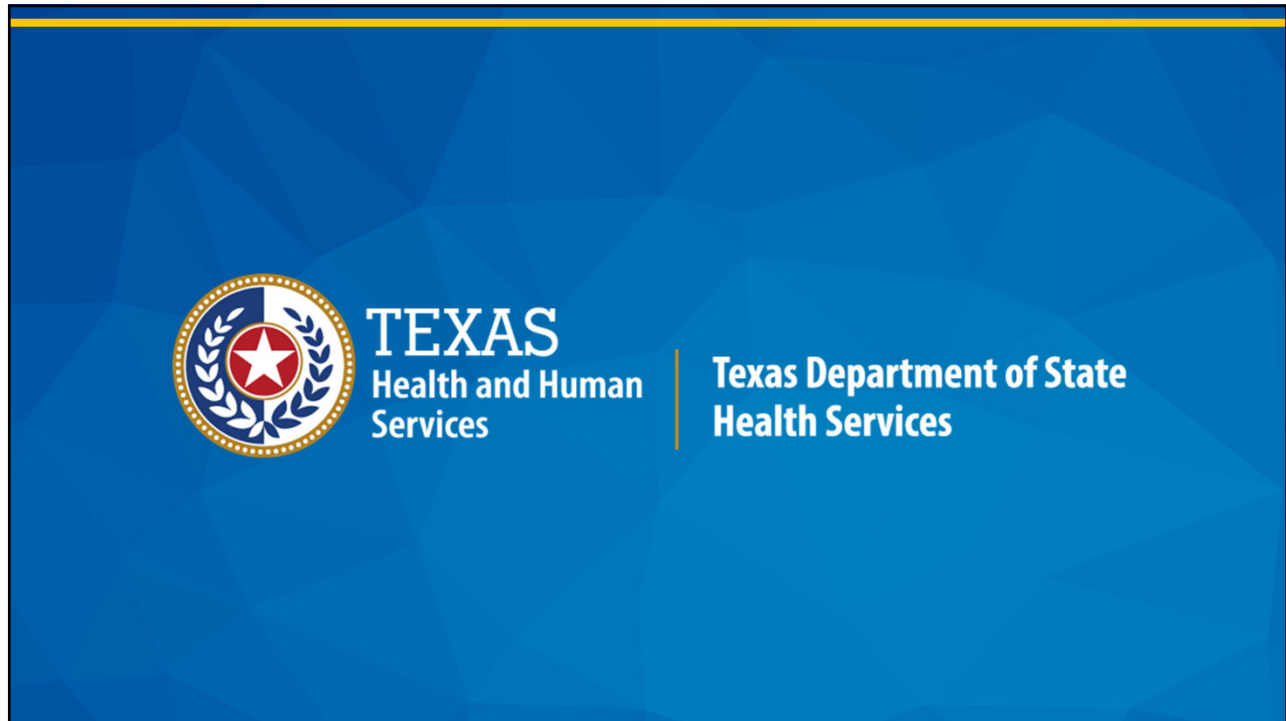
1



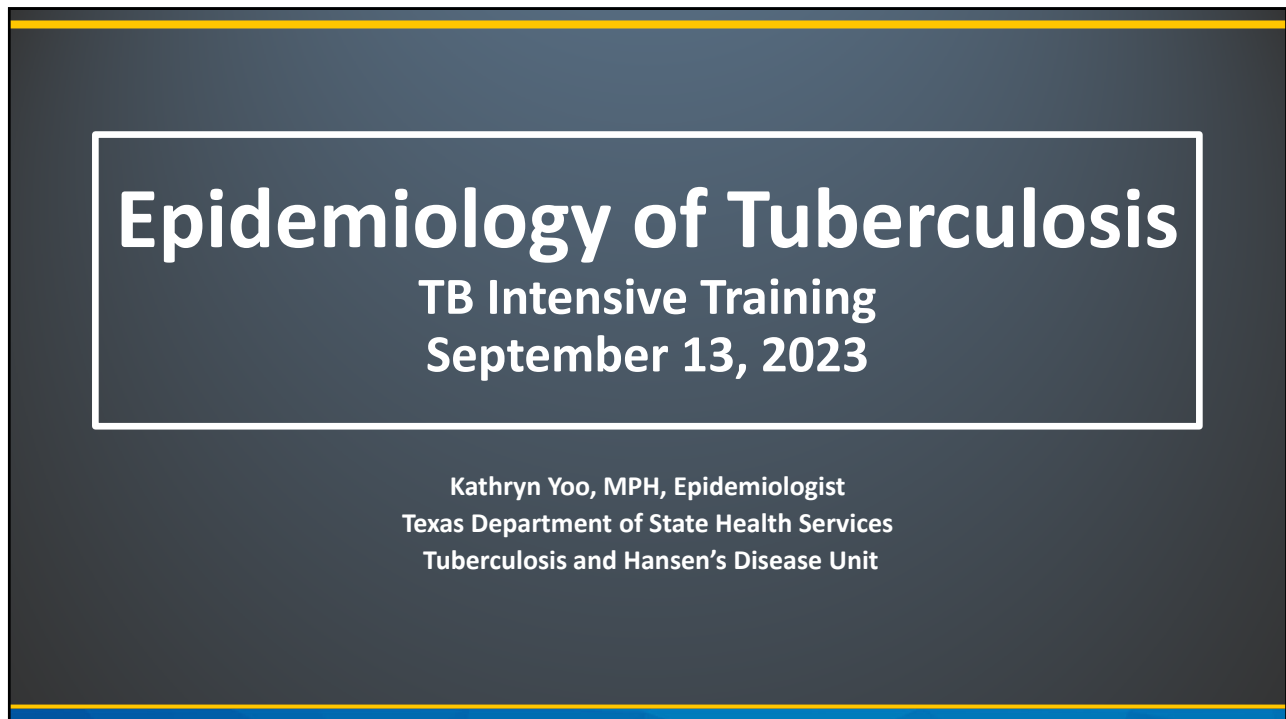
Kathryn Yoo, MPH has the following disclosures to make:

- No conflict of interests
- No relevant financial relationships with any commercial companies pertaining to this educational activity

2



3



4

Disclosures

I have no conflicts of interest or financial disclosures

5

5

Objectives

Describe the current epidemiology of tuberculosis (TB) in Texas, United States, and globally:

- Global Burden of TB
- TB the United States
- TB in Texas

6

Global Burden of TB



TEXAS
Health and Human
Services

Texas Department of State
Health Services

7

TB is Still a Concern

- In 2018, an estimated **1.7 billion** people, nearly **24%** of the world's population, were infected with *M. tuberculosis*
- There were approximately 10.6 million people with TB disease in 2021
- TB is present in all World Health Organization (WHO) regions
- In 2018, the United Nations (UN) held its first high-level meeting on TB
 - Their second high-level meeting will be held in New York September 22, 2023



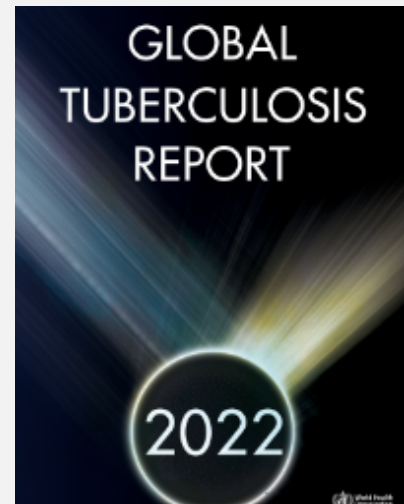
Source: Global Tuberculosis Report 2022 (who.int)

8

8

Global TB

- **6.4 million newly reported cases** of TB globally in 2021
 - Estimated real number of cases is **10.6 million**
- Estimated **1.6 million TB deaths** in 2021 (4,384 deaths per day)
- During the COVID-19 pandemic in 2020 there was a reduction in the reported numbers of new TB cases
 - Resulting effects of COVID-19 pandemic:
 1. Greater volume of people with undiagnosed and untreated TB
 2. Increase in TB-related deaths
 3. Increased transmission of TB
 4. Continued increase of TB cases reported since 2021



Source: [Global Tuberculosis Report 2022 \(who.int\)](https://www.who.int/tb/global-tuberculosis-report-2022)

9

TB and COVID

- Globally, the number of reported TB Cases dropped from 7.1 million in 2019 to 5.8 million in 2020 (18.3%)
- Nationally, the number of TB Cases dropped from 8,898 in 2019 to 7,171 in 2020 (19.4%)
- In Texas, the number of TB Cases dropped from 1,154 in 2019 to 879 in 2020 (23.8%)
- Until the COVID-19 pandemic, TB was the leading cause of death from a single infectious agent

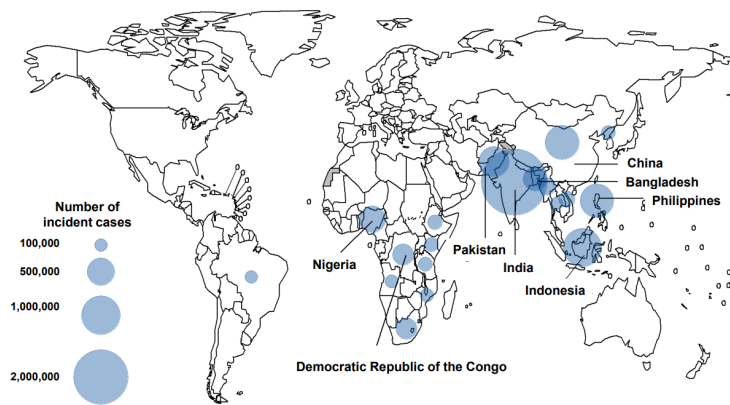
Source: [http://www.cdc.gov/tb/statistics](https://www.cdc.gov/tb/statistics)

10

10

Global Distribution of TB

8 countries, 68% of global cases in 2021
87% in 30 high TB burden countries

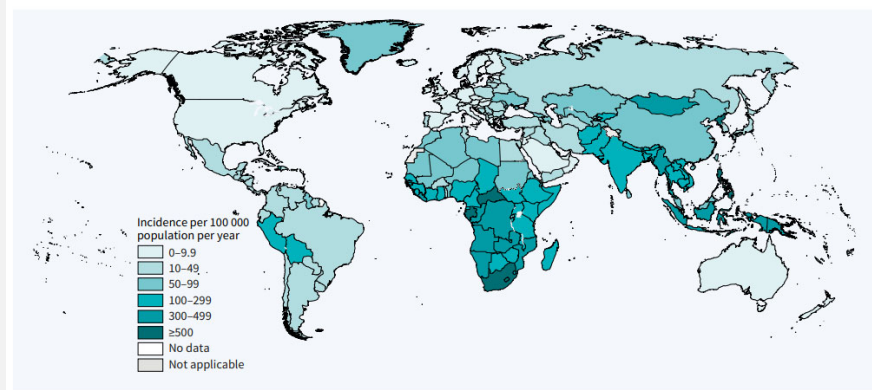


Source: Country 2.1 TB incidence (who.int)

11

Global Burden of TB

FIG. 14
Estimated TB incidence rates, 2021



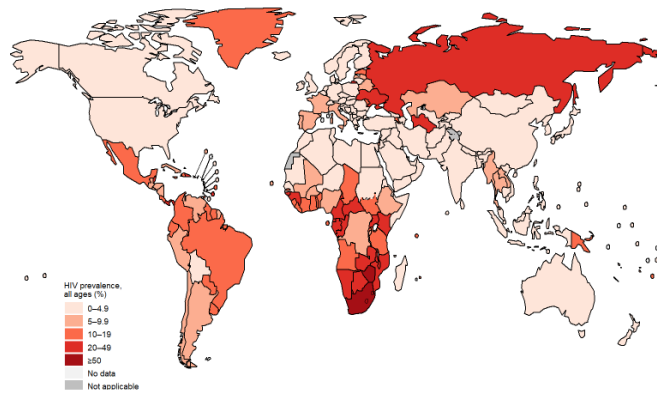
2.1 Country TB incidence (who.int)

12

TB among HIV-positive persons

Global Perspective

Fig. 2.1.4 Estimated HIV prevalence in people with new or relapse TB, 2021



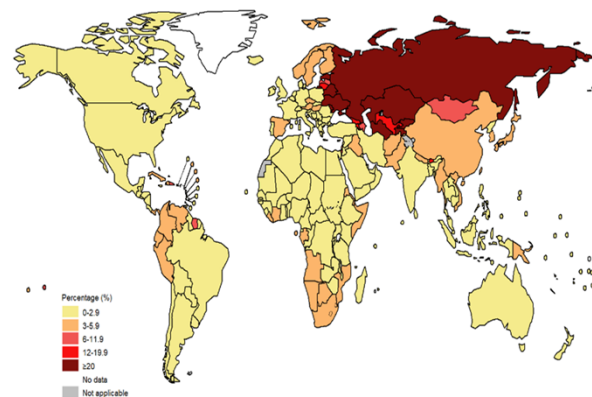
Source: 2.1 TB incidence (who.int)¹³

13

Drug Resistant TB

- Drug-resistant TB is a global public health threat
- There were **450,000** cases of MDR-TB or RR-TB in 2021
 - 3.6% of newly diagnosed cases
 - 18% of persons previously treated
- 42% of global cases of MDR/RR-TB were reported in 2021 from India, the Russian Federation, and Pakistan

Fig. 2.3.6 Percentage of new TB cases with MDR/RR-TB, 2021



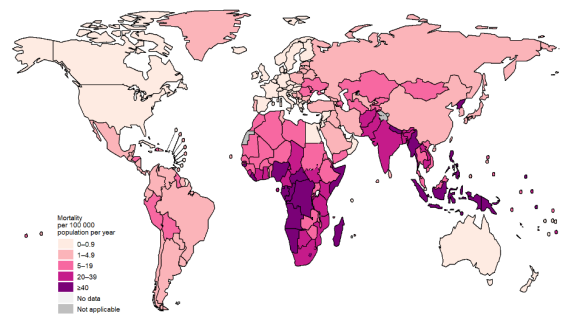
Source: 2.1 TB incidence (who.int)

14

Global TB Mortality

- There were an estimated **1.4 million** deaths among HIV-negative TB cases globally in 2021
- There were an estimated **187,000** deaths among HIV-positive TB cases globally in 2021
- WHO Africa and South-East Asia Regions accounted for 82% of total TB deaths in 2021

Fig. 2.2.12 Estimated TB mortality rates in HIV-negative people, 2021

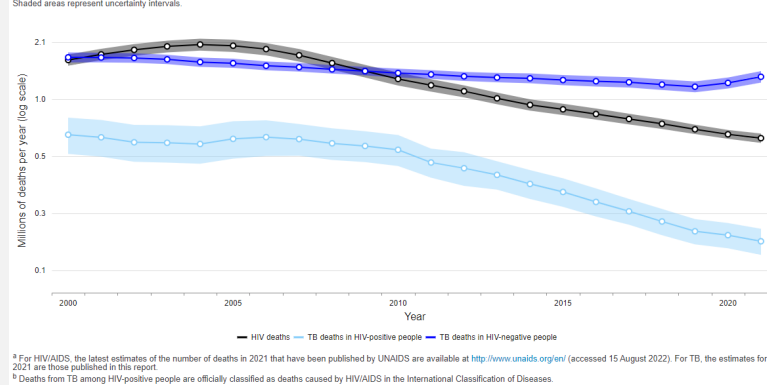


[2.2 TB mortality \(who.int\)](https://www.who.int/tb/mortality)

15

Global TB Mortality

Fig. 2.2.5 Global trends in the estimated number of deaths caused by TB and HIV (in millions), 2000–2021^{a,b}



[2.2 TB mortality \(who.int\)](https://www.who.int/tb/mortality)

16

TB in the United States



17

TB in the United States

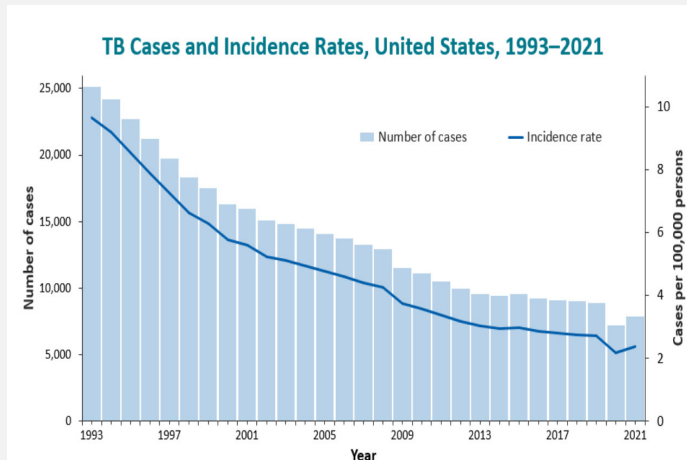
- **8,300** TB cases were reported in 2022 by 60 US reporting jurisdictions (states, cities, U.S. territories, and affiliated areas)
- Up to **13 million** people are estimated to be living with TB Infection in the US
- Case counts and incidence have been on the rise (returning to pre-pandemic levels) after substantial decline in 2020
 - Missed or delayed diagnosis are suspected contributors to drop in 2020

[Source: Data & Statistics | TB | CDC](#)

18

18

Incidence of TB in the United States



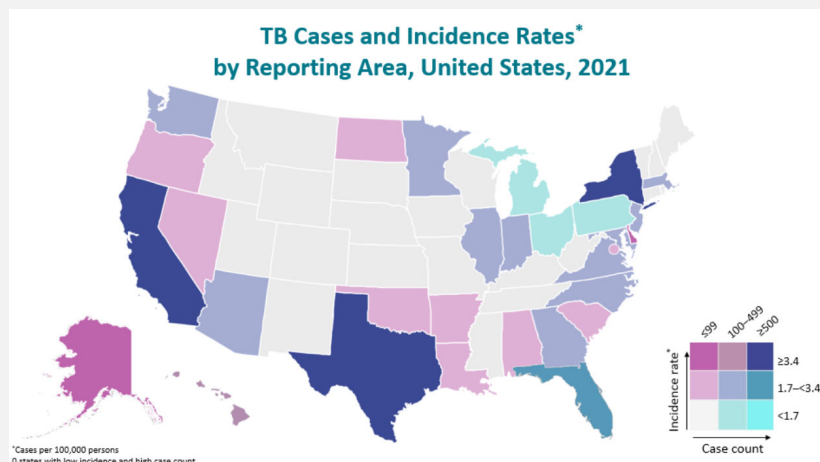
- **7,882 TB cases** were reported in 2021
 - This represents a **9.9%** increase from 2020
- United States is a low-incidence country
 - Incidence rate in the U.S. in 2021 was **2.4 cases per 100,000** persons (9.8% increase from 2020; however, it remained below pre-pandemic levels)

Source: 2021-surveillance-Report-Slideset.pptx (live.com)

19

19

Where is TB Found in the US?



- All US Reporting Areas reported cases of TB in 2021
- California (22%), Texas (13%), New York (9%), and Florida (6%) account for about half of all TB cases in the US
- 8 states, including Texas, the District of Columbia and New York City have incidence rates higher than the national rate

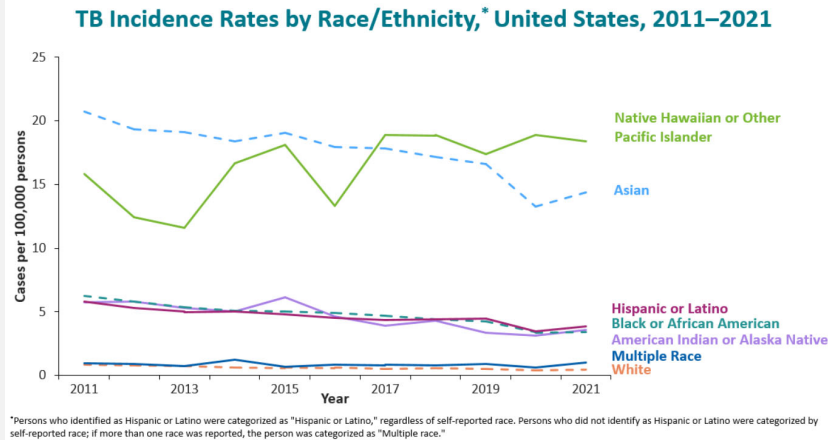
Source: 2021-surveillance-Report-Slideset.pptx (live.com)

20

20

TB Demographics in the United States

Race/Ethnicity



- Non-Hispanic Asian persons (36%) and Hispanic or Latino persons of all races represent the largest proportion of TB cases in the U.S.
- Incidence of TB is highest among Native Hawaiian or Other Pacific Islander (18.4 cases per 100,000 persons) and Asian persons (14.4 cases per 100,000 persons)
- Among U.S.-born cases, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native have the highest rates

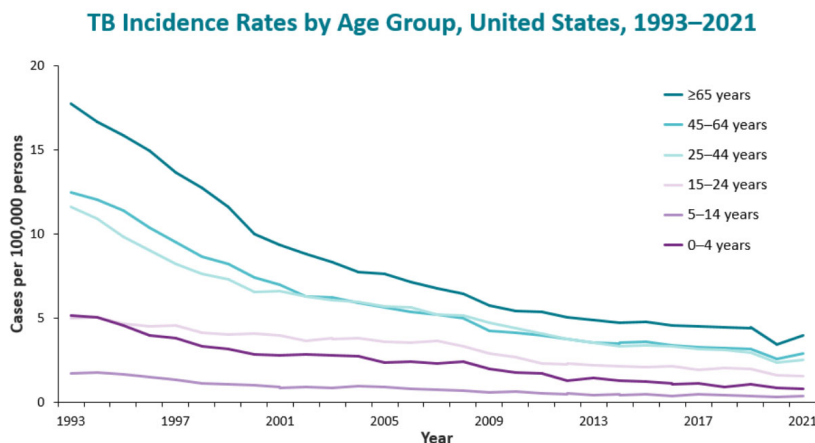
Source: 2021-surveillance-Report-Slideset.pptx (live.com)

21

21

TB Demographics in the United States

Age



- Children under 15 years of age accounted for 4% of TB cases in the U.S. in 2021
- Incidence rate is highest among adults 65 years of age or older (4.0 cases per 100,000 persons)

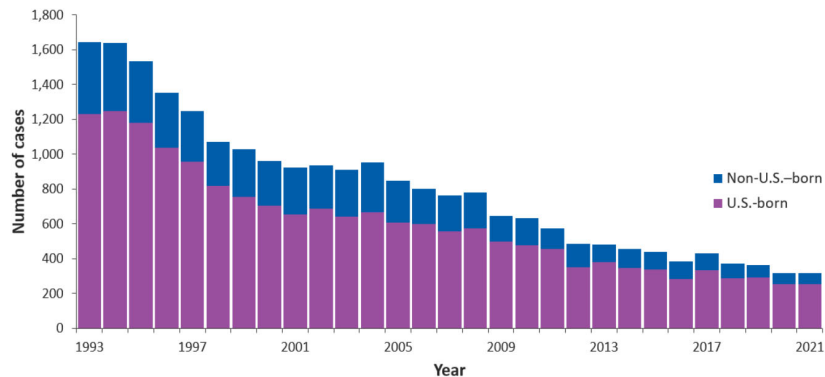
Source: 2021-surveillance-Report-Slideset.pptx (live.com)

22

22

Pediatric TB in the United States

Pediatric TB Cases 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.

- TB disease in children under 15 years of age (pediatric TB) is a marker for recent transmission
 - Infants and young children are more likely than older children and adults to develop life-threatening forms of TB disease
- 50% of all pediatric cases in 2021 occurred in children 0-4 years of age
 - Children 0-4 years of age accounted for 2% of all U.S. cases (incidence rate of 0.8 cases per 100,000 persons)

[2021-surveillance-Report-Slideset.pptx \(live.com\)](#)

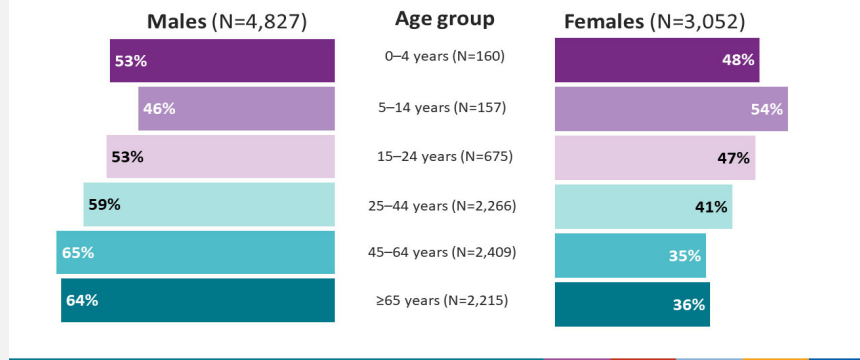
23

23

TB Demographics in the United States

Sex

Percentage of TB Cases by Sex and Age Group, United States, 2021



- In 2021, persons assigned male at birth accounted for 61.3% of TB cases
- Among U.S. born persons, incidence rate for males was higher than females in every age group, except age group 5-14 years

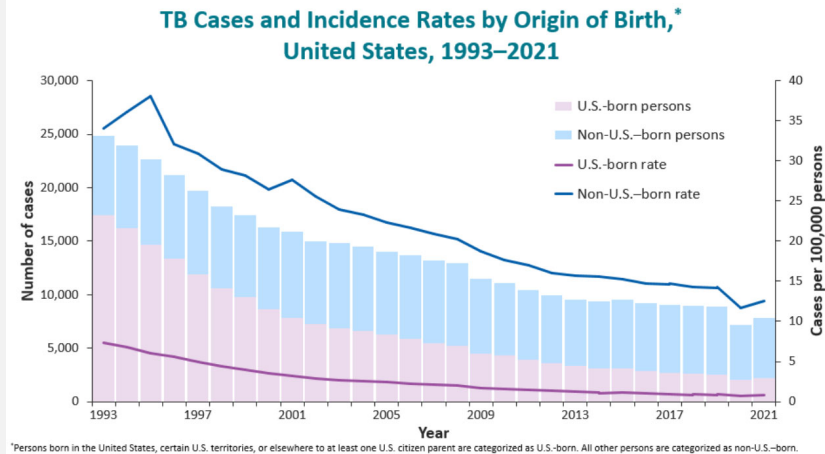
[2021-surveillance-Report-Slideset.pptx \(live.com\)](#)

24

24

TB Demographics in the United States

Origin of Birth



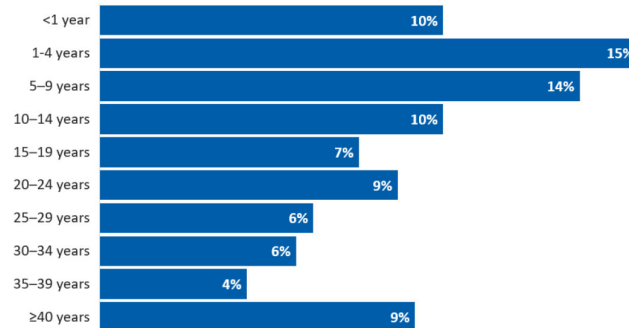
- **71.4%** of TB cases in 2021 were among non-US-born persons
- In 2021, the incidence rate among non-U.S.-born persons was 15.8 times higher than U.S.-born persons
 - TB incidence rates increased by **11% for US-born persons** and **7% for Non-US-born persons** from 2020 to 2021
- 54.2% of non-U.S. born cases in 2021 were born in Mexico, the Philippines, India, Vietnam, and China

Source: 2021-surveillance-Report-Slideset.pptx (live.com) 25

25

Non-U.S.-Born TB Cases in 2021

Percentage of TB Cases Among Non-U.S.-Born* Persons by Years Since Initial Arrival in the United States at Diagnosis,† 2021 (N=5,626)



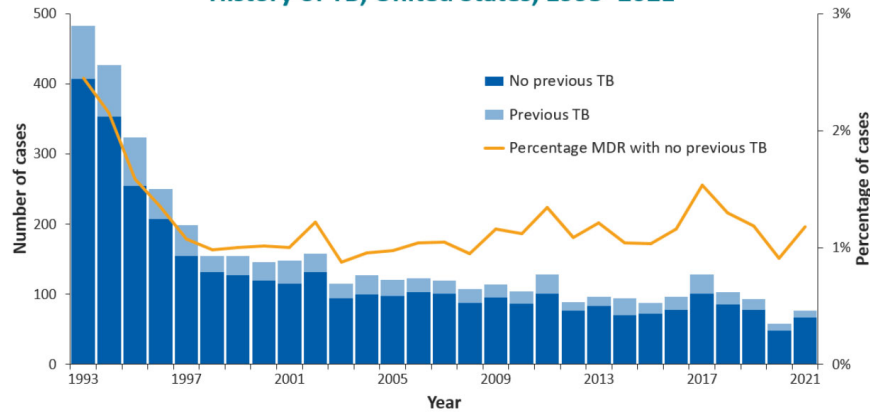
*Persons born in the United States, certain U.S. territories, or elsewhere to at least one U.S. citizen parent are categorized as U.S.-born. All other persons are categorized as non-U.S.-born.
†The number of years since initial arrival in the United States at diagnosis was unknown or missing for 11% of non-U.S.-born persons. These persons were included in the denominator when calculating percentages.

Source: 2021-surveillance-Report-Slideset.pptx (live.com) 26

26

Drug-resistant TB in the United States

Number and Percentage of Multidrug-Resistant (MDR)* TB Cases by History of TB, United States, 1993–2021



*Resistant to at least isoniazid and rifampin.

Source: 2021-surveillance-Report-Slideset.pptx (live.com) 27

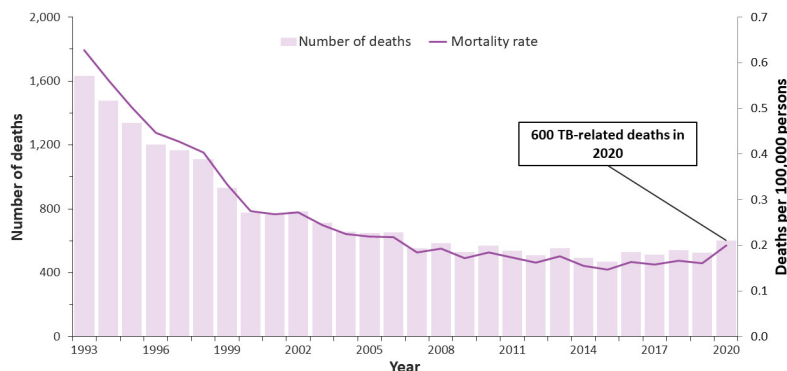
- 77 TB cases were reported as MDR TB in 2021

- 0.3% of cases among US-born persons were initially diagnosed with MDR TB compared to 1.3% of cases among non-US-born persons

27

TB Mortality in the United States

TB-Related Deaths* and Mortality Rates, United States, 1993–2020



*National Vital Statistics System Underlying Cause of Death (based on deaths reported through 2020)

- There was a **14.1% increase** in TB-related deaths from 2019 to 2020

- 2020 was the first year since 2006 with 600 or more TB-related deaths

Source: 2021-surveillance-Report-Slideset.pptx (live.com) 28

28

TB in Texas



TEXAS
Health and Human
Services

Texas Department of State
Health Services

29

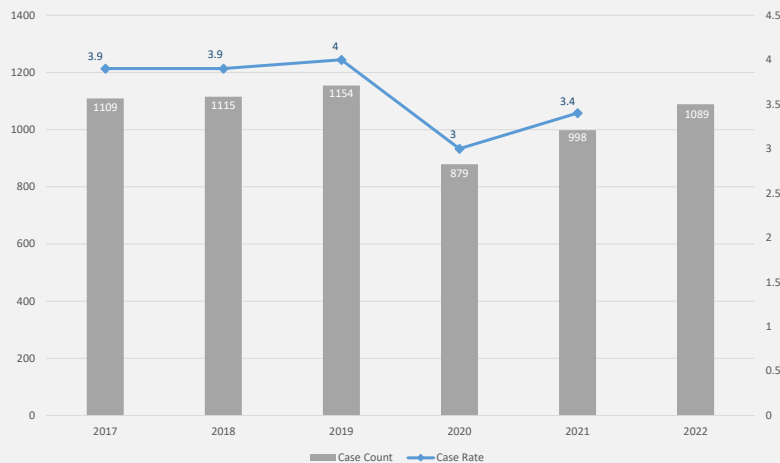
The Big Picture

- Texas has the second highest number of TB cases in the U.S.
 - 998 cases reported in 2021
- Texas has the fifth highest incidence of TB in the U.S.
 - 3.4 cases per 100,000 persons in 2021
- Prevalence of TB infection in Texas is estimated to be 1.08 million people

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8016318/>

30

Incidence of TB in Texas, 2017 - 2021



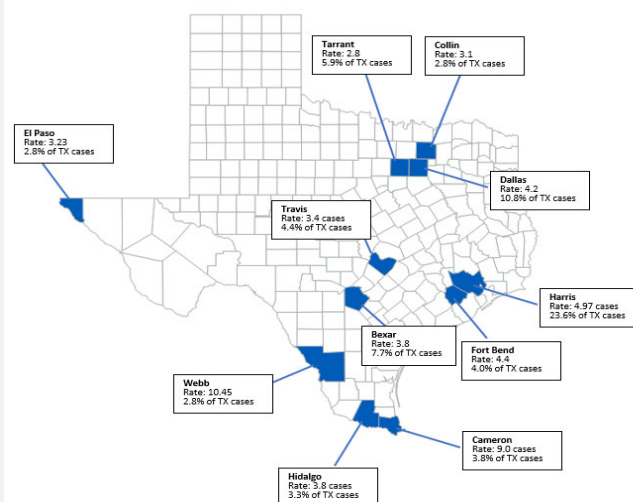
- TB case counts and rates in 2020 were impacted by the COVID-19 pandemic
- Counts and rates recovered in 2021 compared to 2020
 - Case counts moved closer to pre-pandemic levels in 2022

Source: DSHS TB Program

31

31

Where is TB Found in Texas?



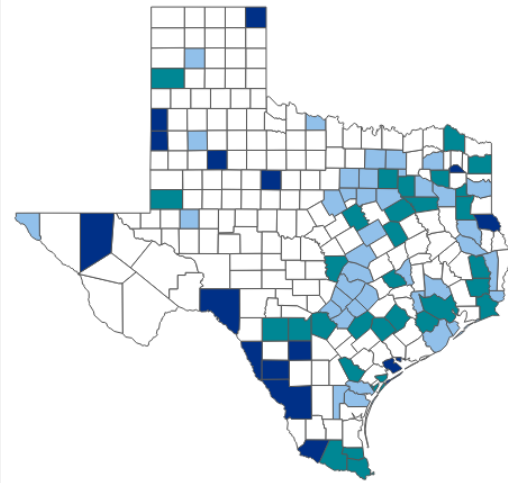
Source: DSHS TB Program

* Tuberculosis cases diagnosed among inmates under custody of the Texas Department of Criminal Justice (TDCJ) are attributed to that agency. For more information about the geographic distribution of TDCJ Units visit www.tdcj.texas.gov

32

32

Incidence of TB in Texas Counties

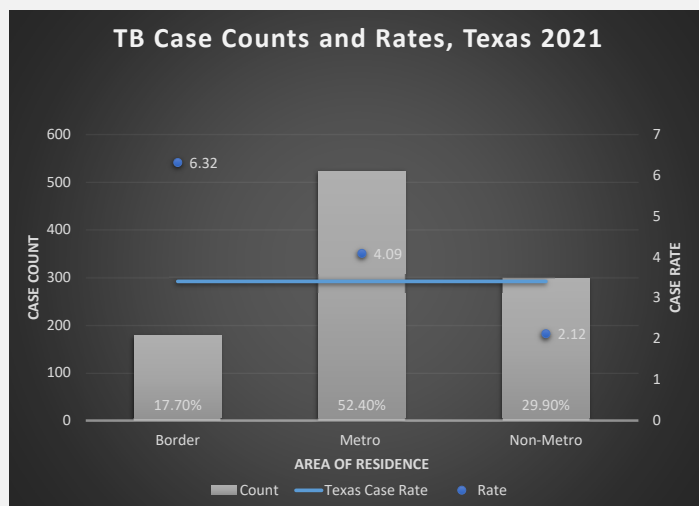


County	Case Count	Rate per 100,000 Persons
Frio	19	103.06
Culberson	1	45.6
Cochran	1	39.75
Lipscomb	1	34.12
TDCJ	28	23.75
Starr	12	18.17
Maverick	10	17.22
Garza	1	17.06
Camp	2	15.85
Bailey	1	14.63
Shelby	3	12.53
Dimmit	1	11.8
Val Verde	5	10.51
Webb	28	10.45
Calhoun	2	10.14
Jones	2	10.06

Source: DSHS TB Program³³

33

TB Incidence in Texas Geographic Area



- The majority of TB cases in Texas are reported from large metropolitan areas
- Incidence rate (IR) is higher in counties along the Texas - Mexico border region
 - This area accounts for 9% of the Texas population but represents 17.7% of all TB cases

Source: DSHS TB Program

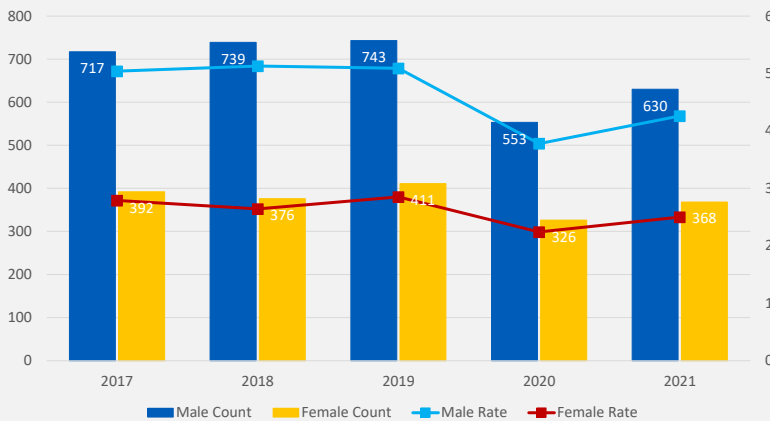
34

34

TB Demographics in Texas

Sex

TB Case Counts and Rates by Sex at Birth, 2017-2021



- Number of cases and incidence rates are higher among persons assigned male at birth
 - Consistent among all age groups
 - 63% of 2021 TB cases in Texas were among males

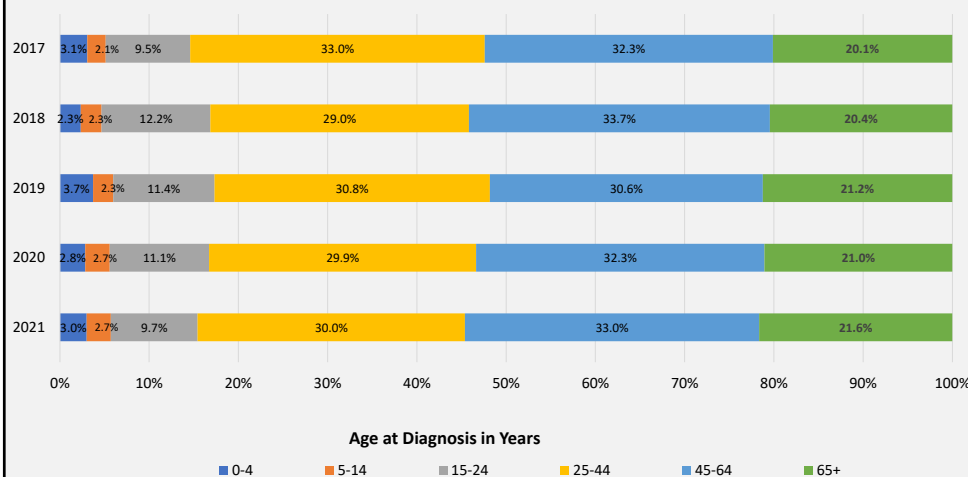
Source: DSHS TB Program
35

35

TB Demographics in Texas

Age

Proportion of TB Cases by Age Group (in Years), 2017-2021



- Adults aged 25-64 years represent the largest proportion of TB cases in Texas
- Lowest incidence group are children 5-14 years old
- Highest incidence of TB is among adults over 65 years of age

Source: DSHS TB Program
36

36

TB Demographics in Texas

Race/ Ethnicity

Texas TB Case Rates by Race and Ethnicity, 2021



- Non-Hispanic Asians, Hawaiian Native or other Pacific Islanders have the highest incidence of TB in Texas
 - Asian IR = 13.81 cases per 100,000 persons
 - HNPI IR=10.98 cases per 100,000 persons
- The TB incidence rates in Texas for non-Hispanic Black or African American, Hispanic or Latino (all races), and non-Hispanic White persons are higher than the national rates for each of these groups

Source: DSHS TB Program

37

37

TB Demographics in Texas

Origin of Birth

- In 2021, **70%** of Texas TB cases were among Non-US-born persons
- 60 different countries were represented among Texas TB cases in 2021

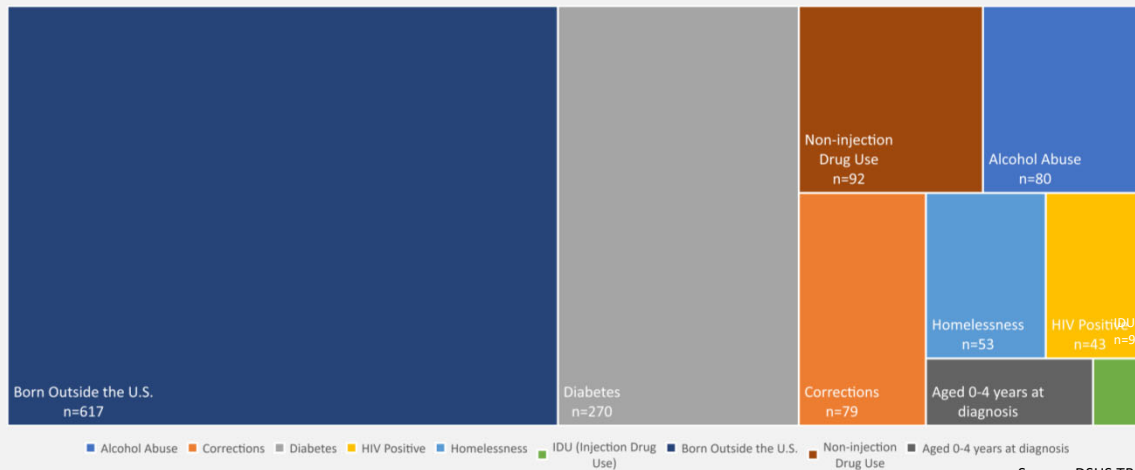
Country of Birth	Case Count	Proportion
Mexico	241	38.87
Vietnam	57	9.19
India	54	8.71
Honduras	34	5.48
Philippines	33	5.32
Guatemala	28	4.52
Ethiopia	12	1.94
Nepal	12	1.94
El Salvador	11	1.77
Pakistan	11	1.77

Source: DSHS TB Program

38

38

Important Risk Factors for TB in Texas

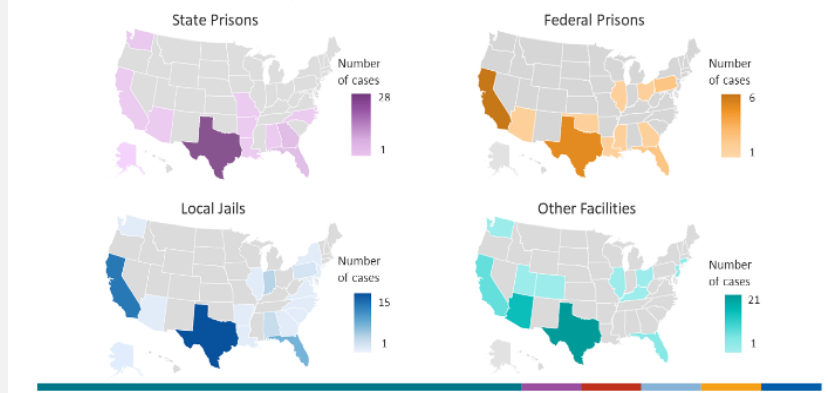


39

39

TB in Correctional Settings

TB Cases Among Correctional Facility Residents Aged ≥15 Years by Type of Facility, United States, 2021



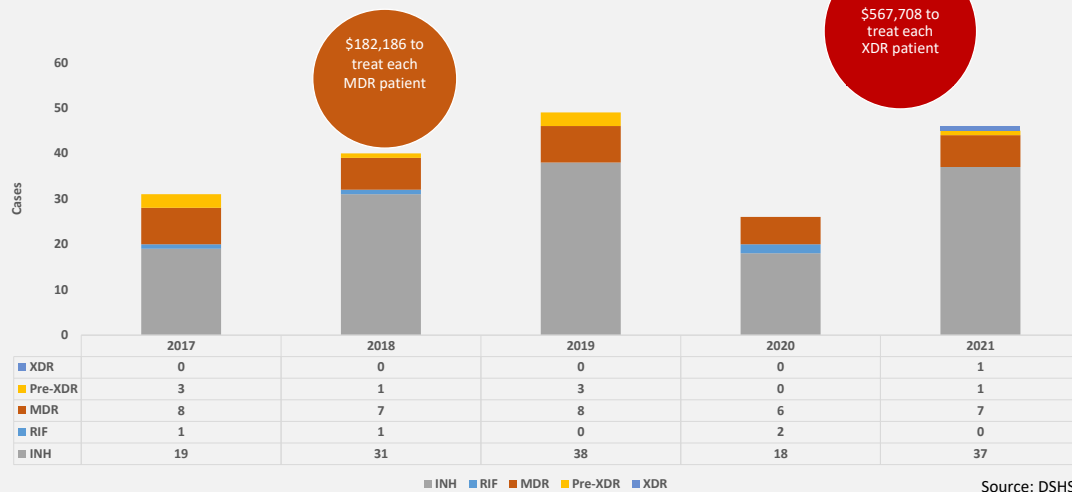
- About 8% of Texas TB cases in 2021 were incarcerated at diagnosis
 - Nationally, 2.6% of all TB cases are reported from correctional facilities
 - Texas accounted for 38% of all TB cases reported from correctional facilities in the U.S. in 2021

Source: DSHS TB Program

40

40

Drug Resistant TB in Texas



41

For More Information

- **Global TB:** WHO Global Tuberculosis Report, 2022
- **TB in the US:** CDC Reported Tuberculosis in the United States, 2021
- **TB in Texas:** Visit our website www.texastb.org or email TBEpi@dshs.Texas.gov

42

42

Questions?

Epidemiology of Tuberculosis
TB Intensive
September 13, 2023

Kathryn Yoo
TBEpi@dshs.texas.gov