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Health impact and cost-effectiveness of testing and treatment of *Mycobacterium tuberculosis* infection among Asian and Hispanic persons with diagnosed diabetes in the United States

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Abstract

Objectives: To evaluate the cost-effectiveness of testing and treatment for *Mycobacterium tuberculosis* (*Mtb*) infection among Asian and Hispanic persons with diagnosed diabetes in the United States.

Methods: We estimated population size and *Mtb* infection prevalence for Asian and Hispanic persons aged ≥ 15 years with diagnosed, non-gestational diabetes, by age and US-born-status. We assumed a one-time test for *Mtb* infection intervention, with positive-testing persons offered treatment. Using a deterministic, transmission-dynamic model of TB in the United States, we estimated costs, TB cases and deaths averted, and quality-adjusted life-years (QALY) gained under the intervention compared to no-intervention. We estimated incremental cost-effectiveness ratios (ICERs), calculated as costs per QALY-gained, from a TB health services perspective, including diagnosis and treatment for TB infection and disease. We also assessed health services and societal perspectives. We estimated 95% uncertainty intervals via probabilistic sensitivity analysis.

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Results: TB cases averted per 100,000 persons tested ranged from 7.5 (95% uncertainty interval: 6.9–8.1) among US-born Hispanic persons to 238.9 (225.2–254.3) among non-US-born Asian persons. TB deaths averted per 100,000 persons tested ranged from 1.3 (1.2–1.4) among US-born Hispanic persons to 53.7 (51.4–56.1) among non-US-born Asian persons. ICERs for US-born Asian and Hispanic populations were \$856,671 (\$533,506–\$1,234,032) and \$1,081,646 (\$673,142–\$1,551,264), respectively. ICERs for non-US-born Asian and Hispanic populations were lower: \$66,664 (\$41,456–\$93,625) and \$68,749 (\$43,136–\$97,044), respectively. ICERs were 2–19% higher under a societal perspective.

Conclusions: While the intervention produced health benefits for all populations assessed, health benefits were greater—and ICERs more favorable—for non-US-born Asian and Hispanic populations with diagnosed-diabetes.

Précis:

Asian and Hispanic persons with diabetes have elevated tuberculosis risks and may benefit from testing and treatment for *Mycobacterium tuberculosis* infection, especially non-US-born persons.

Keywords

Mycobacterium tuberculosis infection; mathematical modeling; persons with diabetes; cost-effectiveness analysis

INTRODUCTION

During 2013–2022, non-Hispanic Asian (hereafter Asian) and Hispanic persons comprised 34.8% and 29.5% of incident tuberculosis (TB) cases in the United States ¹ despite only representing 6.4% and 19.5% of the U.S. population ², respectively. There are several factors potentially contributing to these high incidence rates. First, Asian and Hispanic persons have an elevated prevalence of diabetes compared to non-Hispanic White persons. Age-sex-adjusted diagnosed diabetes rates are estimated at 11.6% among Asian adults and 14.9% among Hispanic adults, in contrast to 8.2% among non-Hispanic White adults ³. Second, in the United States, Asian and Hispanic persons with diabetes have elevated prevalences of *Mycobacterium tuberculosis* (*Mtb*) infection compared to those without diabetes or pre-diabetes ⁴. Using test-positivity as an indicator of *Mtb* infection prevalence, these differences were estimated at +14.5% (23.6% vs. 9.1%) among Hispanic and +9.9% (27.2% vs. 17.3%) among Asian adults ⁴. Furthermore, diabetes is associated with an elevated risk of developing TB disease among those with *Mtb* infection ^{5–7}.

Over 80% of TB in the United States is estimated to arise from progression of established *Mtb* infection as opposed to a recent transmission event ¹. As such, interventions to test and treat *Mtb* infection are a central component of TB elimination efforts in the United States ⁸. Testing and treating *Mtb* infection among Asian and Hispanic persons with diabetes has the potential to address a major health disparity and to reduce overall TB disease in the United States. In this study, we estimated the impact and cost-effectiveness of *Mtb* infection testing and treatment for Asian and Hispanic persons with diagnosed diabetes in the United States.

METHODS

Study population and data sources

We estimated four study populations for this analysis: (1) non-US-born Asian persons, (2) US-born Asian persons, (3) non-US-born Hispanic persons, and (4) US-born Hispanic persons, all with diagnosed diabetes. We estimated US resident Asian and Hispanic persons aged ≥ 15 years with diagnosed diabetes, stratified by race, ethnicity, age, and whether the person is US-born or non-US-born. We first calculated population estimates for each age-, nativity-, ethnicity-, and race-stratum using data from the American Community Survey (ACS) 2022 5-year public-use microdata files⁹. We categorized persons as non-Hispanic Asian or Hispanic (of any racial identity), following US Census Bureau conventions¹⁰; referred to as Asian or Hispanic persons, respectively. We then estimated the prevalence of diagnosed diabetes each age-, nativity-, ethnicity-, and race-stratum using data from the 2020–2022 National Health Interview Survey¹¹. Persons were identified as having diagnosed diabetes if they reported having ever been told by a healthcare professional that they have diabetes. Those reporting gestational diabetes without reporting diabetes outside of pregnancy were not included in the study populations.

To estimate *Mtb* infection prevalence for persons with diagnosed diabetes in each age-, nativity-, ethnicity-, and race-stratum, we used data on interferon gamma release assay (IGRA) positivity from the 2011–2012 National Health and Nutrition Examination Survey (NHANES)¹², which represent the most recent nationally-representative *Mtb* infection prevalence data. Restricting the estimation to include IGRA-positive persons with only *diagnosed* diabetes resulted in small cell sizes. To increase precision of *Mtb* infection prevalence estimates, we included IGRA-positive persons with either diagnosed and undiagnosed diabetes, consistent with determination guidance from the American Diabetes Association¹³. We estimated *Mtb* infection prevalence by adjusting the prevalence of IGRA positive test results (from NHANES) using published estimates of IGRA sensitivity and specificity¹⁴, following a published approach⁵. Details on survey variables used are provided in the Supplement.

Intervention scenario

We estimated the outcomes of a one-time *Mtb* infection testing and treatment intervention offered in 2024 to each of the four study populations (non-US-born Asian persons, US-born Asian persons, non-US-born Hispanic persons, and US-born Hispanic persons) with diagnosed diabetes. We assumed that *Mtb* infection testing would be conducted with IGRA, and TB disease would be excluded from treatment for *Mtb* infection with a two-view chest x-ray. IGRA test sensitivity was assumed to be 78% (95% uncertainty interval: 65%–91%) for US-born persons and 79% (70%–90%) for non-US-born persons¹⁴. IGRA test specificity was assumed to be 98% (96%–99%) for US-born persons and 99% (96%–100%) for non-US-born persons¹⁴.

Individuals receiving a positive IGRA test and negative chest x-ray result would be offered treatment to prevent TB disease. We assumed treated persons would be prescribed one of three self-administered regimens: 25% would receive a regimen of weekly isoniazid

(900 mg) and rifapentine (900 mg) for 3 months (3HP), 7% would receive daily isoniazid (300 mg) and rifampin (600 mg) for 3 months (3HR), and 68% would receive daily rifampin (600 mg) for 4 months (4R), with these percentages based on recent prescribing patterns¹⁵. We assumed isoniazid-containing regimens (3HP and 3HR) had a 0.3% risk of hepatotoxicity¹⁶. The treatment acceptance rate was assumed to be 77% (70%–85%)¹⁷ and treatment completion rate was 76% (57%–95%)¹⁵. The probability of cure given treatment completion was assumed to be 93% (90%–96%)¹⁸. We assumed persons with *Mtb* infection and diabetes had a rate ratio for TB progression of 1.60 (1.47–1.73) compared to persons without diabetes⁵. Similarly, we assumed that all persons with diabetes in the study populations experienced a rate ratio of 1.93 (1.84–2.03) for all-cause mortality, as compared to the US general population¹⁹. We assumed that persons developing TB disease in the future would be identified and initiated in TB disease treatment based on current performance of TB case detection and treatment outcomes¹.

This intervention scenario was compared to a ‘no intervention’ scenario that assumed any future *Mtb* infection- and TB disease-related health services would eventually be provided with the same coverage and effectiveness as in the intervention scenario, but without the one-time *Mtb* infection testing and treatment intervention offered to persons in the study populations. Persons who were not offered the intervention or did not accept treatment in 2024 were eligible to receive treatment in future years, through routine TB health services. These persons had an age-stratified probability of progression to TB disease and/or TB death prior to their future diagnosis and treatment.

Mathematical model

We estimated intervention outcomes using a published transmission-dynamic model of TB in the United States²⁰. This deterministic, compartmental model simulates TB epidemiology and the long-term consequences of *Mtb* infection treatment interventions and was calibrated to reproduce trends in the US population and TB epidemiology through 2023. This model is available on GitHub as a package for the R programming language (MITUS)²¹. The model stratifies the US population by age, US-born status, *Mtb* infection status, and a set of generalized risk strata representing factors associated with elevated TB progression rates and mortality. We used these strata to represent the *Mtb* infection progression risk and mortality associated with diabetes. Figure S1 presents a schematic state diagram of the model, which includes model compartments and transitions. Further details on model assumptions and calibration can be found in the Supplement.

We constructed cohorts within the model representing persons in the estimated study populations: Asian and Hispanic persons aged ≥15 years with diagnosed diabetes stratified by age and nativity. Each population was parameterized with their unique age and nativity distribution and their respective *Mtb* infection prevalence, rates of progression to TB disease, and background mortality rates. Model parameters describing the *Mtb* infection testing and treatment cascade (test sensitivity and specificity, distribution of treatment regimens, treatment effectiveness, etc.) did not differ between baseline and intervention scenarios.

Estimation of health outcomes

We used the mathematical model to estimate TB cases averted, TB deaths averted, life years gained, and quality-adjusted life years gained (QALYs) for the intervention scenario compared to no intervention. TB cases included incident TB among the study populations as well as secondary cases among contacts, as simulated by the transmission model. TB deaths included all deaths occurring among persons with TB disease (including untreated persons and those receiving treatment). Life years were calculated as the number of TB deaths in each age group multiplied by life expectancy for that age group. Age-group-specific life expectancies are given in the Table S1²². QALYs were calculated to include years lost due to TB mortality and the reductions in quality of life associated with *Mtb* infection treatment, untreated TB disease, and TB treatment²³. The disutility weight associated with potential *Mtb* infection treatment hepatotoxicity associated with isoniazid was 0.25 (0.19–0.31)²⁴, applied for 14 days²⁵.

Untreated TB disease and TB treatment during the first month had a disutility weight of 0.25 (0.34–0.17); this value was based on standard gamble utility estimates for persons receiving TB treatment compared to control, at treatment initiation²⁶. After one month of treatment, disutility weights decreased to 0.11 (0.21–0.02) through completion; this value was based on standard gamble utility estimates for persons receiving TB treatment compared to control, averaged over months 2–6 after diagnosis²⁶. All parameters used in the QALY calculation, including additional parameters, such as duration of TB disease, treatment, and adverse events, can be found in Table S2. Calculations for each health outcome are described in the Supplement. To capture intervention consequences over the lifetime of the study cohort, all health outcomes were evaluated between the years 2024–2100.

Estimation of costs

We estimated costs under three perspectives: a TB health services perspective, a health services perspective, and a societal perspective. The TB health services perspective included costs associated with the diagnosis and treatment of *Mtb* infection and TB disease. The health services perspective included TB health services costs as well as future non-TB health services costs. The societal perspective included all health services costs as well as the productivity losses associated with TB healthcare visits, morbidity, and mortality, adjusted for non-healthcare spending²⁷. We present results calculated using the TB health service perspective as the main analysis and report results for the additional perspectives in the Supplement.

Per-patient *Mtb* infection treatment costs were based on published estimates and varied by regimen²⁸. Per-person costs of treatment with 3HP totaled \$557, treatment with 3HR totaled \$1,054, and treatment with 4R totaled \$1,276. Details of the cost components for these regimens can be found in Table S3. The per-patient cost of treating TB disease was assumed to be \$25,285, based on cost analyses conducted by the Centers for Disease Control and Prevention^{29,30}. For all treatment costs, we assumed an uncertainty range of $\pm 25\%$. Annual total healthcare expenditures by age and diabetes status were based on analyses of Medical Expenditure Panel Survey data³¹. Annual total non-healthcare spending was calculated from the US Bureau of Labor Statistics' Consumer Expenditure Surveys³².

Productivity losses were calculated using age-group-stratified US life-expectancies (Table S1),²² the additional mortality risk associated with diabetes,³³ estimated productivity lost to diagnosis and treatment²⁵, and productivity estimates (annual and lifetime) based on an analysis of US market and non-market productivity (Table S4, S5)³⁴. All costs are reported in 2022 US dollars. This study is reported as per the Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022)³⁵. The CHEERS checklist (Table S9) and detailed cost inputs are provided in the Supplement.

Cost-effectiveness analysis

We estimated incremental cost-effectiveness ratios (ICERs)—calculated as the incremental difference in mean costs divided by the incremental difference in mean QALYs—to evaluate the cost-effectiveness of the *Mtb* infection testing and treatment intervention for the four study population strata, as compared to the no intervention scenario. Future costs and health benefits were discounted at 3% per year³⁶.

Statistical analysis

We used Monte Carlo simulation to propagate parameter uncertainty throughout the analysis (probabilistic sensitivity analysis).³⁷ To account for uncertainty in calibrated parameters, we simulated results for 1,000 parameter sets generated by the Bayesian approach used to calibrate the mathematical model³⁸. For parameters not included in the calibration (e.g., cost inputs, utility weights), we sampled from probability distributions representing the uncertainty in each of these inputs. For parameters that had a published uncertainty range, we use these values to parameterize the distribution; otherwise, we assume an uncertainty range of $\pm 25\%$. We calculated point estimates for each outcome as the mean of these values and 95% uncertainty intervals as the 2.5th and 97.5th percentiles.

We conducted one-way sensitivity analyses to understand the robustness of the results to variation in individual parameters. These parameters and their ranges are presented in Table S6. Analyses were conducted in R (version 4.2.1) using the survey (version 4.0), MASS, (version 7.3.60), and Rcpp (version 1.0.10) packages^{39–42}. All codes used in this analysis are publically available at <https://github.com/PPML/tttDiabetes>.

RESULTS

Study population

We estimated that there were 292,900 (95% uncertainty interval: 144,900–644,200) US-born Asian, 1,296,600 (1,006,300–1,682,400) non-US-born Asian, 2,204,500 (1,759,900–2,762,900) US-born Hispanic, and 2,164,100 (1,766,000–2,664,900) non-US-born Hispanic persons aged ≥ 15 years with diagnosed diabetes in the United States in 2024 (Table 1). Figure S2 shows age-stratified estimates of diagnosed diabetes prevalence in each population. Figure S3 shows the age distribution of each population. The estimated percentage of the population with diagnosed diabetes that was aged 55 years or older ranged from 54% among non-US-born Asian persons to 71% among US-born Asian persons.

The non-US-born Asian population with diagnosed diabetes had the highest *Mtb* infection prevalence at 31.6% (11.9%–56.7%) and estimated prevalence was lowest among the US-born Hispanic persons at 4.7% (0.5%–12.0%) (Table 1). Figure S4 shows the estimated *Mtb* infection prevalence for all populations, stratified by age group, origin of birth, and diabetes status. Estimated *Mtb* infection prevalence was higher among non-US-born persons compared with US-born persons, across all age groups and diabetes statuses.

Health outcomes

Table 2 shows the health outcomes of the *Mtb* infection testing and treatment intervention in each population over the period 2024–2100. Per 100,000 persons tested, the number of TB cases averted ranged from an estimated 239 (225–254) among non-US-born Asian persons to 8 (7–8) among US-born Hispanic persons. The number of TB deaths averted per 100,000 persons tested ranged from an estimated 53.7 (51.4–56.1) among non-US-born Asian persons to 1.3 (1.2–1.4) among US-born Hispanic persons. QALYs gained per 100,000 persons tested followed the same pattern and were highest among non-US-born Asian persons (584 [546–628]) and lowest among US-born Hispanic persons (17 [15–19]).

Incremental costs

Table 3 presents the incremental cost of the intervention in each population from the TB health service perspective, per 100,000 persons tested for *Mtb* infection. These incremental costs of the intervention were higher among non-US-born persons—\$22.88 (\$13.97–\$31.80) million among non-US-born Asian persons and \$20.31 (\$12.47–\$28.31) million among non-US-born Hispanic persons—reflecting the higher *Mtb* infection prevalence among these populations compared with US-born populations. Incremental cost estimates from the health services and societal perspective are shown in Table S7, and Figure S5 compares incremental costs across all perspectives. Discounted incremental TB health services, all health services, and societal costs associated with the intervention are presented in Table S8.

Cost-effectiveness

The incremental cost per QALY gained varied across the four study populations, with interventions among the two non-US-born populations having greater QALYs gained and lower incremental costs than those among US-born populations (Tables 2 and 3). Figure 1 depicts the calculated ICERs for each population. The ICERs calculated for the non-US-born Asian population and the Hispanic population with diagnosed diabetes were \$66,664 (\$41,456–\$93,625) and \$68,749 (\$43,136–\$97,044) per additional QALY gained, respectively. ICERs for US-born Asian and Hispanic populations with diagnosed diabetes were substantially higher: \$856,671 (\$533,506–\$1,234,032) and \$1,081,646 (\$673,142–\$1,551,264) per additional QALY gained, respectively. Figure S6 presents incremental costs and health benefits on the cost-effectiveness plane, estimated from the societal perspective. These ICERs ranged from \$76,035 (\$49,265–\$107,005) among the non-US-born Hispanic population to \$1,102,605 (\$695,169–\$1,576,240) among the US-born Hispanic population.

Sensitivity analyses

Figure 2 presents the results of one-way sensitivity analyses for key parameters, stratified by each intervention population with diagnosed diabetes. Across all populations, the ICER was most sensitive to uncertainty in *Mtb* infection prevalence, with higher *Mtb* infection prevalence estimates associated with lower ICER values (i.e., more cost-effective). The percentage change in ICERs ranged from a 13% decrease to a 49% increase as *Mtb* infection prevalence among non-US-born varied by $\pm 25\%$. ICER percentage change was higher when *Mtb* infection prevalence was varied $\pm 25\%$ among US-born persons, ranging from a 50% reduction to a 746% increase.

DISCUSSION

In this analysis, we estimated the cost-effectiveness of a *Mtb* infection testing and treatment intervention conducted in 2024 among US resident Asian or Hispanic persons diagnosed with diabetes. Per 100,000 persons tested, the impact of the *Mtb* infection testing and treatment intervention ranged from 7.5 (6.9–8.1) TB cases averted among US-born Hispanic persons with diagnosed diabetes to 238.9 (225.2–254.3) TB cases averted among non-US-born Asian persons with diagnosed diabetes. Interventions among non-US-born persons were estimated to have greater health benefits, measured by QALYs gained, and lower incremental costs, than the same intervention among US-born persons, based on to the elevated *Mtb* infection prevalence among non-US-born populations⁴³. Our analysis estimated that *Mtb* infection prevalence among persons with diabetes was five times higher among non-US-born Asian persons and six times higher among non-US-born Hispanic persons, compared with US-born persons of the same race and ethnicity. These results are consistent with existing Centers for Disease Control and Prevention and US Preventive Services Task Force screening guidelines for *Mtb* infection in the United States, which recommend prioritizing non-US-born persons for testing and treatment^{44,45}.

Our results were generally consistent with previous cost-effectiveness studies, which have examined the cost-effectiveness of *Mtb* infection testing and treatment interventions for persons with diabetes and for non-US-born persons in the United States. This study's estimated ICERs for US-born persons with diabetes are similar to previously estimated ICERs for persons with diabetes^{46,47}. Furthermore, our estimated ICERs for non-US-born persons with diabetes suggest that interventions among persons with diabetes have a more favorable cost-effectiveness profile compared to other strategies among the total non-US-born population^{46,48,49}. Currently, diagnosed diabetes is not considered a sufficient condition for prioritized *Mtb* infection testing^{44,45,50}. However, the California Adult Tuberculosis Risk Assessment recommends prioritizing testing among non-US-born persons with an additional risk factor, such as diabetes, when there are insufficient resources to test the full non-US-born population⁵⁰.

Testing for *Mtb* infection among persons with selected co-morbid conditions is a recommended^{44,45,50} and cost-effective⁴⁸ way to reduce TB disease. However, screening for *Mtb* infection or TB among persons with diabetes has not been recommended because of the large number of US residents with diagnosed diabetes and potential low yield of screening programs in these populations⁵¹. However, our results suggest that healthcare

programs could consider the integration of *Mtb* infection testing and treatment into diabetes care for non-US-born Asian and Hispanic persons. The successful management of diabetes includes several routine health care visits to prevent complications⁵², many of which have been shown to have good economic value^{53,54}. These visits may provide an opportunity for TB education and *Mtb* infection testing.

This study has several limitations. While we used the most recent nationally representative survey data to estimate *Mtb* infection prevalence, these data are over 10 years old and may not represent the current prevalence of *Mtb* infection in the United States. Nonetheless, the point estimate of *Mtb* infection prevalence appeared stable between 1999–2000 and the 2010–2011⁵⁵, although the variance was wide, as reflected in Figure 2. Additionally, our estimation of diabetes prevalence relied on self-reported data for diagnosed diabetes (as recorded in the National Health Interview Survey), but 8.7 million people (22.8% of adults) with diabetes are undiagnosed^{56,57}. Furthermore, diabetes is known to be systematically underdiagnosed in Asian and Hispanic persons as compared to non-Hispanic White adults in the same age group^{3,58}, potentially because of underlying disparities in healthcare access⁵⁹. Furthermore, the stratifications required for the model analysis resulted in small numbers for some populations, accounted for in our uncertainty calculations. Finally, diabetes has been shown to increase TB incidence^{6,7}, but the condition may also increase TB disease severity⁶⁰. Moreover, TB disease may increase the risk of diabetes-related complications^{61,62}. We did not account for additional TB severity or diabetes-related complications in our analysis; therefore, although we accounted for increased mortality overall among people with diabetes, our estimates may underestimate the QALY and productivity losses resulting from TB disease.

Our analysis focused on the impact of treating *Mtb* infection among persons with diabetes to prevent the development of TB disease. However, enhanced diabetes prevention⁶³ and management with medication⁶⁴ are also potential pathways to reduce TB incidence. Further research to estimate the potential health impact and cost-effectiveness of diabetes interventions on the risk of progressing to TB disease should be considered.

Conclusions

Testing and treatment of *Mtb* infection is a central strategy for accelerating the reduction of TB disease in the United States, and our results show the importance of this intervention for Asian and Hispanic persons with diagnosed diabetes. Testing and treatment of *Mtb* infection would produce health benefits for all study populations. In our model, these health benefits were substantially greater, with correspondingly more favorable ICERs and cost-effectiveness, for non-US-born Asian and Hispanic populations with diagnosed diabetes relative to US-born populations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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HIGHLIGHTS

- We evaluated the impact of testing and treating for *Mtb* infection in Asian and Hispanic persons with diagnosed diabetes in the United States, by US-country of birth versus non-US-country of birth.
- Our results suggest that both non-US-born and US-born Asian and Hispanic persons with diabetes may benefit from testing and treatment for *Mtb* infection. However, testing and treating for *Mtb* infection has a lower cost per QALY gained when implemented for non-US-born populations compared to US-born populations.
- Conducting *Mtb* infection testing and treatment interventions among populations at high risk of diabetes and *Mtb* infection, such as Asian and Hispanic persons, particularly those who are non-U.S-born, could contribute to TB elimination in the United States.

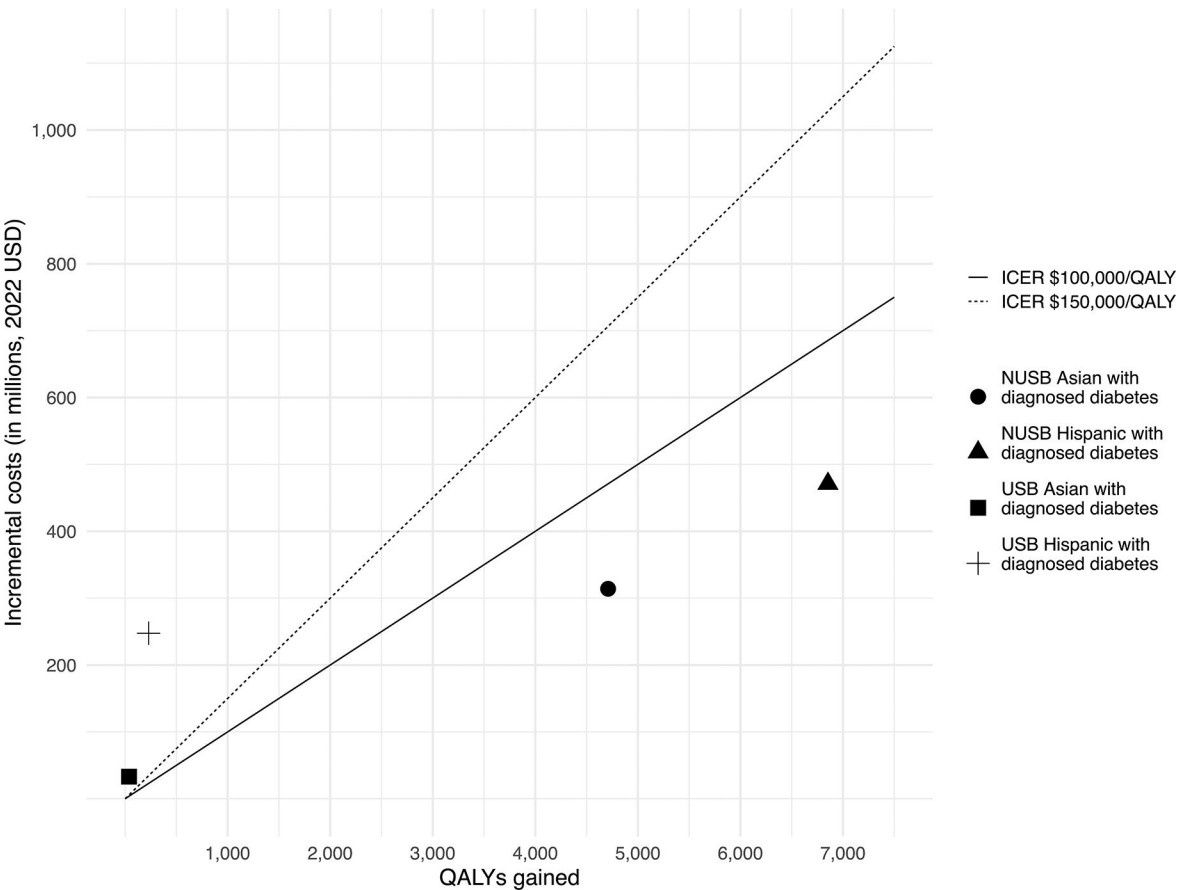


Figure 1: Incremental cost per quality-adjusted life year (QALY) gained over 2024–2100 for one-time Mtb infection testing and treatment intervention among non-Hispanic Asian and Hispanic persons with diagnosed diabetes by US-born (USB) versus non-US –born (NUSB) status, as compared to no intervention.

The interventions presented above are non-competing interventions. The results presented above reflect the mean total incremental costs and mean total QALYs gained for each intervention, which were used to calculate the incremental cost effectiveness ratios (ICERs). Results estimated from a TB health services perspective in 2022 dollars, with 3% discount rate applied to future costs and health outcomes.

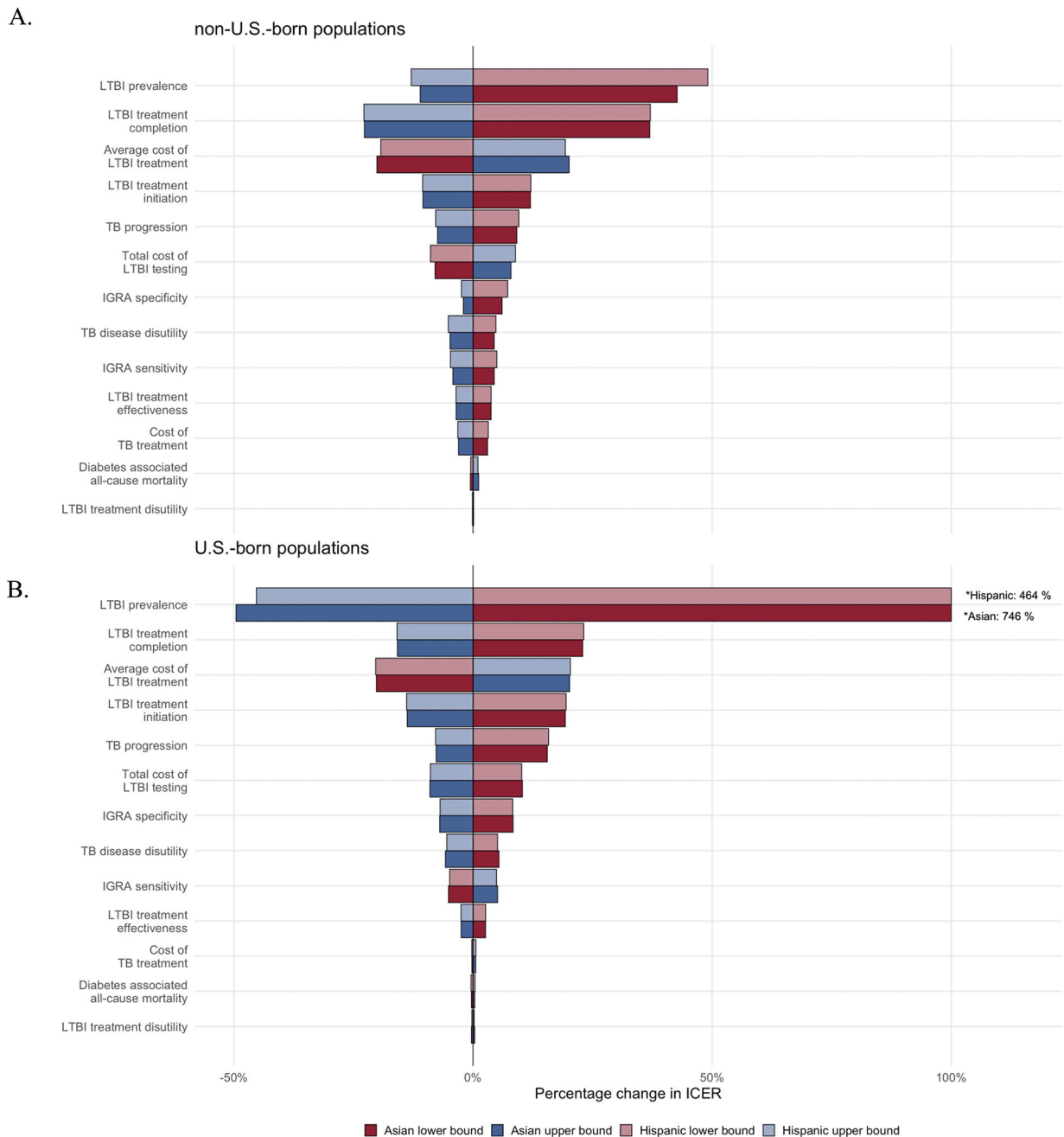


Figure 2: One-way sensitivity analyses for parameters affecting incremental cost-effectiveness ratios (ICER).

Panel A: Non-US-born populations. Panel B: US-born populations. Parameters are described in Supplement Table S6.

Table 1: Diagnosed diabetes and *Mycobacterium tuberculosis* (*Mtb*) infection prevalence estimates among US-born and non-US-born Asian and Hispanic populations ≥ 15 years of age, United States, 2024

Population	Population size (millions) ^a	Diagnosed diabetes prevalence (%) ^b	Population with diagnosed diabetes	<i>Mtb</i> infection prevalence (%) ^c	Population with <i>Mtb</i> infection ^d
<i>Non-US-born Asian</i>	12.2 (11.9–12.5)	10.6 (8.3 – 13.8)	1,296,600 (1,006,300–1,682,400)	31.6 (11.9 –56.7)	409,700 (154,300– 735,200)
<i>Non-US-born Hispanic</i>	19.2 (18.3–20.2)	11.3 (9.2–13.9)	2,164,100 (1,766,000–2,664,900)	28.3 (10.6– 51.7)	612,400 (229,400 – 1,118,800)
<i>US-born Asian</i>	5.9 (5.6–6.1)	5.0 (2.5–11.0)	292,900 (144,900–644,200)	6.3 (0.4–17.6)	18,500 (1,200–51,600)
<i>US-born Hispanic</i>	27.0 (24.5–29.5)	8.2 (6.5–10.2)	2,204,500 (1,759,900–2,762,900)	4.7 (0.5–12.0)	103,600 (11,000–264,500)

Values in parentheses represent 95% uncertainty intervals.

^aEstimated from the 2022 5-year American Community Survey.

^bEstimated from the 2020 - 2022 cycles of the National Health Interview Survey.

^cEstimated from the 2011-2012 National Health and Nutrition Examination Survey; among persons with diagnosed and undiagnosed diabetes.

^dCalculated using the prior estimates to represent prevalence among persons with diagnosed diabetes.

Table 2: Incremental TB health outcomes per 100,000 persons tested for *Mycobacterium tuberculosis (Mtb)* infection in 2024, by population in the United States, 2024–2100.

Intervention population (all with diagnosed diabetes)	No. persons initiating <i>Mtb</i> infection treatment	TB cases averted	Deaths with TB averted	Life years gained	QALYs gained	Discounted QALYs gained*
Non-US-born Asian persons	20,251 (19,520–21,583)	238.9 (225.2–254.3)	53.7 (51.4–56.1)	546 (526–566)	584 (546–628)	371 (344–405)
Non-US-born Hispanic persons	17,542 (16,663–18,376)	229.1 (216.3–243.9)	43.6 (41.9–45.3)	500 (479–518)	535 (526–566)	323 (297–354)
US-born Asian persons	2,072 (2,013–2,142)	10.0 (9.2–10.9)	1.6 (1.5–1.7)	20 (19–22)	22 (20–24)	13 (12–15)
US-born Hispanic persons	1,962 (1,914–2,018)	7.5 (6.9–8.1)	1.3 (1.2–1.4)	16 (15–17)	17 (15–19)	10 (9–12)

Values in parentheses represent 95% uncertainty intervals.

* Annual discount rate of 3% applied to future health outcomes.

Table 3:
Incremental TB health service costs over 2024–2100 per 100,000 persons tested for *Mycobacterium tuberculosis* (*Mtb*) infection in 2024 compared to no intervention, by population (in millions, USD 2022).

Intervention population	Incremental <i>Mtb</i> infection testing cost	Incremental <i>Mtb</i> infection treatment cost	Incremental TB treatment cost	Incremental TB health services costs	Incremental discounted TB health services costs*
Non-US-born Asian persons with diabetes	9.54 (5.91–13.24)	19.36 (12.14–27.30)	–6.02 (–9.09––3.15)	22.88 (13.97–31.80)	24.75 (15.81–33.94)
Non-US-born Hispanic persons with diabetes	9.54 (5.91–13.24)	16.55 (10.37–23.28)	–5.78 (–8.71––3.03)	20.31 (12.47–28.31)	22.22 (14.27–30.25)
US-born Asian persons with diabetes	9.54 (5.91–13.24)	1.95 (1.21–2.73)	–0.25 (–0.38––0.13)	11.20 (7.47–15.19)	11.32 (7.55–15.26)
US-born Hispanic persons with diabetes	9.54 (5.91–13.24)	1.85 (1.15–2.58)	–0.19 (–0.28––0.10)	11.19 (7.44–15.12)	11.26 (7.55–15.26)

Values in parentheses represent 95% uncertainty intervals.

* Annual discount rate of 3% applied to future costs. The intervention has large first year *Mtb* infection and treatment costs, followed by benefits of averted TB treatment costs in the future. Due to these future benefits being discounted, the discounted incremental TB health services cost (i.e., intervention costs minus the cost of TB cases prevented) is greater than the non-discounted incremental TB health services costs.