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# Systematic Review of Contact Investigation Costs for Tuberculosis, United States

## Appendix

## **Additional Methods**

#### **Estimation of National Contact Investigation Costs**

To estimate national contact investigation costs, we used the following equation:

Total Cost<sub>t</sub> =  $N_t \times (LC + TST_{p,t} \times TST_c + QFT_{p,t} \times QFT_c + TSPOT_{p,t} \times TSPOT_c + PTP_t \times CXR_c)$ 

Where *t* denotes a year during 2013–2022, *p* denotes proportion of contacts, and *c* denotes unit cost. N<sub>t</sub> denotes total contacts (smear positive, culture positive and smear negative, culture positive) elicited as reported by the ARPE report for year *t* (*1*–*3*). LC denotes the mean labor cost per contact for contact investigation from the systematic review (\$175.94 [range \$79.97–\$293.51]). TST<sub>p,t</sub>, QFT<sub>p,t</sub>, and TSPOT<sub>p,t</sub> denote the proportion of tuberculin skin tests (TST), QFT, and TSPOT tests given to contacts in year *t* (*4*). TST<sub>c</sub>, QFT<sub>c</sub>, and TSPOT<sub>c,t</sub> denote the cost per test for a TST (\$14.16), QFT test (\$61.89), and TSPOT assay (\$100) in 2022 (*5*). PTP<sub>t</sub> denotes the proportion of contacts that tested positive in year *t* (*1*–*3*), and CXR<sub>c</sub> denotes the cost of chest radiograph (\$43.79). Using the above formula, we computed total contact investigation costs for each year during 2013–2022 and summed the yearly costs to obtain 10-year costs. We also used a 95% confidence estimate for labor costs to generate a CI for all estimates.

## **Community Guide Quality Rating**

According to the Community Guide, studies were judged as having "good," "fair," or "limited" quality of execution; quality of execution is defined through the Community Guide's assessment framework (6). Studies with 0-1, 2-4, and  $\geq 5$  limitations were categorized as having good, fair, and limited execution, respectively. Of the included studies, 9 were judged to be good

quality (7-15), and 1 was fair quality (16). Because none of the studies were judged to have "limited execution," all studies were included in the review.

	% Patients tested†			Total contacts <sup>‡</sup>		
				% Contacts with	No. smear positive, culture	No. smear negative, culture
Year	TST	QFT	T-SPOT	positive test	positive index case	positive index case
2013	86.7	12.5	0.9	14.7	69,063	16,063
2014	81.9	17.1	1.0	13.2	65,590	14,847
2015	76.1	22.5	1.6	11.8	64,509	17,680
2016	69.5	28.5	2.2	11.8	59,721	13,914
2017	64.1	33.4	2.6	11.8	51,392	14,100
2018	59.0	38.6	2.5	11.1	53,783	13,589
2019	52.1	42.0	6.2	10.5	51,419	12,679
2020	46.0	46.2	8.2	11.6	35,918	8,829
2021	40.7	51.1	8.5	14.6	28,736	8,128
2022	37.6	54.2	8.3	13.2	33,576	9,830

Appendix Table 1. TB tests among privately	r insured patients and total numbers of contacts elicited, United States,	2013-2022*

\*QFT, QuantiFERON-TB Gold blood assay; T-SPOT, tuberculosis antigen immunospot assay; TST, tuberculin skin test. †Analysis of Truven Health MarketScan Research Databases (2013–2022) (https://marketscan.truvenhealth.com/marketscanportal). ‡Contact data from 2017–2022 Contact Investigation Report (ARPE Data, Division of Tuberculosis Elimination, Centers for Disease Control and Prevention, Atlanta, Georgia (cited October 9, 2024).

Appendix Table 2. Search strategy used for the review

Database	Strategy
Medline (OVID)	Tuberculosis OR TB OR LTBI AND (outbreak* ADJ5 investigat*) OR (contact* ADJ5 trac*) OR (contact*
1946–	ADJ5 investigat*) OR (epidemiolog* ADJ5 activit*) OR (epidemiolog* ADJ5 investigat*) OR (epidemiolog*
	ADJ5 link*) OR (population ADJ5 surve*) OR public health AND(cost* OR economic* OR expense* OR
	expenditure* OR financ* OR fund* OR resource* OR surveillance OR infrastructure OR staff OR personnel
	OR capital OR dollars OR spend* OR capacity building OR grant* OR investment* OR ec.fs) AND Exp
	United States/ OR United States OR USA OR Alabama OR Alaska OR Arizona OR Arkansas OR California
	OR Colorado OR Connecticut OR Delaware OR Florida OR Georgia OR Hawaii OR Idaho OR Illinois OR
	Indiana OR Iowa OR Kansas OR Kentucky OR Louisiana OR Maine OR Maryland OR Massachusetts OR
	Michigan OR Minnesota OR Mississippi OR Missouri OR Montana OR Nebraska OR Nevada OR New
	Hampshire OR New Jersey OR New Mexico OR New York OR North Carolina OR North Dakota OR Ohio
	OR Oklahoma OR Oregon OR Pennsylvania OR Rhode Island OR South Carolina OR South Dakota OR
	Tennessee OR Texas OR Utah OR Vermont OR Virginia OR Washington OR West Virginia OR Wisconsin
	OR Wyoming OR New England OR Mid-Atlantic OR (U.S. ADJ3 cities) OR United States.gi; Limit English;
	Abstracts Available; Limit to yr = 1990–2024
Embase (OVID)	Tuberculosis OR TB OR LTBI AND (outbreak* ADJ5 investigat*) OR (contact* ADJ5 trac*) OR (contact*
1974–	ADJ5 investigat*) OR (epidemiolog* ADJ5 activit*) OR (epidemiolog* ADJ5 investigat*) OR (epidemiolog*
	ADJ5 link*) OR (population ADJ5 surve*) OR public health AND (cost* OR economic* OR expense* OR
	expenditure" OR funde" OR funde" OR resource" OR surveillance OR infrastructure OR staff OR personnel
	OR capital OR dollars OR spend* OR capacity building OR grant* OR investment*) AND Exp United States/
	OR United States OR USA OR Alabama OR Alaska OR Arizona OR Arkansas OR California OR Colorado
	OR Connecticut OR Delaware OR Florida OR Georgia OR Hawali OR Idano OR Illinois OR Indiana OR Iowa
	OR Kansas OR Kentucky OR Louisiana OR Maine OR Maryand OR Massachusetts OR Michigan OR
	Minnesota OK Mississippi OK Missouri OK Montana OK Nebraska OK Nevada OK New Hampsnire OK
	New Jersey OR New Mexico OR New York OR North Carolina OR North Dakota OR Onio OR Oklanoma
	OR Oregon OR Pennsylvania OR Knode Island OR South Carolina OR South Dakota OR Tennessee OR
	Texas or ottan OR Vermont OR Virginia OR washington OR west Virginia OR wisconsin OR wysoming OR
	New England OR Mid-Atlantic OR (U.S. ADJ3 clues); Limit English; Abstracts Available; Limit to yr = 1990–
CINAHI	Tuberculosis OR TR OR LTRLAND (outbreak* N5 investigat*) OR (contact* N5 trac*) OR (contact* N5
(EBSCOHost)	investigat*) OR (epidemiolog* N5 activit*) OR (epidemiolog* N5 investigat*) OR (epidemiolog* N5 link*) OR
	(population N5 surve*) OR "public health" AND (cost* OR economic* OR expense* OR expenditure* OR
	financ* OR fund* OR resource* OR surveillance OR infrastructure OR staff OR personnel OR capital OR
	dollars OB spend* OB capacity building OB grant* OB investment*) AND "United States" OB USA OB
	Alabama OR Alaska OR Arizona OR Arkansas OR California OR Colorado OR Connecticut OR Delaware
	OR Florida OR Georgia OR Hawaii OR Idaho OR Illinois OR Indiana OR Iowa OR Kansas OR Kentucky OR
	Louisiana OR Maine OR Maryland OR Massachusetts OR Michigan OR Minnesota OR Mississippi OR
	Missouri OR Montana OR Nebraska OR Nevada OR "New Hampshire" OR "New Jersey" OR "New Mexico"
	OR "New York" OR "North Carolina" OR "North Dakota" OR Ohio OR Oklahoma OR Oregon OR
	Pennsylvania OR "Rhode Island" OR "South Carolina" OR "South Dakota" OR Tennessee OR Texas OR
	Utah OR Vermont OR Virginia OR Washington OR "West Virginia" OR Wisconsin OR Wyoming OR "New
	England" OR Mid-Atlantic OR (U.S. N3 cities); Limit English; Abstracts Available; Limit to yr = 1990–2024

Database	Strategy
Scopus	TITLE-ABS-KEY(Tuberculosis OR TB OR LTBI) AND TITLE-ABS-KEY((outbreak* W/5 investigat*) OR
	(contact* W/5 trac*) OR (contact* W/5 investigat*) OR (epidemiolog* W/5 activit*) OR (epidemiolog* W/5
	investigat*) OR (epidemiolog* W/5 link*) OR (population W/5 surve*) OR "public health") AND TITLE-ABS-
	KEY(cost* OR economic* OR expense* OR expenditure* OR financ* OR fund* OR resource* OR
	surveillance OR infrastructure OR staff OR personnel OR capital OR dollars OR spend* OR "capacity
	building" OR grant* OR investment*) AND TITLE-ABS-KEY("United States" OR USA OR Alabama OR
	Alaska OR Arizona OR Arkansas OR California OR Colorado OR Connecticut OR Delaware OR Florida OR
	Georgia OR Hawaii OR Idaho OR Illinois OR Indiana OR Iowa OR Kansas OR Kentucky OR Louisiana OR
	Maine OR Maryland OR Massachusetts OR Michigan OR Minnesota OR Mississippi OR Missouri OR
	Montana OR Nebraska OR Nevada OR "New Hampshire" OR "New Jersey" OR "New Mexico" OR "New
	York" OR "North Carolina" OR "North Dakota" OR Ohio OR Oklahoma OR Oregon OR Pennsylvania OR
	"Rhode Island" OR "South Carolina" OR "South Dakota" OR Tennessee OR Texas OR Utah OR Vermont
	OR Virginia OR Washington OR "West Virginia" OR Wisconsin OR Wyoming OR "New England" OR Mid-
	Atlantic OR (U.S. W/3 cities)) AND NOT INDEX(medline); Limit English; Abstracts Available; Limit to yr =
	1990–2024

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