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Supplementary appendix 2

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Excess tuberculosis cases and deaths following an economic recession in Brazil: an analysis of nationally-representative disease registry data appendix 2

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TABLES

Table S1. Number and proportion of TB excess cases by sex and age group in Brazil over the recession period 2015-2019.

Sex/Age group	Excess cases (Mean)	Excess cases (95% UI)	Proportion of excess cases (%, Mean)	Proportion of excess cases (%, 95% UI)
Men				
Age 0-9	208	(-201, 590)	0.9	(-0.9,2.6)
Age 10-19	-33	(-938, 799)	-0.2	(-4.4, 3.4)
Age 20-29	12284	(10350, 14163)	54.1	(44.1, 66.2)
Age 30-39	3763	(1908, 5487)	16.5	(8.9, 23.6)
Age 40-49	287	(-1314, 1871)	1.1	(-6.3, 7.7)
Age 50-59	214	(-1297, 1666)	0.8	(-6.2, 7.0)
Age 60-69	1260	(105, 2346)	5.5	(0.5, 10.1)
Age 70-79	639	(-73, 1303)	2.8	(-0.3, 5.8)
Age 80+	313	(-101, 704)	1.4	(-0.4, 3.1)
Women				
Age 0-9	33	(-298, 344)	0.1	(-1.4, 1.5)
Age 10-19	147	(-570, 856)	0.6	(-2.7, 3.7)
Age 20-29	837	(-248, 1879)	3.6	(-1.1, 8.2)
Age 30-39	253	(-811, 1295)	1.0	(-3.9, 5.5)
Age 40-49	-1	(-942, 910)	-0.1	(-4.5, 3.9)
Age 50-59	701	(-129, 1518)	3.1	(-0.6, 6.6)
Age 60-69	1114	(473, 1741)	4.9	(2.1, 7.7)
Age 70-79	498	(49, 917)	2.2	(0.2, 4.1)
Age 80+	353	(56, 631)	1.6	(0.3, 2.8)
Total	22869	(18126, 27528)	100	NA

Table S2. Number and proportion of TB excess cases by in Brazil over the recession period 2015-2019.

State	Excess cases (Mean)	Excess cases (95% UI)	Proportion of recorded to predicted cases (%, Mean)	Proportion of recorded to predicted cases (%, 95% UI)
North				
Acre (AC)	-13	(-408, 358)	99.5	(85.4, 117.6)
Amazonas (AM)	303	(-847, 1399)	101.7	(95.6, 108.2)
Amapá (AP)	452	(236, 638)	146.0	(119.7, 180.3)
Pará (PA)	3730	(2677, 4735)	119.0	(113.0, 125.4)
Rondônia (RO)	-310	(-820, 163)	92.3	(81.8, 104.6)
Roraima (RR)	348	(121, 529)	143.9	(111.8, 186.3)
Tocantins (TO)	194	(-35, 382)	121.0	(97.0, 151.9)
Northeast				
Alagoas (AL)	47	(-560, 593)	100.8	(91.9, 110.3)
Bahia (BA)	2390	(1329, 3434)	109.3	(104.9, 113.9)
Ceará (CE)	3532	(2640, 4415)	119.0	(113.6, 125.0)
Maranhão (MA)	3151	(2506, 3773)	132.0	(123.9, 140.9)
Paraíba (PB)	-230	(-867, 381)	96.8	(88.8, 105.8)
Pernambuco (PE)	778	(-557, 2030)	102.7	(98.2, 107.2)
Piauí (PI)	513	(124, 873)	114.3	(103.1, 127.1)
Rio Grande do Norte (RN)	217	(-425, 801)	103.2	(94.2, 113.1)
Sergipe (SE)	-203	(-799, 105)	95.6	(84.6, 108.6)
Southeast				
Espírito Santo (ES)	752	(202, 1273)	111.9	(102.9, 122.0)
Minas Gerais (MG)	1327	(299, 2282)	106.5	(101.4, 111.7)
Rio de Janeiro (RJ)	9331	(7591, 11028)	114.8	(111.7, 118.0)
São Paulo (SP)	3042	(630, 5367)	103.0	(100.6, 105.3)
South				
Paraná (PR)	835	(68, 1591)	106.7	(100.5, 113.7)
Rio Grande do Sul (RS)	-1386	(-2831, -43)	96.0	(92.1, 99.9)
Santa Catarina (SC)	-864	(-1722, -20)	93.1	(87.1, 99.8)
Midwest				
Distrito Federal (DF)	-562	(-1011, -166)	78.6	(67.1, 92.6)
Goiás (GO)	256	(-339, 804)	104.4	(94.8, 115.1)
Mato Grosso do Sul (MS)	474	(-124, 1021)	108.0	(98.1, 119.0)
Mato Grosso (MT)	-5236	(-6296, 4217)	59.2	(54.7, 64.3)

Total	22869	(18126, 27528)	105.2	(104.1, 106.3)
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Table S3. Linear models of association of ratio of recorded to predicted cases with extreme poverty rate.

Coefficients	Estimates	Std.Error	Pr(> t)
<i>Model</i>			
Intercept†	0.999	0.049	<0.0001
Absolute increase in the average extreme poverty rate (<US \$1.9 using 2011 purchasing power parity) from pre-recession to recession	0.044	0.024	0.078

† The intercept represents the value of outcome (ratio of observed to predicted TB cases) when the explanatory variable is equal to zero.

FIGURES

Figure S1a. Pre-recession trends of rates of TB case notifications, absolute and excess cases in men by age group in Brazil over 2010 to 2019.

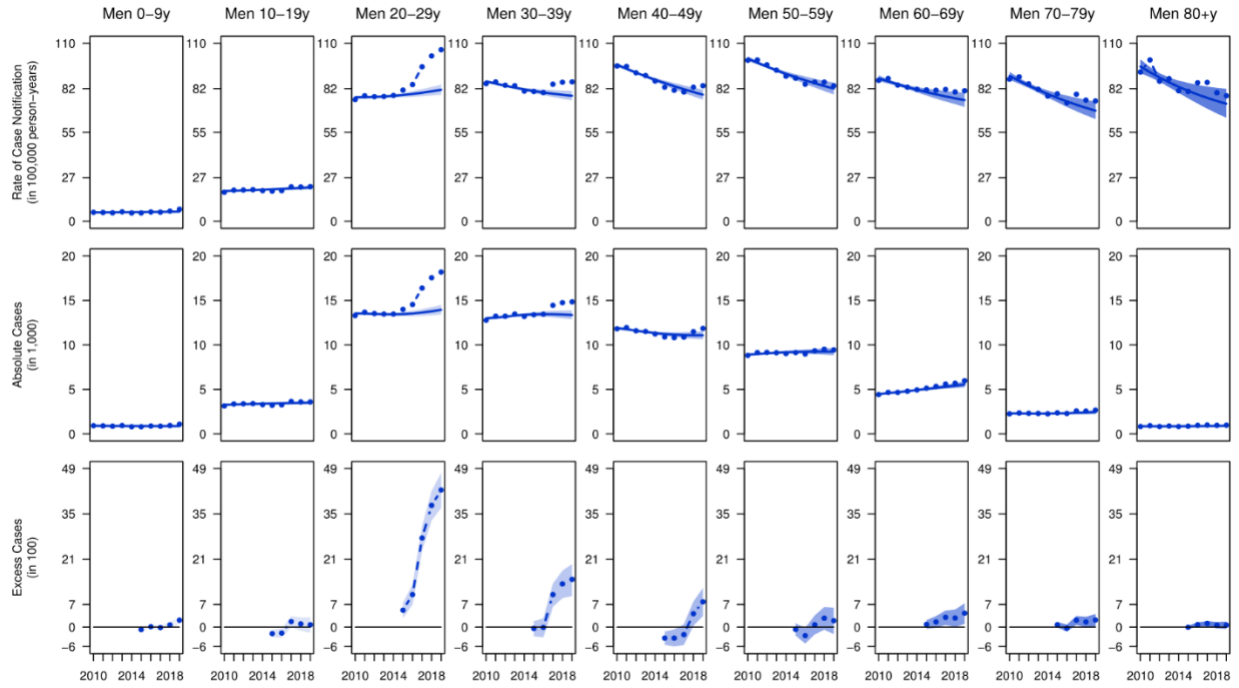


Figure S1b. Pre-recession trends of rates of TB case notifications, absolute and excess cases in women by age group in Brazil over 2010 to 2019.

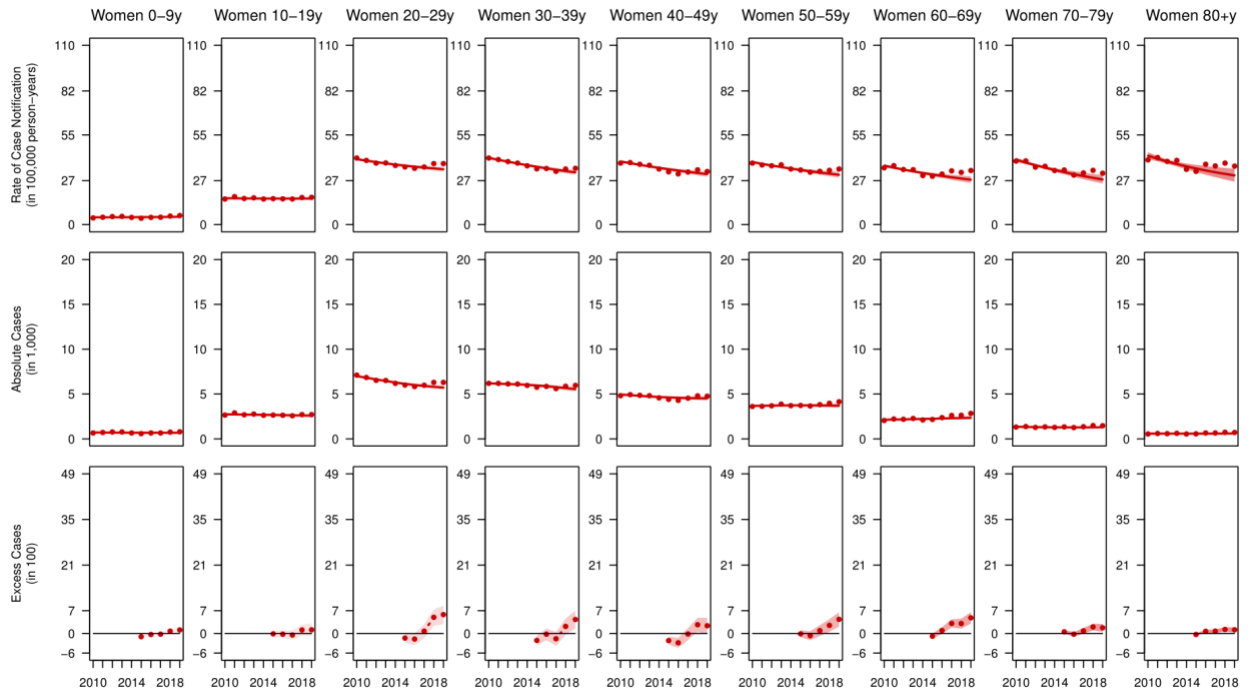


Figure S2. Pre-recession trends of rates of TB case notifications, absolute and excess cases by *state* in Brazil over 2010 to 2019.

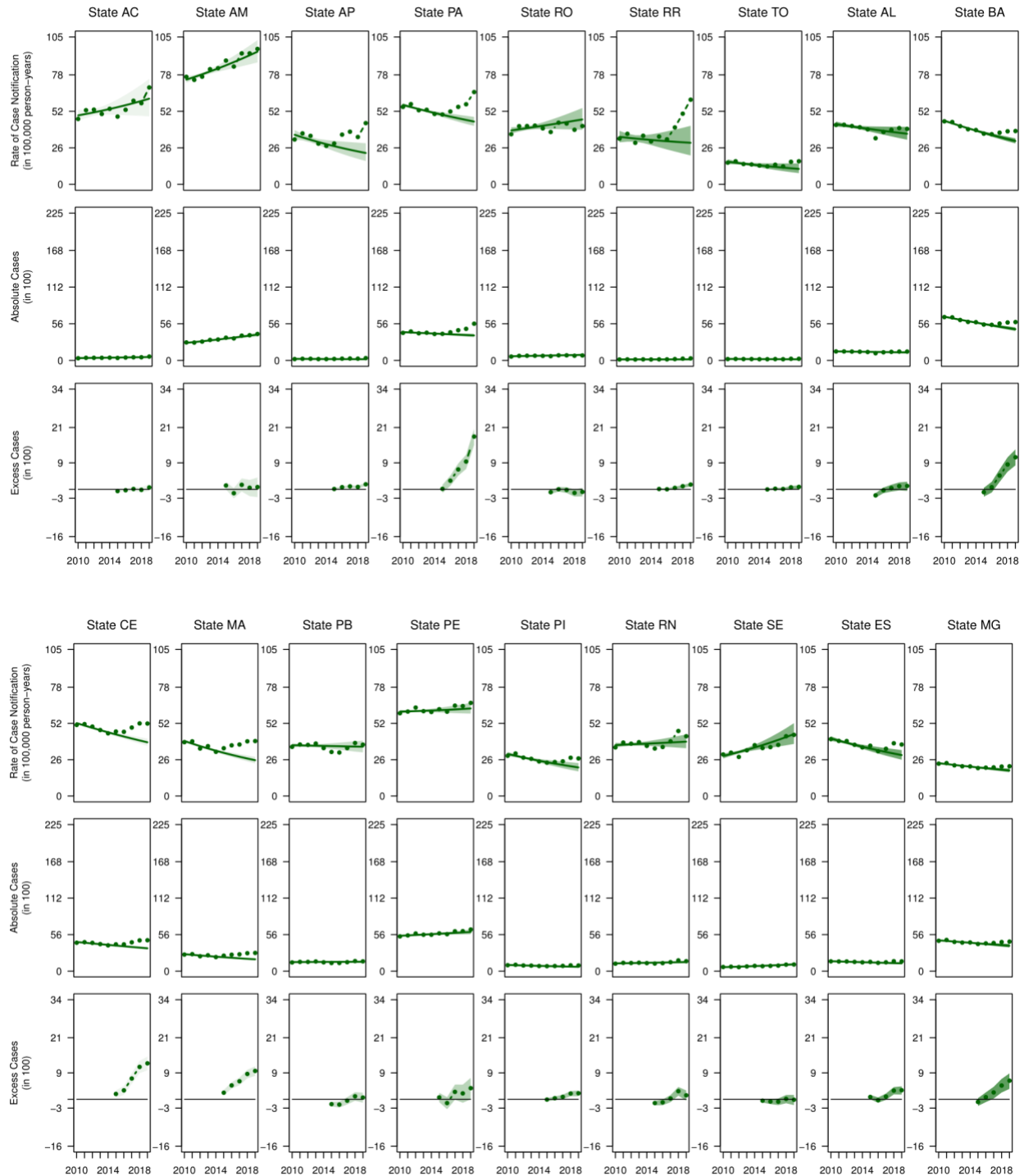
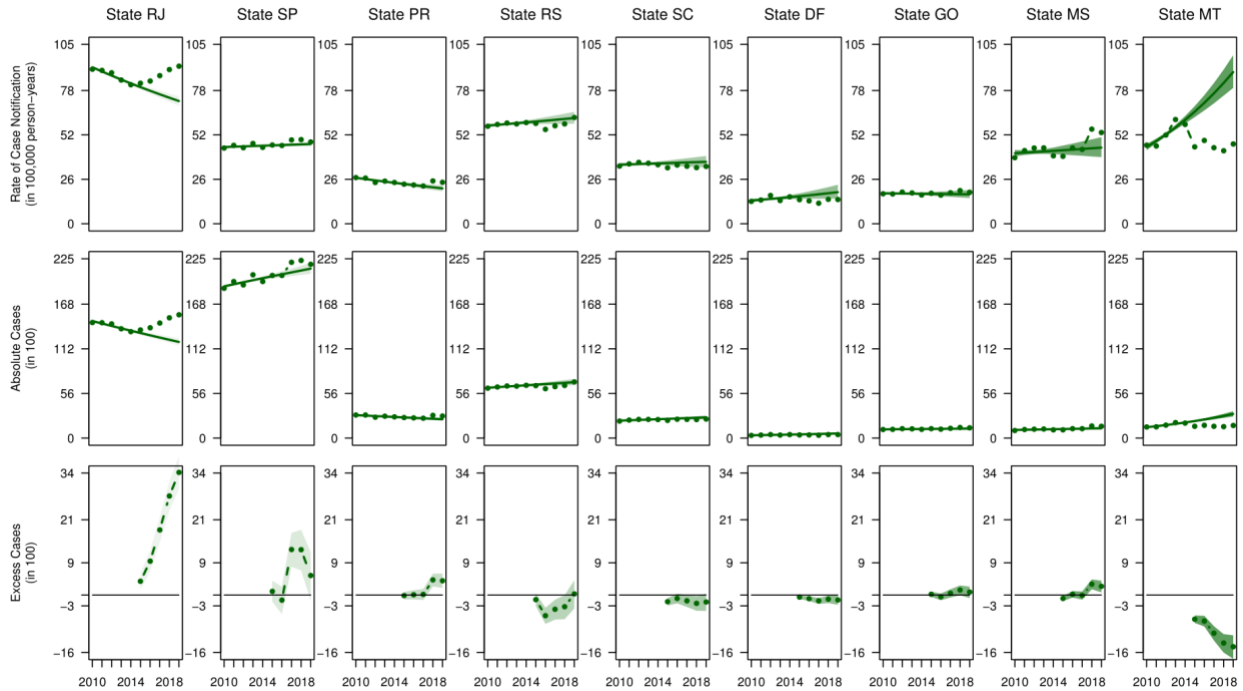


Figure S2 (Continued). Pre-recession trends of rates of TB case notifications, absolute and excess cases by *state* in Brazil over 2010 to 2019.



State Abbreviations:

North: AC- Acre, AM-Amazonas, AP-Amapá, PA-Pará, RO- Rondônia, RR-Roraima, TO-Tocantins

Northeast: AL-Alagoas, BA-Bahia, CE-Ceará, MA-Maranhão, PB-Paraíba, PE-Pernambuco, PI-Piauí, RN-Rio Grande do Norte, SE-Sergipe

Southeast: ES-Espírito Santo, MG-Minas Gerais, RJ-Rio de Janeiro, SP-São Paulo

South: PR-Paraná, RS-Rio Grande do Sul, SC-Santa Catarina,

Midwest: DF-Distrito Federal, GO-Goiás, MS-Mato Grosso do Sul, MT-Mato Grosso.

Figure S3a. Pre-recession trends of rates of TB deaths, absolute and excess deaths in *men* by age group in Brazil over 2010 to 2019.

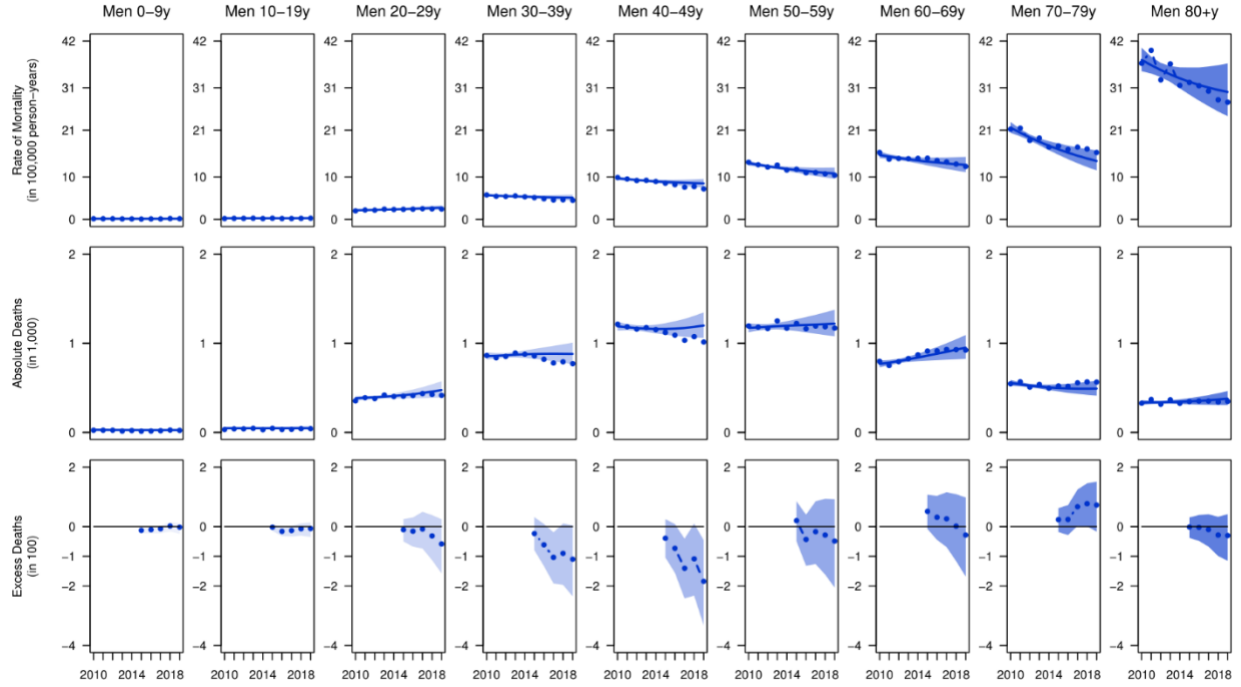


Figure S3b. Pre-recession trends of rates of TB deaths, absolute and excess deaths in *women* by age group in Brazil over 2010 to 2019.

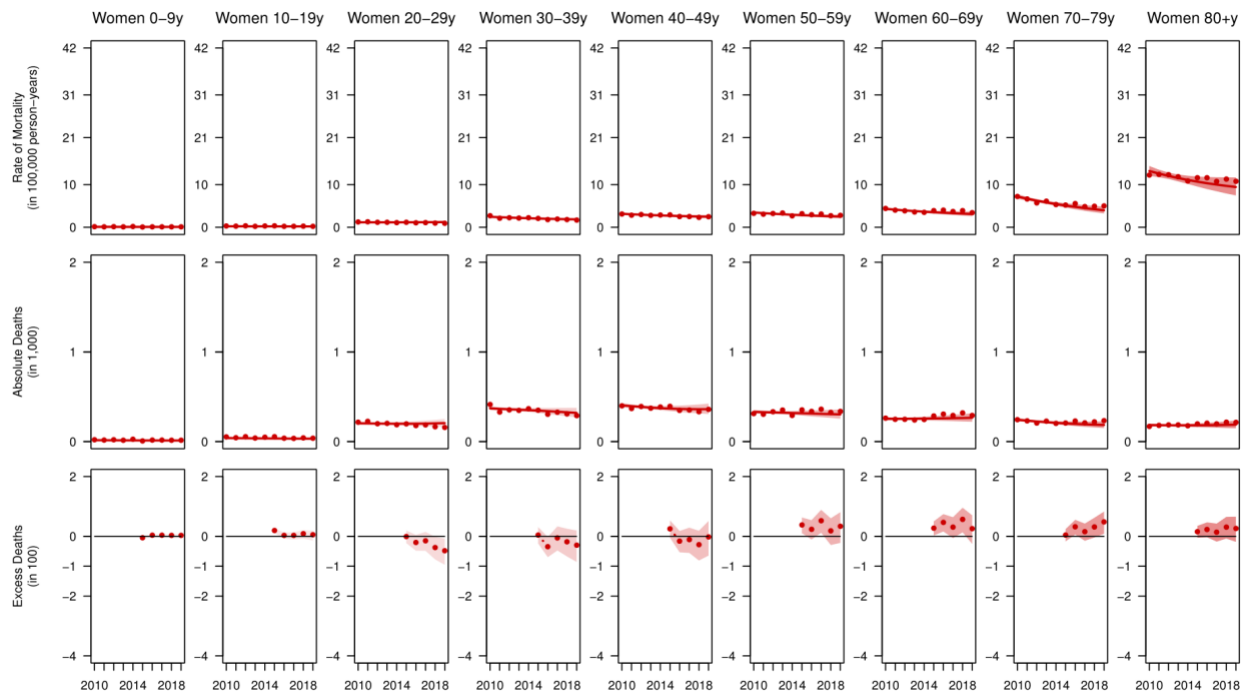


Figure S4. Pre-recession trends of rates of TB deaths, absolute and excess deaths by *state* in Brazil over 2010 to 2019.

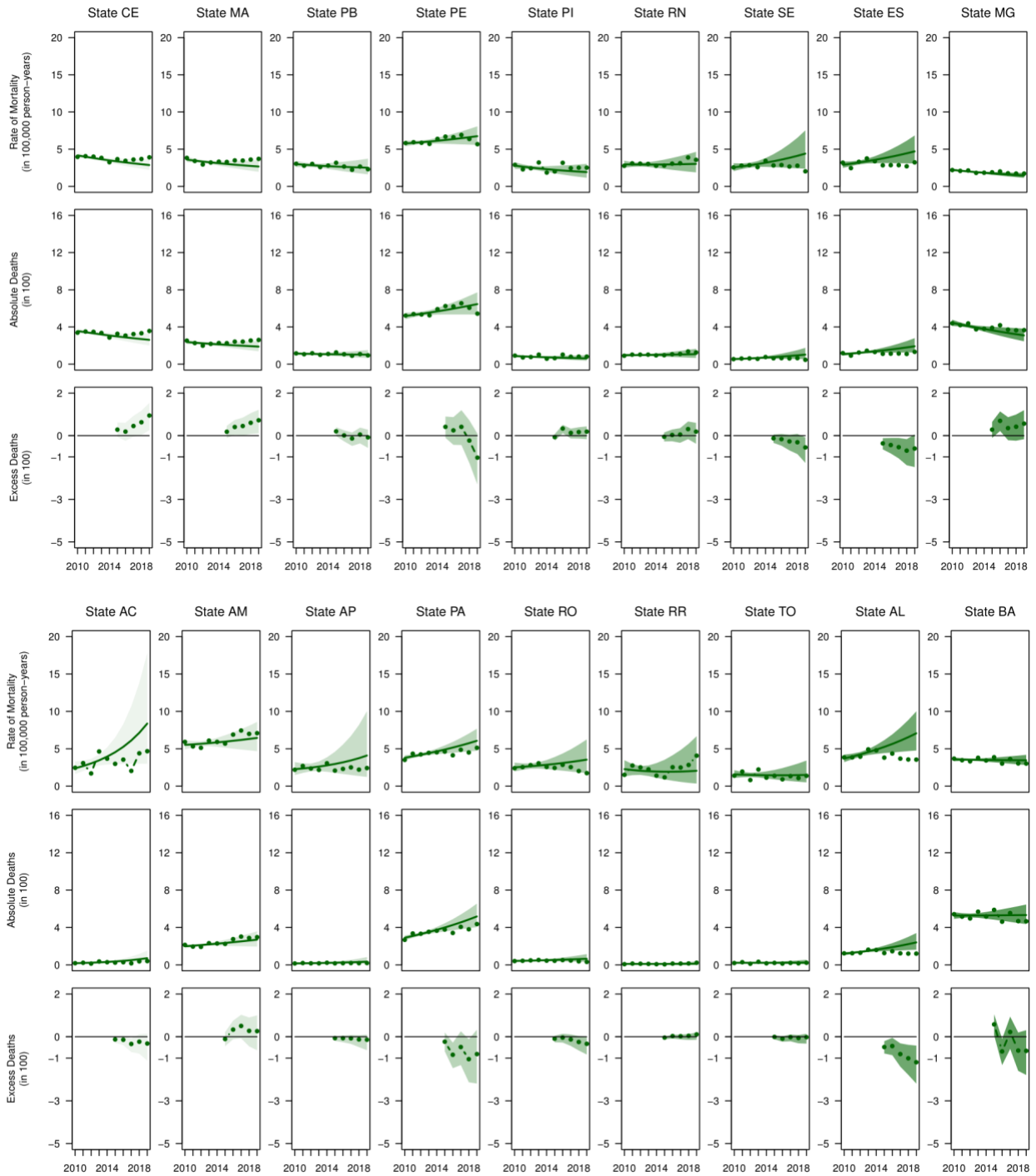
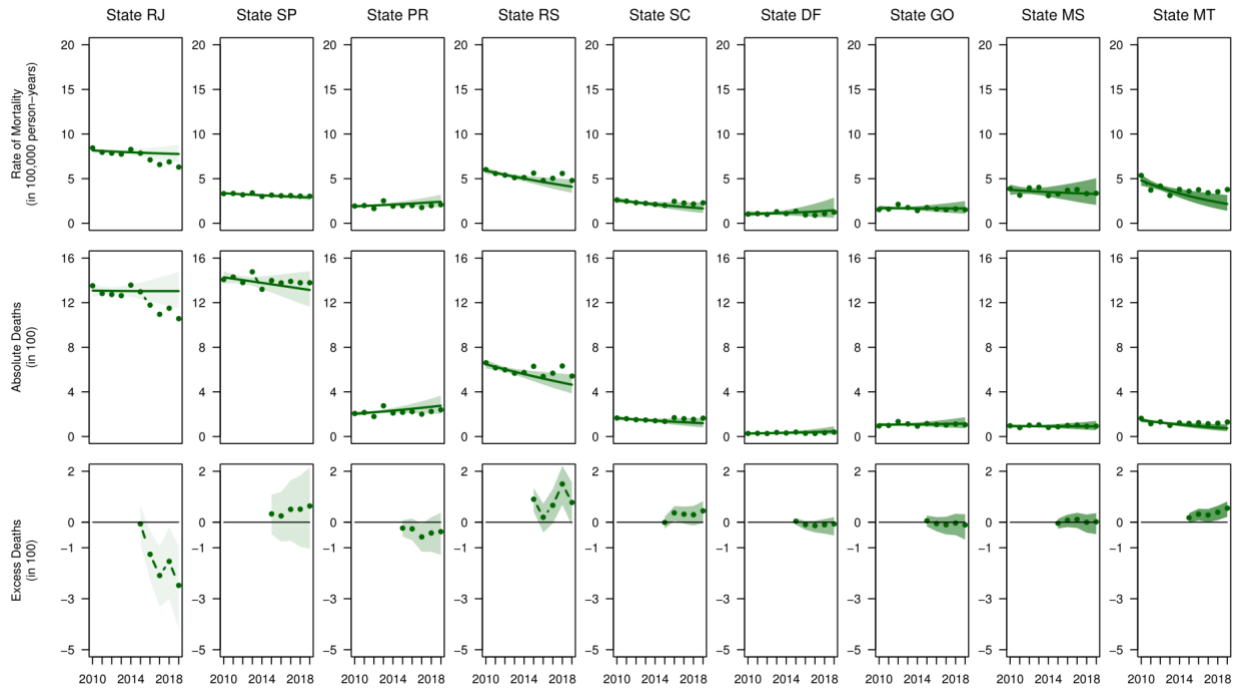


Figure S4 (Continued). Pre-recession trends of rates of TB deaths, absolute and excess deaths by *state* in Brazil over 2010 to 2019.



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Figure S5a. Sensitivity analysis (1) results: Estimates of total excess cases and total excess deaths among total population and men ages 20–29 years during recession over 2015–2019, with different lengths of pre-recession periods (from 3 years of 2012–2014 to 14 years of 2001–2014).

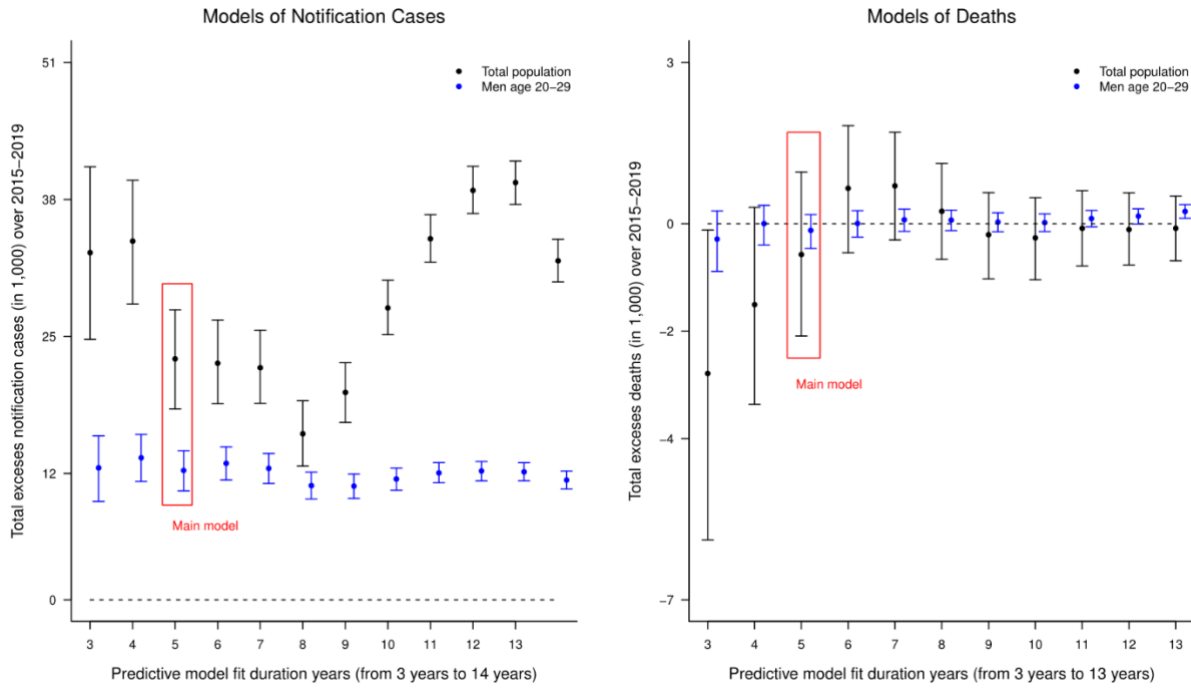
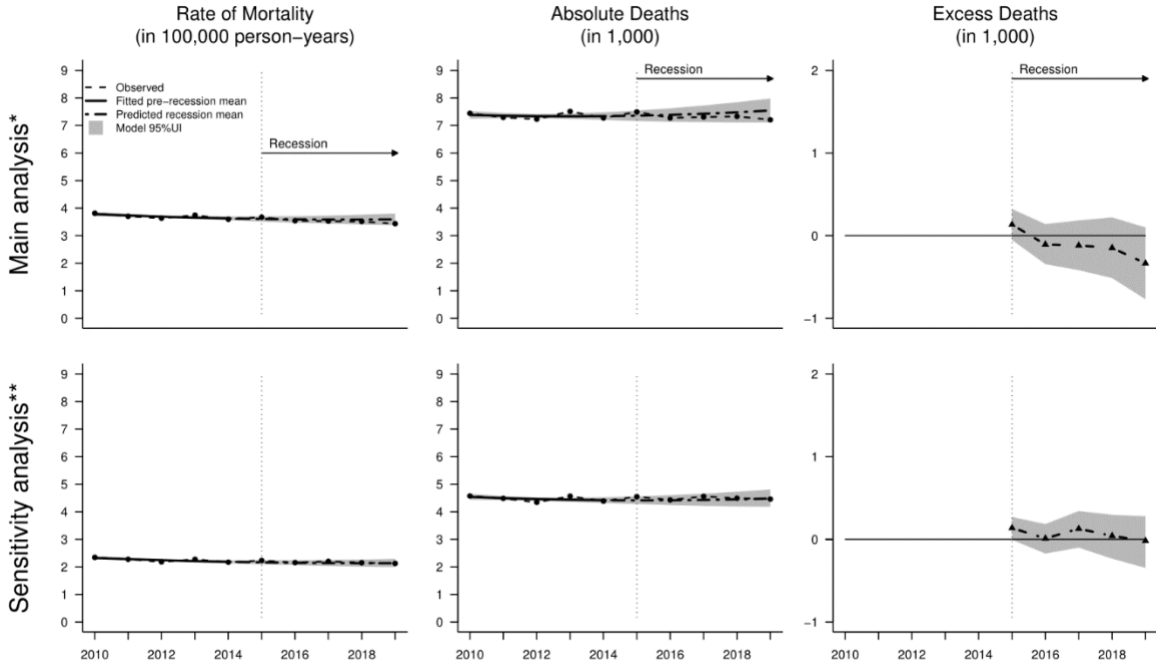


Figure S5b. Sensitivity analysis (2) results: Estimates of total excess deaths with alternative criteria for defining TB deaths among total population over 2010 to 2019.



*For the main analysis, TB deaths were defined as a death with ICD-10 codes A15.0-A19.9, K67.3, K93.0, M49.0, N74.0-N74.1, P37.0, or B20.0 listed as a primary or secondary cause.

**In sensitivity analyses we recalculated results with a restrictive definition of TB death (deaths with A15.0-A19.9 listed as primary cause).