

Supplementary Tables for Surveillance Summary, “Asthma Surveillance by Sociodemographic Characteristics and Geographic Areas Including Rural and Urban, 2006–2018”

Table S1. Characteristics of all survey respondents and of those with current asthma among all ages, children, and adults — 2016–2018 National Health Interview Survey

Characteristic	All survey respondents			Current asthma								
				All ages			Children			Adults		
	Weighted, n	% (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Total	320,600,934	—	—	25,486,467	8.0 (0.12)	7.7–8.2	5,947,939	8.1 (0.55)	7.7–8.6	19,538,528	7.9 (0.13)	7.7–8.2
Sex				p<0.001*			p<0.001*			p<0.001*		
Male	156,735,463	48.9 (0.20)	48.5–49.3	10,183,123	6.5 (0.15)	6.2–6.8	3,383,861	9.0 (0.33)	8.4–9.7	6,799,262	5.7 (0.16)	5.4–6.0
Female	163,865,471	51.1 (0.20)	50.7–51.5	15,303,345	9.4 (0.17)	9.0–9.7	2,564,079	7.1 (0.29)	6.6–7.7	12,739,266	10.0 (0.20)	9.6–10.4
Age group (years)				p<0.001*			p<0.001*			p=0.0002*		
0–4	19,788,580	6.2 (0.09)	6.0–6.4	793,191	4.0 (0.30)	3.5–4.7	793,191	4.0 (0.30)	3.5–4.7	—	—	—
5–11	28,929,462	9.0 (0.12)	8.8–9.3	2,549,066	8.8 (0.37)	8.1–9.6	2,549,066	8.8 (0.37)	8.1–9.6	—	—	—
12–17	24,797,881	7.7 (0.10)	7.5–7.9	2,605,683	10.5 (0.42)	9.7–11.4	2,605,683	10.5 (0.42)	9.7–11.4	—	—	—
18–24	29,477,693	9.2 (0.17)	8.9–9.5	2,593,225	8.8 (0.45)	8.0–9.7	—	—	—	2,593,225	8.8 (0.45)	8.0–9.7
25–34	43,965,209	13.7 (0.16)	13.4–14.0	3,097,891	7.1 (0.28)	6.5–7.6	—	—	—	3,097,891	7.1 (0.28)	6.5–7.6
35–64	123,983,610	38.7 (0.21)	38.3–39.1	10,179,374	8.2 (0.19)	7.9–8.6	—	—	—	10,179,374	8.2 (0.19)	7.9–8.6

Characteristic	All survey respondents			Current asthma								
				All ages			Children			Adults		
	Weighted, n	% (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
≥65	49,658,497	15.5 (0.21)	15.1–15.9	3,668,038	7.4 (0.21)	7.0–7.8	—	—	—	3,668,038	7.4 (0.21)	7.0–7.8
Race and ethnicity				p<0.001*			p<0.001*			p<0.001*		
White NH	195,037,870	61.0 (0.77)	59.4–62.5	15,496,008	8.0 (0.13)	7.7–8.2	2,560,627	6.8 (0.27)	6.3–7.4	12,935,381	8.2 (0.14)	8.0–8.5
Black NH	38,795,475	12.1 (0.42)	11.3–13.0	4,159,143	10.7 (0.35)	10.1–11.5	1,391,780	14.2 (0.75)	12.8–15.8	2,767,363	9.6 (0.39)	8.8–10.4
AI/AN NH	2,415,521	0.8 (0.16)	0.5–1.1	252,177	10.4 (1.42)	8.0–13.6	64,276	10.2 (2.96)	5.6–17.6	187,901	10.5 (1.53)	7.9–13.9
Asian NH	18,331,976	5.7 (0.24)	5.3–6.2	829,238	4.5 (0.36)	3.9–5.3	142,508	3.8 (0.50)	3.0–5.0	686,730	4.7 (0.42)	3.9–5.6
Multiple NH	7,253,554	2.3 (0.09)	2.1–2.4	952,212	13.1 (0.96)	11.4–15.1	398,771	13.0 (1.17)	10.9–15.5	553,441	13.3 (1.33)	10.9–16.1
Hispanic	58,154,889	18.2 (0.69)	16.8–19.6	3,746,988	6.5 (0.30)	5.9–7.1	1,380,782	7.5 (0.46)	6.6–8.4	2,366,206	6.0 (0.35)	5.3–6.7
				p<0.001*			p=0.0008*			p<0.001*		
Puerto Rican [†]	5,584,176	9.6 (0.69)	8.3–11.0	780,533	14.0 (1.17)	11.9–16.5	228,118	13.6 (1.89)	10.3–17.8	552,414	14.2 (1.40)	11.7–17.2
Mexican [†]	35,714,553	61.4 (1.74)	57.9–64.8	1,916,450	5.4 (0.31)	4.8–6.0	782,776	6.6 (0.49)	5.7–7.6	1,133,674	4.8 (0.39)	4.1–5.6
Other Hispanic [†]	16,856,160	29.0 (1.51)	26.1–32.0	1,050,005	6.3 (0.52)	5.3–7.3	369,888	7.6 (0.87)	6.0–9.5	680,117	5.7 (0.57)	4.7–6.9
Ratio of family income to federal poverty threshold				p<0.001*			p<0.001*			p<0.001*		

Characteristic	All survey respondents			Current asthma								
				All ages			Children			Adults		
	Weighted, n	% (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
<100% FPL	43,162,955	13.5 (0.29)	12.9–14.0	4,922,695	11.4 (0.37)	10.7–12.2	1,435,503	10.6 (0.66)	9.3–11.9	3,487,193	11.8 (0.40)	10.7–12.3
100% to <250% FPL	87,072,246	27.2 (0.34)	26.5–27.8	7,216,540	8.3 (0.21)	7.9–8.7	2,036,836	8.8 (0.40)	8.1–9.7	5,179,704	8.1 (0.23)	7.6–8.5
250% to <450% FPL	82,890,024	25.9 (0.26)	25.4–26.4	6,056,514	7.3 (0.22)	6.9–7.8	1,305,116	7.2 (0.38)	6.4–8.0	4,751,399	7.4 (0.25)	6.9–8.0
≥450% FPL	107,475,709	33.5 (0.52)	32.5–34.3	7,290,718	6.8 (0.18)	6.5–7.2	1,170,485	6.3 (0.34)	5.7–7.0	6,120,233	6.9 (0.20)	6.7–7.4
US Census regions and divisions												
Region				p=0.0033*			p=0.0100*			p=0.0012*		
Northeast	56,983,341	17.8 (0.73)	16.4–19.3	5,050,436	8.9 (0.31)	8.3–9.5	1,142,095	9.1 (0.76)	7.8–10.7	3,908,341	8.8 (0.33)	8.2–9.5
				p=0.0001*			p=0.114			p=0.0003*		
New England	1,5011,018	26.3 (1.46)	23.6–29.3	1,614,816	10.8 (0.54)	9.8–11.9	341,080	11.0 (1.43)	8.5–14.2	1,273,736	10.7 (0.58)	9.6–11.9
Middle Atlantic	41,972,323	73.7 (1.46)	70.7–76.4	3,435,620	8.2 (0.34)	7.6–8.9	801,015	8.5 (0.70)	7.2–10.0	2,634,605	8.1 (0.39)	7.4–8.9
Midwest	69,891,347	21.8 (0.63)	20.6–23.1	5,669,742	8.1 (0.22)	7.7–8.6	1,243,798	8.0 (0.41)	7.2–8.8	4,425,944	8.2 (0.23)	7.7–8.6
				p=0.156			p=0.099			p=0.419		
East North Central	48,231,231	69.0 (1.32)	66.4–71.5	4,008,150	8.3 (0.27)	7.8–8.9	893,035	8.4 (0.48)	7.6–9.4	3,115,115	8.3 (0.29)	7.7–8.9
West North Central	21,660,116	31.0 (1.32)	28.5–33.6	1,661,592	7.7 (0.36)	7.0–8.4	350,762	7.1 (0.68)	5.8–8.5	1,310,829	7.9 (0.44)	7.1–8.8

Characteristic	All survey respondents			Current asthma								
				All ages			Children			Adults		
	Weighted, n	% (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
South	117,084,584	36.5 (1.01)	34.6–38.5	8,902,468	7.6 (0.19)	7.2–8.0	2,324,759	8.5 (0.37)	7.8–9.2	6,577,709	7.4 (0.21)	7.0–7.8
				p=0.410			p=0.581			p=0.331		
South Atlantic	61,438,208	52.5 (1.10)	50.3–54.6	4,808,981	7.8 (0.26)	7.3–8.4	1,208,392	8.7 (0.51)	7.8–9.8	3,600,589	7.6 (0.28)	7.1–8.1
East South Central	18,074,125	15.4 (0.77)	14.0–17.0	1,350,401	7.5 (0.37)	6.8–8.2	320,681	7.7 (0.81)	6.3–9.5	1,029,720	7.4 (0.42)	6.6–8.3
West South Central	37,572,251	32.1 (1.06)	30.0–34.2	2,743,085	7.3 (0.31)	6.7–7.9	795,686	8.5 (0.60)	7.3–9.7	1,947,399	6.9 (0.34)	6.3–7.6
West	76,641,661	23.9 (0.94)	22.1–25.8	5,863,821	7.7 (0.28)	7.1–8.2	1,237,288	6.9 (0.38)	6.2–7.7	4,626,534	7.9 (0.31)	7.3–8.5
				p=0.0132*			p=0.931			p=0.0006*		
Mountain	25,126,774	32.8 (1.81)	29.3–36.4	2,131,561	8.5 (0.43)	7.7–9.4	433,482	6.9 (0.79)	5.5–8.6	1,698,079	9.1 (0.38)	8.3–9.8
Pacific	51,514,887	67.2 (1.81)	63.6–70.7	3,732,260	7.3 (0.27)	6.8–7.8	803,806	7.0 (0.41)	6.2–7.8	2,928,454	7.4 (0.31)	6.8–8.0
MSA status				p=0.009*			p=0.103			p=0.0435*		
Large MSA	182,494,015	56.9 (0.74)	55.5–58.4	13,981,756	7.7 (0.15)	7.4–8.0	3,242,332	7.7 (0.28)	7.2–8.3	10,739,424	7.7 (0.16)	7.4–8.0
Small MSA	96,095,562	30.0 (1.25)	27.6–32.5	8,082,693	8.4 (0.20)	8.0–8.8	1,948,888	8.7 (0.39)	8.0–9.5	6,133,805	8.3 (0.22)	7.9–8.8
Non-MSA	42,011,357	13.1 (1.10)	11.1–15.4	3,422,018	8.2 (0.31)	7.6–8.8	756,719	8.3 (0.59)	7.2–9.5	2,665,299	8.1 (0.32)	7.5–8.8

Abbreviations: Prev = prevalence percent, the proportion of the population who reported having current asthma; SE = standard error; CI = confidence interval; NH = non-Hispanic; AI/AN = American Indian or Alaska Native; FPL = Federal Poverty Level; MSA = metropolitan statistical area.

* p-value for chi-square test is statistically significant at 0.05.

[†] As a subset of Hispanic.

Table S2. Percentage with current asthma by selected characteristics and metropolitan statistical area (MSA) status among all ages, children, and adults — 2016–2018 National Health Interview Survey

Characteristic	Current Asthma								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
All ages									
Total	13,981,756	7.7 (0.15)	7.4–8.0	8,082,693	8.4 (0.20)	8.0–8.8	3,422,018	8.2 (0.31)	7.6–8.8
Sex	p<0.001*			p<0.001*			p<0.001*		
Male	5,600,290	6.3 (0.19)	5.9–6.7	3,210,183	6.8 (0.24)	6.3–7.3	1,372,650	6.8 (0.35)	6.1–7.5
Female	8,381,466	9.0 (0.21)	8.6–9.4	4,872,511	10.0 (0.28)	9.5–10.6	2,049,368	9.4 (0.43)	8.6–10.3
Age group (years)	p<0.001*			p<0.001*			p<0.001*		
0–4	446,522	3.9 (0.44)	3.2–4.9	276,339	4.6 (0.50)	3.7–5.6	70,330	3.0 (0.64)	2.0–4.6
5–11	1,439,070	8.7 (0.48)	7.8–9.7	846,910	9.7 (0.66)	8.4–11.0	263,086	7.4 (0.75)	6.0–9.0
12–17	1,356,740	9.7 (0.50)	8.7–10.7	825,640	11.1 (0.74)	9.7–12.6	423,303	13.0 (1.40)	10.5–16.0
18–24	1,352,869	8.2 (0.60)	7.1–9.5	865,742	9.3 (0.74)	8.0–10.9	374,614	10.1 (1.06)	8.2–12.4
25–34	1,847,548	7.1 (0.37)	6.4–7.8	940,600	7.2 (0.53)	6.3–8.3	309,743	6.6 (0.70)	5.3–8.1
35–64	5,723,108	8.0 (0.23)	7.5–8.4	3,082,072	8.7 (0.30)	8.1–9.3	1,374,194	8.4 (0.49)	7.5–9.5
65+	1,815,899	7.1 (0.31)	6.5–7.7	1,245,391	7.8 (0.38)	7.1–8.6	606,747	7.5 (0.44)	6.7–8.4
Race and ethnicity	p<0.001*			p<0.001*			p=0.0085*		

Characteristic	Current Asthma								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
White NH	7,673,427	7.8 (0.19)	7.5–8.2	5,240,164	8.2 (0.24)	7.7–8.7	2,582,418	7.9 (0.33)	7.3–8.6
Black NH	2,646,018	10.6 (0.48)	9.7–11.6	1,165,953	11.0 (0.66)	9.8–12.4	347,171	11.2 (1.25)	9.0–13.9
AI/AN NH	90,035	13.1 (3.20)	8.0–20.8	43,486	9.3 (2.75)	5.1–16.2	118,656	9.4 (1.77)	6.5–13.5
Asian NH	689,390	4.6 (0.40)	3.9–5.5	118,131	4.0 (0.67)	2.8–5.5	21,718	4.6 (1.70) [†]	2.2–9.3
Multiple NH	478,121	12.8 (1.34)	10.4–15.7	356,983	14.2 (1.78)	11.0–18.0	117,109	11.9 (2.08)	8.4–16.6
Hispanic	2,386,867	6.1 (0.33)	5.4–6.7	1,138,274	7.5 (0.46)	6.7–8.5	221,847	6.4 (1.23)	4.3–9.3
	p<0.001*			p<0.001*			p=0.328		
Puerto Rican [§]	492,684	13.8 (1.50)	11.1–17.0	245,900	14.2 (1.73)	11.1–17.9	41,948	15.7 (6.85) [†]	6.3–34.0
Mexican [§]	1,116,771	5.0 (0.37)	4.3–5.8	647,748	6.2 (0.43)	5.4–7.1	151,931	5.4 (1.29)	3.3–8.5
Other Hispanic [§]	777,411	5.8 (0.59)	4.7–7.0	244,625	8.4 (1.21)	6.3–11.1	27,969	7.4 (2.06)	4.3–12.6
Ratio of family income to federal poverty threshold	p<0.001*			p<0.001*			p<0.001*		
<100% FPL	2,369,435	11.0 (0.52)	10.0–12.1	1,675,502	11.9 (0.52)	10.9–12.9	877,759	8.2 (0.31)	7.6–8.8
100% to <250% FPL	3,539,981	7.9 (0.30)	7.3–8.5	2,460,217	8.8 (0.37)	8.1–9.6	1,216,342	8.7 (0.45)	7.9–9.6
250% to <450% FPL	3,344,490	7.4 (0.30)	6.8–8.0	1,936,180	7.5 (0.36)	6.8–8.2	775,845	6.7 (0.50)	5.8–7.7
≥450% FPL	4,727,851	6.7 (0.22)	6.3–7.2	2,010,794	7.2 (0.34)	6.6–7.9	552,072	6.2 (0.53)	5.2–7.3
Children									

Characteristic	Current Asthma								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Total	3,242,332	7.7 (0.28)	7.2–8.3	1,948,888	8.7 (0.39)	8.0–9.5	756,719	8.3 (0.59)	7.2–9.5
Sex	p=0.0023*			p=0.0049*			p=0.150		
Male	1,817,207	8.6 (0.44)	7.8–9.5	1,141,986	9.8 (0.60)	8.7–11.0	424,667	9.1 (0.81)	7.6–10.8
Female	1,425,125	6.8 (0.37)	6.1–7.6	806,902	7.6 (0.49)	6.7–8.6	332,052	7.4 (0.85)	5.9–9.3
Age group (years)	p<0.001*			p<0.001*			p<0.001*		
0–4	446,522	3.9 (0.44)	3.2–4.9	276,339	4.6 (0.50)	3.7–5.6	70,330	3.0 (0.64)	2.0–4.6
5–11	1,439,070	8.7 (0.48)	7.8–9.7	846,910	9.7 (0.66)	8.4–11.0	263,086	7.4 (0.75)	6.0–9.0
12–17	1,356,740	9.7 (0.50)	8.7–10.7	825,640	11.1 (0.74)	9.7–12.6	423,303	13.0 (1.40)	10.5–16.0
Race and ethnicity	p<0.001*			p<0.001*			p=0.0231*		
White NH	1,240,868	6.6 (0.38)	5.9–7.4	861,096	6.9 (0.46)	6.1–7.9	458,663	7.3 (0.64)	6.1–8.7
Black NH	901,826	14.5 (1.05)	12.6–16.7	390,504	14.1 (1.30)	11.7–16.8	99,450	12.5 (1.81)	9.4–16.5
AI/AN NH	22,572	13.5 (5.92) [†]	5.5–29.7	N/A	N/A		— [¶]	— [¶]	— [¶]
Asian NH	121,612	4.0 (0.61)	2.9–5.4	18,153	3.2 (1.11) [†]	1.6–6.3	— [¶]	— [¶]	— [¶]
Multiple NH	198,529	12.7 (1.83)	9.5–16.7	159,961	14.6 (1.83)	11.4–18.6	40,282	9.9 (2.44)	6.0–15.8
Hispanic	756,925	6.3 (0.47)	5.4–7.3	506,152	9.7 (0.89)	8.1–11.6	117,705	9.5 (2.66)	5.4–16.1
	p=0.0054*			p=0.126			p=0.567		

Characteristic	Current Asthma								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Puerto Rican [§]	124,706	12.3 (2.05)	8.8–16.9	77,084	13.9 (2.86)	9.2–20.5	N/A	N/A	N/A
Mexican [§]	389,114	5.4 (0.55)	4.4–6.5	314,094	8.6 (0.89)	7.0–10.5	79,568	8.0 (2.80) [†]	4.0–15.5
Other Hispanic [§]	243,105	6.5 (0.89)	5.0–8.5	114,974	11.5 (2.47)	7.5–17.3	11,809	8.4 (2.74) [†]	4.4–15.6
Ratio of family income to federal poverty threshold	p=0.0004*			p<0.001*			p=0.0044*		
<100% FPL	709,867	7.7 (0.28)	7.2–8.3	510,548	11.4 (0.98)	9.6–13.5	215,088	9.7 (1.51)	7.1–13.1
100% to <250% FPL	994,700	8.1 (0.55)	7.1–9.2	718,767	9.7 (0.75)	8.3–11.3	323,369	9.7 (1.03)	7.8–11.9
250% to <450% FPL	740,128	7.4 (0.55)	6.4–8.5	427,094	7.4 (0.69)	6.2–8.9	137,894	5.6 (0.75)	4.3–7.3
≥450% FPL	797,637	6.3 (0.42)	5.5–7.1	292,480	6.3 (0.62)	5.2–7.7	80,368	6.8 (1.15)	4.9–9.5
Adults									
Total	10,739,424	7.7 (0.16)	7.4–8.0	6,133,805	8.3 (0.22)	7.9–8.8	2,665,299	8.1 (0.32)	7.5–8.8
Sex	p<0.001*			p<0.001*			p<0.001*		
Male	3,783,083	5.6 (0.21)	5.2–6.0	2,068,196	5.8 (0.25)	5.3–6.3	947,982	6.1 (0.39)	5.4–6.9
Female	6,956,341	9.6 (0.24)	9.1–10.1	4,065,609	10.7 (0.34)	10.1–11.4	1,717,316	10.0 (0.48)	9.1–10.9
Age group (years)	p=0.0459*			p=0.0294*			p=0.0170*		
18–24	1,352,869	8.2 (0.60)	7.1–9.5	865,742	9.3 (0.74)	8.0–10.9	374,614	10.1 (1.06)	8.2–12.4
25–34	1,847,548	7.1 (0.37)	6.4–7.8	940,600	7.2 (0.53)	6.3–8.3	309,743	6.6 (0.70)	5.3–8.1

Characteristic	Current Asthma								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
35–64	5,723,108	8.0 (0.23)	7.5–8.4	3,082,072	8.7 (0.30)	8.1–9.3	1,374,194	8.4 (0.49)	7.5–9.5
≥65	1,815,899	7.1 (0.31)	6.5–7.7	1,245,391	7.8 (0.38)	7.1–8.6	606,747	7.5 (0.44)	6.7–8.4
Race and ethnicity	p<0.001*			p<0.001*			p=0.0024*		
White NH	6,432,559	8.1 (0.21)	7.7–8.5	4,379,068	8.5 (0.25)	8.0–9.0	2,123,755	8.1 (0.35)	7.4–8.8
Black NH	1,744,192	9.3 (0.49)	8.4–10.3	775,449	9.9 (0.79)	8.4–11.6	2,297,731	10.8 (1.33)	8.4–13.7
AI/AN NH	67,463	13.0 (3.45)	7.6–21.4	38,048	11.0 (3.51) [†]	5.7–20.0	82,390	9.0 (1.82)	6.0–13.2
Asian NH	567,778	4.8 (0.47)	4.0–5.8	99,978	4.1 (0.80)	2.8–6.0	18,975	5.0 (2.01) [†]	2.2–10.8
Multiple NH	279,592	12.9 (1.68)	9.9–16.5	197,022	13.8 (2.51)	9.6–19.5	76,827	13.3 (3.29)	8.1–21.2
Hispanic	1,629,942	5.9 (0.40)	5.2–6.8	632,122	6.4 (0.55)	5.4–7.6	104,142	4.6 (0.67)	3.5–6.2
	p<0.001*			p=0.0001*			p=0.0947		
Puerto Rican [§]	367,978	14.4 (1.92)	11.1–18.6	168,816	14.3 (2.13)	10.6–19.0	15,620	9.8 (2.97) [†]	5.3–17.4
Mexican [§]	727,657	4.8 (0.49)	3.9–5.9	333,655	4.9 (0.57)	3.9–6.2	72,362	3.9 (0.83)	2.6–5.9
Other Hispanic [§]	534,306	5.5 (0.65)	4.3–6.9	129,651	6.8 (1.13)	4.9–9.3	16,159	6.9 (2.41)	3.4–13.4
Ratio of family income to federal poverty threshold	p<0.001*			p<0.001*			p<0.001*		
<100% FPL	1,659,568	11.3 (0.56)	10.3–12.5	1,164,954	12.1 (0.64)	10.9–13.4	662,670	12.8 (0.85)	11.2–14.6
100% to <250% FPL	2,545,281	7.8 (0.33)	7.2–8.5	1,741,450	8.5 (0.37)	7.8–9.2	892,973	8.4 (0.50)	7.5–9.4

Characteristic	Current Asthma								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
250% to <450% FPL	2,604,362	7.4 (0.35)	6.8–8.1	1,509,086	7.5 (0.41)	6.7–8.3	637,951	7.0 (0.57)	5.9–8.2
≥450% FPL	3,930,214	6.8 (0.25)	6.3–7.3	1,718,315	7.4 (0.39)	6.7–8.2	471,705	6.1 (0.57)	5.0–7.3

Abbreviations: MSA = metropolitan statistical area; Prev = prevalence percent, the proportion of the population who reported having current asthma; SE = standard error; CI = confidence interval; NH = non-Hispanic; AI/AN = American Indian or Alaska Native; FPL = Federal Poverty Level; N/A = Relative standard error is ≥50%.

* p-value for chi-square test is statistically significant at 0.05.

† Relative standard error is 30%–50%; estimate is unreliable.

§ As a subset of Hispanic.

¶ Suppressed because of small cell size

Table S3. Percentage with current asthma by year and metropolitan statistical area (MSA) status among all ages, children, and adults — 2006–2018 National Health Interview Survey

Characteristic	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)
All ages	7.8 (0.20)	7.7 (0.20)	7.8 (0.19)	8.2 (0.19)	8.5 (0.18)	8.5 (0.17)	8.3 (0.17)	7.3 (0.16)	7.7 (0.18)	7.8 (0.18)	8.3 (0.18)	7.9 (0.19)	7.7 (0.20)
Large MSA	7.4 (0.27)	7.3 (0.27)	7.4 (0.27)	8.3 (0.27)	8.3 (0.25)	8.3 (0.23)	8.1 (0.24)	7.1 (0.21)	7.4 (0.25)	7.4 (0.24)	8.0 (0.25)	7.6 (0.26)	7.5 (0.26)
Small MSA	8.4 (0.40)	8.3 (0.36)	8.3 (0.36)	7.7 (0.34)	8.6 (0.34)	8.5 (0.30)	8.3 (0.31)	7.4 (0.31)	7.9 (0.34)	8.2 (0.33)	8.8 (0.33)	8.2 (0.28)	8.2 (0.38)
Non-MSA	7.8 (0.45)	7.9 (0.51)	8.1 (0.49)	8.7 (0.55)	8.9 (0.50)	9.2 (0.45)	8.8 (0.51)	7.9 (0.39)	8.3 (0.41)	8.6 (0.49)	8.8 (0.46)	8.2 (0.44)	7.5 (0.56)
Children	9.3 (0.38)	9.1 (0.37)	9.4 (0.40)	9.6 (0.37)	9.4 (0.35)	9.5 (0.33)	9.3 (0.32)	8.3 (0.29)	8.6 (0.34)	8.4 (0.34)	8.3 (0.34)	8.4 (0.38)	7.5 (0.37)
Large MSA	8.9 (0.51)	8.9 (0.51)	9.2 (0.55)	10.0 (0.52)	9.4 (0.46)	10.0 (0.44)	9.5 (0.46)	8.3 (0.42)	8.7 (0.51)	8.4 (0.45)	7.8 (0.46)	8.0 (0.50)	7.4 (0.47)
Small MSA	11.0 (0.76)	9.7 (0.74)	9.9 (0.72)	8.8 (0.58)	9.1 (0.58)	8.8 (0.59)	9.3 (0.54)	8.2 (0.56)	8.7 (0.55)	8.1 (0.59)	9.0 (0.57)	9.4 (0.64)	7.8 (0.71)
Non-MSA	7.4 (0.77)	8.6 (1.10)	9.2 (0.92)	10.1 (1.13)	9.8 (1.04)	9.3 (0.95)	8.8 (0.83)	8.5 (0.80)	8.0 (0.84)	9.6 (0.97)	9.2 (0.89)	8.2 (0.89)	7.2 (1.27)
Adults	7.3 (0.23)	7.3 (0.22)	7.3 (0.22)	7.7 (0.21)	8.2 (0.21)	8.2 (0.19)	8.0 (0.19)	7.0 (0.18)	7.4 (0.20)	7.6 (0.20)	8.3 (0.21)	7.7 (0.20)	7.7 (0.22)
Large MSA	6.9 (0.29)	6.7 (0.31)	6.8 (0.30)	7.7 (0.29)	7.9 (0.29)	7.7 (0.26)	7.7 (0.27)	6.7 (0.24)	7.0 (0.27)	7.1 (0.28)	8.0 (0.28)	7.5 (0.28)	7.5 (0.29)
Small MSA	7.5 (0.43)	7.8 (0.40)	7.8 (0.41)	7.3 (0.39)	8.4 (0.40)	8.4 (0.34)	8.0 (0.36)	7.2 (0.35)	7.7 (0.38)	8.2 (0.39)	8.8 (0.38)	7.9 (0.31)	8.3 (0.42)
Non-MSA	8.0 (0.49)	7.7 (0.53)	7.7 (0.54)	8.2 (0.56)	8.6 (0.52)	9.1 (0.49)	8.8 (0.54)	7.7 (0.46)	8.4 (0.46)	8.3 (0.53)	8.7 (0.50)	8.2 (0.48)	7.5 (0.57)

Abbreviations: Prev = prevalence percent, the proportion of the population who reported having current asthma; SE = standard error; MSA = metropolitan statistical area.

Table S4. Percentage with current asthma by U.S. Census regions and divisions and metropolitan statistical area (MSA) status among all ages, children, and adults — 2016–2018 National Health Interview Survey

Characteristic	Current asthma								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
U.S. Census region and divisions									
All ages									
Region	p=0.0289*			p=0.0109*			p=0.335		
Northeast	3,143,580	8.3 (0.34)	7.6–9.0	1,496,626	10.2 (0.62)	9.0–11.4	410,230	9.8 (1.06)	7.9–12.1
Northeast divisions	p=0.0059*			p=0.118			p=0.103		
New England	799,205	10.2 (0.74)	8.8–11.7	612,196	11.4 (0.99)	9.6–13.5	203,415	11.7 (0.89)	10.0–13.5
Middle Atlantic	2344,375	7.8 (0.38)	7.1–8.6	884,430	9.4 (0.80)	8.0–11.1	206,815	8.4 (1.38)	6.1–11.6
Midwest	2,819,643	8.1 (0.30)	7.5–8.7	1,638,536	8.2 (0.39)	7.5–9.0	1,211,563	8.1 (0.53)	7.1–9.2
Midwest divisions	p=0.815			p=0.0451*			p=0.705		
East North Central	2,194,580	8.1 (0.33)	7.5–8.8	1,114,439	8.8 (0.53)	7.8–9.9	699,132	8.2 (0.76)	6.9–9.9
West North Central	625,063	8.0 (0.66)	6.8–9.4	524,098	7.2 (0.53)	6.2–8.3	512,431	7.8 (0.72)	6.6–9.4
South	4,710,141	7.5 (0.25)	7.0–8.0	2,853,692	7.8 (0.29)	7.2–8.4	1,338,634	7.8 (0.47)	6.9–8.8
Midwest divisions	p=0.181			p=0.331			p=0.498		
South Atlantic	2,786,921	7.8 (0.34)	7.2–8.5	1,493,639	7.7 (0.42)	6.9–8.5	528,421	8.4 (0.81)	6.9–10.1
East South Central	432,094	6.8 (0.60)	5.7–8.0	523,428	8.6 (0.54)	7.6–9.7	394,879	7.1 (0.71)	5.8–8.6
West South Central	1,491,126	7.1 (0.41)	6.3–7.9	836,625	7.6 (0.56)	6.6–8.8	415,334	7.7 (0.91)	6.1–9.7

Characteristic	Current asthma								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
West	3,308,392	7.1 (0.30)	6.6–7.8	2,093,839	8.5 (0.41)	7.7–9.3	461,591	8.4 (0.70)	7.1–9.8
West divisions	p=0.0245*			p=0.416			p=0.243		
Mountain	975,228	8.4 (0.66)	7.2–9.8	909,346	8.9 (0.69)	7.6–10.4	246,987	7.6 (0.46)	6.7–8.6
Pacific	2,333,164	6.7 (0.34)	6.1–7.4	1,184,493	8.2 (0.50)	7.3–9.3	214,604	9.5 (1.27)	7.2–12.3
Children									
Regions	p=0.0735			p=0.0277*			p=0.843		
Northeast	722,244	8.6 (0.78)	7.2–10.2	352,346	10.9 (1.26)	8.7–13.7	67,505	7.5 (1.54)	4.9–11.1
Northeast divisions	p=0.313			p=0.794			p=0.0140*		
New England	175,898	10.6 (2.33)	6.8–16.1	125,102	11.4 (1.89)	8.2–15.6	40,081	12.0 (1.57)	9.2–15.4
Middle Atlantic	546,347	8.1 (0.77)	6.7–9.7	227,244	10.7 (1.64)	7.9–14.4	27,424	4.8 (1.88) [†]	2.2–10.2
Midwest	609,728	7.8 (0.57)	6.8–9.0	346,177	7.7 (0.60)	6.6–9.0	287,892	8.9 (1.03)	7.1–11.1
Midwest divisions	p=0.774			p=0.0092*			p=0.553		
East North Central	472,988	7.9 (0.63)	6.8–9.2	247,150	9.0 (0.70)	7.7–10.4	172,898	9.4 (1.48)	6.9–12.7
West North Central	136,740	7.5 (1.31)	5.3–10.5	99,028	5.7 (0.86)	4.2–7.6	114,995	8.2 (1.35)	5.9–11.3
South	1,212,476	8.0 (0.48)	7.1–9.0	802,969	9.4 (0.64)	8.2–10.7	309,314	8.2 (0.87)	6.6–10.1
South divisions	p=0.269			p=0.853			p=0.612		
South Atlantic	702,747	8.5 (0.68)	7.3–10.0	387,152	9.0 (0.90)	7.4–11.0	118,493	8.7 (1.34)	6.4–11.7

Characteristic	Current asthma								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
East South Central	99,754	6.5 (1.05)	4.7–8.9	141,074	9.6 (1.57)	6.9–13.2	79,853	6.9 (1.39)	4.6–10.2
West South Central	409,974	7.7 (0.78)	6.3–9.3	274,743	9.8 (1.10)	7.9–12.2	110,968	8.8 (1.71)	6.0–12.8
West	697,884	6.6 (0.48)	5.7–7.6	447,396	7.4 (0.68)	6.2–8.9	92,007	7.4 (1.90)	4.4–12.1
West divisions	p=0.328			p=0.603			p=0.0905		
Mountain	216,524	7.4 (1.09)	5.6–9.9	181,138	7.0 (1.37)	4.7–10.2	35,820	4.5 (0.79)	3.2–6.3
Pacific	481,360	6.3 (0.52)	5.3–7.4	266,259	7.8 (0.58)	6.7–9.0	56,188	12.7 (3.62)	7.2–21.7
Adults									
Regions	p=0.0621			p=0.0013*			p=0.186		
Northeast	2,421,336	8.2 (0.39)	7.5–9.0	1,144,280	9.9 (0.66)	8.7–11.3	342,725	10.4 (1.32)	8.1–13.3
Northeast divisions	p=0.0192*			p=0.0662			p=0.393		
New England	623,308	10.0 (0.87)	8.5–11.9	487,095	11.4 (0.92)	9.8–13.4	163,334	11.6 (0.88)	10.0–13.4
Middle Atlantic	1,798,028	7.7 (0.43)	6.9–8.6	657,186	9.0 (0.90)	7.4–11.0	179,391	9.5 (2.05)	6.2–14.4
Midwest	2,209,915	8.2 (0.34)	7.5–8.9	1,292,359	8.4 (0.46)	7.5–9.3	923,670	7.8 (0.50)	6.9–8.9
Midwest divisions	p=0.914			p=0.274			p=0.866		
East North Central	1,721,592	8.2 (0.37)	7.5–9.0	867,289	8.7 (0.62)	7.6–10.0	526,234	7.9 (0.65)	6.7–9.3
West North Central	488,323	8.1 (0.79)	6.7–9.8	425,070	7.7 (0.68)	6.5–9.2	397,436	7.8 (0.79)	6.3–9.5
South	3,497,666	7.3 (0.26)	6.8–7.8	2,050,723	7.3 (0.34)	6.7–8.0	1,029,320	7.7 (0.50)	6.7–8.7

Characteristic	Current asthma								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
South divisions	p=0.339			p=0.318			p=0.615		
South Atlantic	2,084,174	7.6 (0.37)	6.9–8.4	110,6486	7.3 (0.46)	6.4–8.2	409,929	8.3 (0.96)	6.6–10.4
East South Central	332,340	6.9 (0.77)	5.5–8.5	382,355	8.3 (0.66)	7.0–9.7	315,025	7.2 (0.73)	5.9–8.7
West South Central	1,081,151	6.9 (0.42)	6.1–7.7	561,882	6.8 (0.71)	5.6–8.4	304,366	7.4 (0.88)	5.9–9.3
West	2,610,508	7.3 (0.33)	6.7–8.0	1,646,443	8.8 (0.41)	8.1–9.7	369,583	8.6 (0.71)	7.4–10.1
West divisions	p=0.0125*			p=0.134			p=0.978		
Mountain	758,703	8.7 (0.62)	7.6–10.0	728,209	9.6 (0.56)	8.5–10.7	211,167	8.6 (0.49)	7.7–9.6
Pacific	1,851,804	6.9 (0.39)	6.1–7.7	918,234	8.4 (0.57)	7.3–9.5	158,416	8.7 (1.52)	6.1–12.2

Abbreviations: MSA = metropolitan statistical area; Prev = prevalence percent, the proportion of the population who reported having current asthma; SE = standard error; CI = confidence interval.

* p-value for chi-square test is statistically significant at 0.05.

† Relative standard error is 30%–50%; estimate is unreliable.

Table S5. Percentage of current asthma by urban-rural classification (six-levels) among all ages, children, and adults — 2016–2018 National Health Interview Survey

Characteristic	All survey respondents			Current asthma								
				All ages			Children			Adults		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Urban-rural classification				p=0.0019*			p=0.252			p=0.0054*		
Large central metropolitan	100,582,672	31.4 (0.49)	30.4–32.3	7,327,448	7.3 (0.19)	6.9–7.7	1,700,141	7.6 (0.38)	6.9–8.3	5,627,307	7.2 (0.21)	6.8–7.6
Large fringe metropolitan	82,685,805	25.8 (0.60)	24.6–27.0	6,705,839	8.1 (0.23)	7.7–8.6	1,546,829	7.9 (0.42)	7.1–8.7	5,159,010	8.2 (0.26)	7.7–8.7
Medium Metropolitan	65,861,315	20.5 (1.17)	18.3–22.9	5,558,467	8.5 (0.25)	8.0–9.0	1,381,782	9.0 (0.46)	8.2–10.0	4,176,685	8.3 (0.28)	7.7–8.8
Small Metropolitan	29,459,786	9.2 (1.10)	7.2–11.6	2,472,695	8.4 (0.33)	7.8–9.1	562,468	8.3 (0.75)	6.9–9.9	1,910,227	8.4 (0.35)	7.8–9.1
Micropolitan	26,461,517	8.3 (0.97)	6.5–10.4	2,128,466	8.1 (0.39)	7.3–8.9	470,805	8.2 (0.77)	6.8–9.8	1,657,661	8.0 (0.41)	7.3–8.9
Non-core	15,549,840	4.9 (0.67)	3.7–6.3	1,293,551	8.3 (0.47)	7.4–9.3	285,914	8.4 (1.00)	6.6–10.6	1,007,638	8.3 (0.50)	7.4–9.3

Abbreviations: Prev = prevalence percent, the proportion of the population who reported having current asthma; SE = standard error; CI = confidence interval.

* p-value for chi-square test is statistically significant at 0.05.

Table S6. Percentage of current asthma by state and metropolitan statistical area (MSA) status — 2016–2018 National Health Interview Survey

State	Current asthma								
	Total		Large MSA		Small MSA		Non-MSA		p-value
	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	
Alabama	8.5 (0.85)	7.0–10.3	11.2 (2.07)	7.7–15.9	8.3 (0.81)	6.8–10.0	6.3 (1.45)	4.0–9.8	0.236
Alaska	8.4 (0.78)	7.0–10.0	—	—	8.8 (0.95)	7.1–10.8	7.5 (0.00)	7.5–7.5	0.286
Arizona	8.6 (0.77)	7.2–10.2	8.5 (1.02)	6.7–10.7	8.8 (0.67)	7.6–10.2	—	—	0.779
Arkansas	8.4 (0.94)	6.7–10.4	—	—	9.3 (1.19)	7.2–11.9	6.2 (1.62)	3.7–10.3	0.133
California	7.0 (0.32)	6.4–7.7	6.4 (0.38)	5.7–7.2	8.9 (0.72)	7.6–10.4	11.2 (0.00)	11.2–11.2	0.0011*
Colorado	9.1 (0.96)	7.4–11.2	8.0 (1.59)	5.4–11.8	10.9 (0.61)	9.8–12.2	6.6 (0.00)	6.6–6.6	0.0323*
Connecticut	11.2 (0.92)	9.5–13.2	11.9 (2.17)	8.3–16.9	10.7 (0.91)	9.0–12.6	13.1 (1.60)	10.3–16.6	0.373
Delaware	10.3 (1.42)	7.9–13.5	8.3 (1.74)	5.4–12.4	12.9 (1.99)	9.5–17.3	—	—	0.103
District of Columbia	12.0 (1.43)	9.5–15.1	12.0 (1.43)	9.5–15.1	—	—	—	—	—
Florida	7.1 (0.47)	6.3–8.1	7.5 (0.58)	6.5–8.8	6.1 (0.79)	4.7–7.8	10.1 (0.00)	10.1–10.1	0.173
Georgia	7.9 (0.57)	6.9–9.1	7.3 (0.82)	5.9–9.1	9.3 (0.45)	8.4–10.2	8.4 (1.49)	5.9–11.9	0.162
Hawaii	5.8 (0.66)	4.6–7.2	—	—	5.8 (0.80)	4.4–7.6	5.8 (0.11)	5.6–6.0	0.969
Idaho	7.4 (0.59)	6.3–8.7	—	—	7.9 (0.72)	6.6–9.4	6.5 (0.44)	5.7–7.4	0.198
Illinois	7.4 (0.44)	6.6–8.3	6.8 (0.53)	5.9–7.9	9.4 (0.77)	7.9–11.0	8.4 (1.94)	5.3–13.1	0.0606
Indiana	8.6 (0.59)	7.5–9.8	9.3 (0.87)	7.7–11.1	8.0 (0.91)	6.3–9.9	7.7 (0.61)	6.6–9.0	0.344

State	Current asthma								
	Total		Large MSA		Small MSA		Non-MSA		p-value
	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	
Iowa	8.1 (0.98)	6.4–10.3	—	—	7.3 (1.04)	5.5–9.6	9.7 (1.65)	6.9–13.5	0.198
Kansas	8.4 (0.53)	7.5–9.5	8.5 (1.04)	6.7–10.8	9.1 (1.13)	7.2–11.6	7.8 (0.41)	7.0–8.7	0.308
Kentucky	8.0 (0.80)	6.5–9.7	8.2 (0.66)	7.0–9.6	7.3 (1.10)	5.4–9.8	7.9 (1.70)	5.1–11.9	0.840
Louisiana	8.2 (0.83)	6.7–10.0	6.3 (1.68)	3.7–10.6	8.1 (0.95)	6.4–10.2	11.7 (1.10)	9.7–14.0	0.137
Maine	12.3 (1.73)	9.3–16.2	—	—	14.7 (2.77)	10.0–21.0	10.3 (1.32)	8.0–13.2	0.227
Maryland	8.9 (1.15)	6.9–11.4	8.9 (1.15)	6.9–11.4	—	—	—	—	—
Massachusetts	10.4 (1.03)	8.6–12.6	9.8 (1.07)	7.9–12.1	12.1 (2.46)	8.0–17.8	10.2 (1.87)	7.1–14.5	0.701
Michigan	8.9 (0.52)	7.9–10.0	10.2 (0.79)	8.8–11.9	7.3 (0.90)	5.7–9.2	8.7 (0.43)	7.9–9.6	0.0584
Minnesota	7.2 (0.65)	6.0–8.6	7.2 (0.93)	5.6–9.3	7.6 (0.00)	7.6–7.6	6.9 (1.09)	5.0–9.3	0.773
Mississippi	7.5 (0.97)	5.8–9.6	3.2 (0.00)	3.2–3.2	9.3 (0.56)	8.3–10.5	5.0 (0.79)	3.7–6.8	0.0014*
Missouri	8.8 (0.86)	7.3–10.7	8.6 (1.10)	6.6–11.0	9.5 (0.88)	7.9–11.4	9.0 (2.27)	5.5–14.6	0.817
Montana	8.3 (0.69)	7.1–9.8	—	—	7.0 (0.01)	7.0–7.0	8.9 (0.76)	7.5–10.5	0.174
Nebraska	5.0 (0.57)	4.0–6.2	—	—	5.0 (0.67)	3.8–6.5	4.9 (1.00)	3.3–7.3	0.933
Nevada	8.7 (0.86)	7.1–10.5	8.9 (1.14)	6.9–11.5	8.1 (0.09)	7.9–8.3	6.7 (0.00)	6.7–6.7	0.561
New Hampshire	10.9 (1.00)	9.1–13.1	10.4 (0.91)	8.7–12.3	9.9 (1.94)	6.7–14.4	12.1 (1.54)	9.4–15.5	0.720
New Jersey	7.4 (0.65)	6.2–8.8	7.1 (0.74)	5.8–8.7	8.8 (0.96)	7.1–10.9	—	—	0.175

State	Current asthma								
	Total		Large MSA		Small MSA		Non-MSA		p-value
	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	
New Mexico	9.4 (1.23)	7.2–12.1	—	—	9.8 (1.91)	6.6–14.2	8.5 (0.57)	7.5–9.7	0.587
New York	8.5 (0.49)	7.6–9.5	8.1 (0.55)	7.1–9.2	10.0 (1.38)	7.6–13.1	10.8 (1.98)	7.5–15.3	0.169
North Carolina	7.5 (0.59)	6.4–8.7	6.6 (0.62)	5.5–8.0	8.4 (1.04)	6.6–10.7	6.5 (0.80)	5.1–8.3	0.283
North Dakota	6.3 (0.97)	4.6–8.5	—	—	6.6 (0.00)	6.6–6.6	6.1 (1.52)	3.7–9.9	0.755
Ohio	9.0 (0.69)	7.7–10.4	8.3 (0.77)	6.9–9.9	10.2 (1.40)	7.7–13.3	9.2 (2.24)	5.6–14.6	0.469
Oklahoma	9.1 (1.13)	7.2–11.6	10.6 (1.20)	8.5–13.2	5.3 (1.26)	3.3–8.4	10.5 (2.79)	6.2–17.4	0.0088*
Oregon	8.8 (1.13)	6.8–11.3	7.8 (1.62)	5.1–11.6	8.6 (1.18)	6.6–11.2	13.9 (0.00)	13.9–13.9	0.510
Pennsylvania	8.3 (0.66)	7.1–9.7	8.0 (0.73)	6.6–9.5	9.3 (1.19)	7.2–11.9	5.6 (0.76)	4.3–7.3	0.196
Rhode Island	9.6 (0.78)	8.1–11.2	9.6 (0.78)	8.1–11.2	—	—	—	—	—
South Carolina	7.8 (0.89)	6.2–9.7	—	—	7.4 (0.93)	5.8–9.5	9.9 (2.34)	6.1–15.5	0.373
South Dakota	6.0 (1.17)	4.1–8.8	—	—	5.7 (1.58)	3.3–9.7	6.7 (0.00)	6.7–6.7	0.566
Tennessee	6.5 (0.49)	5.6–7.5	4.5 (0.67)	3.4–6.0	8.7 (1.32)	6.4–11.6	8.3 (0.43)	7.5–9.2	0.0001*
Texas	6.8 (0.37)	6.1–7.6	6.8 (0.44)	6.0–7.8	7.2 (0.89)	5.6–9.1	6.0 (0.61)	4.9–7.3	0.480
Utah	7.3 (1.46)	4.9–10.8	8.0 (1.51)	5.5–11.5	6.9 (2.26) [†]	3.6–12.9	N/A	N/A	N/A
Vermont	11.0 (1.67)	8.1–14.7	—	—	9.5 (0.98)	7.7–11.6	14.5 (0.00)	14.5–14.5	0.0854
Virginia	8.0 (0.63)	6.8–9.3	8.0 (0.57)	7.0–9.2	5.6 (0.76)	4.2–7.3	9.5 (2.25)	5.9–14.9	0.244

State	Current asthma								
	Total		Large MSA		Small MSA		Non-MSA		p-value
	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	
Washington	7.7 (0.52)	6.8–8.8	8.7 (0.64)	7.5–10.0	6.6 (1.04)	4.8–9.0	7.0 (0.64)	5.8–8.3	0.109
West Virginia	9.1 (0.81)	7.6–10.8	—	—	9.6 (0.40)	8.9–10.5	7.8 (1.64)	5.1–11.7	0.438
Wisconsin	7.7 (0.63)	6.5–9.0	7.5 (0.78)	6.1–9.1	9.3 (0.48)	8.4–10.3	7.2 (1.33)	5.0–10.3	0.185
Wyoming	8.2 (1.50)	5.7–11.7	—	—	8.7 (0.00)	8.7–8.7	8.0 (2.07)	4.8–13.1	0.748

Abbreviations: Prev = prevalence percent, the proportion of the population who reported having current asthma; SE = standard error; CI = confidence interval; — = no counties in the MSA level within the state; N/A = relative standard error is ≥50%.

* p-value for chi square test is statistically significant at 0.05.

† Relative standard error is 30%–50%; estimate is unreliable.

Table S7. Percentage with one or more asthma attacks* in the past 12 months among those with current asthma by selected characteristics among all ages, children, and adults with current asthma[†] — 2016–2018 National Health Interview Survey

Characteristic	Asthma attacks								
	All ages			Children			Adults		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Total	11,703,647	46.0 (0.69)	44.6–47.4	3,146,587	53.0 (1.33)	50.4–55.6	8,557,060	43.9 (0.77)	42.4–45.4
Sex	p=0.0022 [§]			p=0.563			p<0.001 [§]		
Male	4,405,891	43.4 (1.13)	41.2–45.6	1,814,401	53.7 (1.81)	50.2–57.3	2,591,490	38.2 (1.36)	35.5–40.9
Female	7,297,756	47.7 (0.87)	46.0–49.4	1,332,186	52.1 (2.14)	47.8–56.2	5,965,571	46.9 (0.95)	45.0–48.7
Age group (years)	p<0.001 [§]			p=0.0001 [§]			p<0.001 [§]		
0–4	500,253	63.3 (3.59)	56.0–70.1	500,253	63.3 (3.59)	56.0–70.1	—	—	—
5–11	1,435,296	56.4 (1.93)	52.6–60.2	1,435,296	56.4 (1.93)	52.6–60.2	—	—	—
12–17	1,211,037	46.6 (1.98)	42.7–50.5	1,211,037	46.6 (1.98)	42.7–50.5	—	—	—
18–24	935,308	36.1 (2.35)	31.6–40.8	—	—	—	935,308	36.1 (2.35)	31.6–40.8
25–34	1,215,361	39.3 (1.94)	35.5–43.1	—	—	—	1,215,361	39.3 (1.94)	35.5–43.1
35–64	4,943,862	48.6 (1.08)	46.5–50.7	—	—	—	4,943,862	48.6 (1.08)	46.5–50.7
≥65	1,462,530	40.0 (1.49)	37.1–42.9	—	—	—	1,462,530	40.0 (1.49)	37.1–42.9
Race and ethnicity	p=0.209			p=0.0587			p=0.549		
White NH	7,111,073	46.0 (0.83)	44.3–47.6	1,418,352	55.5 (1.85)	51.8–59.1	5,692,721	44.1 (0.90)	42.3–45.8
Black NH	1,869,536	45.1 (1.59)	42.0–48.2	732,681	52.9 (2.88)	47.2–58.5	1,136,856	41.1 (1.99)	37.3–45.1

Characteristic	Asthma attacks								
	All ages			Children			Adults		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
AI/AN NH	104,016	41.2 (6.52)	29.3–54.4	24,092	37.5 [¶] (12.44)	17.5–63.0	79,923	42.5 (7.49)	28.8–57.5
Asian NH	386,864	46.7 (4.13)	38.7–54.8	83,290	58.4 (6.64)	45.1–70.6	303,574	44.2 (4.76)	35.2–53.6
Multiple NH	518,822	54.7 (3.48)	47.8–61.4	238,121	59.7 (4.81)	50.0–68.7	280,702	51.0 (4.84)	41.6–60.3
Hispanic	1,687,247	45.0 (2.34)	40.5–49.7	648,173	47.0 (2.84)	41.5–52.6	1,039,074	43.9 (3.00)	38.1–49.9
	p=0.438			p=0.0721			p=0.500		
Puerto Rican**	387,642	49.7 (4.36)	41.2–58.1	111,931	49.1 (6.86)	36.0–62.3	275,712	49.9 (5.13)	40.0–59.9
Mexican**	796,835	41.6 (3.24)	35.4–48.1	344,770	44.1 (3.94)	36.6–51.9	452,065	39.9 (4.18)	32.0–48.3
Other Hispanic**	502,769	47.9 (4.16)	39.8–56.0	191,472	51.8 (5.48)	41.1–62.3	311,297	45.8 (5.17)	35.9–56.0
Ratio of family income to federal poverty threshold	p=0.0014 [§]			p=0.319			p=0.0011 [§]		
<100% FPL	2,458,551	50.0 (1.66)	46.8–53.3	768,623	53.6 (2.97)	47.8–59.4	1,689,928	48.5 (1.83)	45.0–52.1
100% to < 250% FPL	3,453,825	48.0 (1.29)	45.4–50.5	1,047,926	51.5 (2.28)	47.0–56.0	2,405,899	46.6 (1.51)	43.6–49.5
250% to < 450% FPL	2,563,005	42.4 (1.43)	39.6–45.2	662,422	50.9 (2.50)	45.9–55.8	1,900,584	40.0 (1.68)	36.8–43.4
≥450% FPL	3,228,266	44.3 (1.29)	41.8–46.9	667,617	57.3 (2.76)	51.8–62.6	2,560,649	41.9 (1.43)	39.1–44.7
US Census regions and divisions									
Regions	p=0.279			p=0.163			p=0.199		

Characteristic	Asthma attacks								
	All ages			Children			Adults		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Northeast	2,214,856	43.9 (1.47)	41.0–46.8	619,571	54.2 (2.90)	48.5–59.9	1,595,285	40.8 (1.61)	37.7–44.0
	p=0.140			p=0.397			p=0.271		
New England	652,137	40.4 (2.87)	34.9–46.1	170,874	50.1 (5.63)	39.2–61.0	481,263	37.8 (3.45)	31.3–44.8
Middle Atlantic	1,562,719	45.5 (1.93)	41.7–49.3	448,697	56.0 (4.11)	47.9–63.9	1,114,022	42.3 (2.16)	38.1–46.6
Midwest	2,557,512	45.2 (1.41)	42.4–48.0	624,634	50.5 (2.92)	44.8–56.2	1,932,878	43.7 (1.56)	40.7–46.8
	p=0.125			p=0.951			p=0.0674		
East North Central	1,758,264	43.9 (1.83)	40.4–47.6	447,564	50.4 (3.66)	43.3–57.5	1,310,700	42.1 (1.96)	38.3–46.0
West North Central	799,249	48.2 (2.10)	44.1–52.3	177,071	50.8 (4.43)	42.1–59.3	622,178	47.5 (2.23)	43.2–51.9
South	4,156,819	46.8 (1.27)	44.3–49.3	1,183,284	50.9 (2.17)	46.7–55.2	2,973,535	45.3 (1.45)	42.5–48.2
	p=0.120			p=0.0104 [§]			p=0.0651		
South Atlantic	2,355,703	49.1 (1.60)	46.0–52.3	640,909	53.1 (2.82)	47.5–58.6	1,714,794	47.8 (1.84)	44.2–51.4
East South Central	613,194	45.4 (2.05)	41.4–49.5	196,128	61.2 (4.27)	52.5–69.1	417,066	40.5 (2.67)	35.4–45.8
West South Central	1,187,923	43.4 (2.69)	38.2–48.7	346,248	43.5 (3.82)	36.2–51.1	841,675	43.3 (3.07)	37.4–49.4
West	2,774,459	47.4 (1.38)	44.7–50.1	719,097	58.3 (2.91)	52.5–63.9	2,055,362	44.5 (1.43)	41.7–47.3
	p=0.185			p=0.675			p=0.197		
Mountain	960,923	45.1 (1.85)	41.5–48.8	245,395	56.8 (4.63)	47.6–65.5	715,527	42.1 (1.88)	38.5–45.9
Pacific	1,813,537	48.7 (1.94)	44.9–52.5	473,702	59.2 (3.39)	52.4–65.6	1,339,835	45.8 (2.12)	41.7–50.0

Characteristic	Asthma attacks								
	All ages			Children			Adults		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
MSA status	p=0.525			p=0.0869			p=0.0526		
Large MSA	6,321,586	45.3 (1.00)	43.3–47.3	1,797,752	55.7 (1.90)	51.9–59.3	4,523,834	42.2 (1.10)	40.0–44.3
Small MSA	3,771,354	46.7 (1.20)	44.4–49.1	968,333	49.7 (2.06)	45.7–53.7	2,803,022	45.8 (1.37)	43.1–48.5
Non-MSA	1,610,707	47.1 (1.69)	43.8–50.4	380,502	50.3 (3.43)	43.6–57.0	1,230,205	46.2 (1.86)	42.6–49.8

Abbreviations: Prev = prevalence percent, the proportion of the population with current asthma who reported having one or more asthma attacks in the past 12 months; SE = standard error; CI = confidence interval; NH = non-Hispanic; AI/AN = American Indian or Alaska Native; FPL = Federal Poverty Level; MSA = metropolitan statistical area.

* Having had one or more episode of asthma or an asthma attack in the past 12 months

† Includes persons who answered “yes” to the questions: “Have you EVER been told by a doctor or other health professional that you had asthma?” and “Do you still have asthma?”

§ p-value for chi square test is statistically significant at 0.05.

¶ Relative standard error is 30%–50%; estimate is unreliable

** As a subset of Hispanic

Table S8. Percentage with one or more asthma attacks* in the past 12 months by selected characteristics and metropolitan statistical Area (MSA) status among all ages, children, and adults with current asthma[†] — 2016–2018 National Health Interview Survey

Characteristic	Asthma attacks								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
All ages									
Total	6,321,586	45.3 (1.00)	43.3–47.3	3,771,354	46.7 (1.20)	44.4–49.1	1,610,707	47.1 (1.69)	43.8–50.4
Sex	p=0.161			p=0.0447 [§]			p=0.0094 [§]		
Male	2,431,821	43.5 (1.66)	40.3–46.8	1,401,153	43.7 (1.83)	40.2–47.4	572,917	41.7 (2.40)	37.1–46.5
Female	3,889,764	46.5 (1.24)	44.0–48.9	2,370,202	48.7 (1.62)	45.5–51.9	1,037,790	50.7 (2.30)	46.2–55.2
Age group (years)	p<0.001 [§]			p=0.0013 [§]			p=0.0171 [§]		
0–4	297,285	67.1 (5.47)	55.6–76.8	153,532	55.6 (5.42)	44.8–65.8	49,437	70.3 (9.68)	48.8–85.4
5–11	823,462	57.4 (2.72)	52.0–62.7	459,419	54.2 (3.22)	47.9–60.5	152,416	57.9 (5.33)	47.3–67.9
12–17	677,005	50.0 (2.80)	44.6–55.5	355,382	43.0 (3.14)	37.0–49.3	178,650	42.2 (4.62)	33.5–51.5
18–24	423,830	31.3 (3.05)	25.7–37.6	327,384	37.9 (4.34)	29.8–46.7	184,093	49.1 (5.72)	38.2–60.2
25–34	667,959	36.2 (2.65)	31.1–41.5	413,317	44.1 (3.41)	37.5–50.8	134,085	43.3 (4.98)	33.9–53.2
35–64	2,696,381	47.2 (1.48)	44.3–50.1	1,561,294	50.7 (1.88)	47.1–54.4	686,186	49.9 (2.99)	44.1–55.8
≥65	735,663	40.6 (2.22)	36.3–45.0	501,026	40.4 (2.40)	35.7–45.2	225,840	37.3 (3.57)	30.6–44.5

Characteristic	Asthma attacks								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Race and ethnicity	p=0.278			p=0.458			p=0.108		
White NH	3,375,905	44.1 (1.18)	41.8–46.4	2,465,587	47.1 (1.47)	44.3–50.0	1,269,582	49.2 (1.84)	45.6–52.8
Black NH	1,227,780	46.5 (2.25)	42.2–51.0	505,711	43.4 (3.08)	37.5–49.5	136,046	39.2 (4.48)	30.8–48.2
AI/AN NH	46,771	51.9 (12.81)	28.3–74.7	2,211,587	50.9 (15.94)**	22.9–78.3	35,129	29.6 (5.15)	20.6–40.6
Asian NH	306,940	44.5 (4.47)	36.0–53.4	65,940	55.8 (8.44)	39.2–71.2	13,983	64.4 (17.00)	29.7–88.6
Multiple NH	268,179	56.1 (5.29)	45.6–66.1	188,887	53.3 (5.08)	43.4–63.0	61,756	52.7 (8.14)	37.0–67.9
Hispanic	1,094,066	45.9 (2.89)	40.3–51.6	510,459	44.8 (3.51)	38.1–51.8	82,722	37.3 (8.56)	22.5–54.9
	p=0.204			p=0.913			p=0.0449 [§]		
Puerto Rican [¶]	264,987	53.8 (5.70)	42.6–64.6	108,583	44.2 (6.62)	31.8–57.2	14,072	33.5 (11.50) **	15.5–58.1
Mexican [¶]	461,644	41.4 (3.94)	33.9–49.3	286,429	44.2 (5.02)	34.7–54.2	48,762	32.1 (10.18)**	15.9–54.2
Other Hispanic [¶]	367,435	47.3 (5.39)	37.0–57.8	115,447	47.2 (6.08)	35.6–59.0	19,887	71.1 (9.43)	50.0–85.8
Ratio of family income to federal poverty threshold	p=0.0107 [§]			p=0.313			p=0.175		
<100% FPL	1,199,736	50.7 (2.36)	46.1–55.3	828,021	49.6 (2.67)	44.4–54.8	430,794	49.1 (3.68)	41.9–56.3
100% to <250% FPL	1,673,085	47.4 (2.09)	43.3–51.5	1,184,368	48.2 (2.02)	44.3–52.2	596,372	49.1 (2.40)	44.4–53.8

Characteristic	Asthma attacks								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
250% to <450% FPL	1,374,607	41.2 (2.09)	37.1–45.3	871,483	45.0 (2.34)	40.5–49.6	316,915	40.8 (3.04)	35.0–46.9
≥450% FPL	2,074,158	43.9 (1.63)	40.8–47.2	887,482	44.2 (2.33)	39.6–48.8	266,626	48.3 (4.15)	40.3–56.4
Children									
Total	1,797,752	55.7 (1.90)	51.9–59.3	968,333	49.7 (2.06)	45.7–53.7	380,502	50.3 (3.43)	43.6–57.0
Sex	p=0.8933			p=0.223			p=0.731		
Male	1,011,123	55.9 (2.55)	50.8–60.8	594,803	52.1 (2.78)	46.6–57.5	208,475	49.1 (4.78)	39.9–58.4
Female	786,629	55.4 (2.81)	49.8–60.8	373,530	46.3 (3.53)	39.5–53.2	172,027	51.9 (5.88)	40.4–63.1
Age Group (years)	p=0.0195 [§]			p=0.0388 [§]			p=0.0198 [§]		
0–4	297,285	67.1 (5.47)	55.6–76.8	153,532	55.6 (5.42)	44.8–65.8	49,437	70.3 (9.68)	48.8–85.4
5–11	823,462	57.4 (2.72)	52.0–62.7	459,419	54.2 (3.22)	47.9–60.5	152,416	57.9 (5.33)	47.3–67.9
12–17	677,005	50.0 (2.80)	44.6–55.5	355,382	43.0 (3.14)	37.0–49.3	178,650	42.2 (4.62)	33.5–51.5
Race and ethnicity	p=0.427			p=0.568			p=0.531		
White NH	720,517	58.3 (2.86)	52.6–63.8	445,424	51.7 (2.88)	46.1–57.3	252,411	55.1 (3.85)	47.5–62.5
Black NH	470,940	52.6 (3.76)	45.2–59.9	208,591	53.4 (5.09)	43.4–63.1	53,150	53.4 (8.01)	37.9–68.3

Characteristic	Asthma attacks								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
AI/AN NH	— ^{††}	— ^{††}	— ^{††}	— ^{††}	— ^{††}	— ^{††}	— ^{††}	— ^{††}	— ^{††}
Asian NH	— ^{††}	— ^{††}	— ^{††}	— ^{††}	— ^{††}	— ^{††}	— ^{††}	— ^{††}	— ^{††}
Multiple NH	128,147	64.5 (6.43)	51.2–76.0	83,593	52.3 (7.32)	38.1–66.1	26,380	65.5 (11.32)	41.5–83.5
Hispanic	396,428	52.5 (3.69)	45.2–59.6	215,727	42.6 (4.41)	34.3–51.4	36,018	30.6 (9.40)**	15.6–51.2
	p=0.248			p=0.935			p=0.306		
Puerto Rican [¶]	78,687	63.1 (8.51)	45.5–77.8	30,220	39.2 (10.69)	21.1–60.9	— ^{††}	— ^{††}	— ^{††}
Mexican [¶]	182,672	47.1 (5.08)	37.4–57.0	134,675	42.9 (6.22)	31.3–55.3	27,424	34.5 (13.14)**	14.4–62.2
Other Hispanic [¶]	135,069	55.6 (7.18)	41.4–68.9	50,833	44.2 (9.82)	26.6–63.4	— ^{††}	— ^{††}	— ^{††}
Ratio of family income to federal poverty threshold	p=0.217			p=0.994			p=0.982		
<100% FPL	405,907	57.4 (4.28)	48.8–65.5	258,976	50.7 (4.73)	41.5–59.9	103,740	48.2 (8.47)	32.4–64.4
100% to <250% FPL	527,115	53.1 (3.61)	46.0–60.1	354,020	49.3 (3.47)	42.5–56.0	166,790	51.7 (5.15)	41.6–61.5
250% to <450% FPL	381,913	51.8 (3.91)	44.1–59.4	212,279	49.7 (4.44)	41.1–58.3	68,230	49.5 (6.47)	37.0–62.0
≥450% FPL	482,816	60.9 (3.19)	54.5–66.9	143,059	48.9 (5.33)	38.6–59.3	41,742	52.0 (9.47)	33.9–69.5
Adults									

Characteristic	Asthma attacks								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Total	4,523,834	42.2 (1.10)	40.0–44.3	2,803,022	45.8 (1.37)	43.1–48.5	1,230,205	46.2 (1.86)	42.6–49.8
Sex	p=0.0051 [§]			p=0.0004 [§]			p=0.0037 [§]		
Male	1,420,698	37.6 (1.98)	33.8–41.6	806,350	39.1 (2.26)	34.8–43.6	364,442	38.4 (3.03)	32.7–44.5
Female	3,103,136	44.6 (1.36)	42.0–47.3	1,996,672	49.2 (1.71)	45.8–52.5	865,763	50.4 (2.40)	45.7–55.1
Age group (years)	p<0.001 [§]			p=0.0026 [§]			p=0.0663		
18–24	423,830	31.3 (3.05)	25.7–37.6	327,384	37.9 (4.34)	29.8–46.7	184,093	49.1 (5.72)	38.2–60.2
25–34	667,959	36.2 (2.65)	31.1–41.5	413,317	44.1 (3.41)	37.5–50.8	134,085	43.3 (4.98)	33.9–53.2
35–64	2,696,381	47.2 (1.48)	44.3–50.1	1,561,294	50.7 (1.88)	47.1–54.4	686,186	49.9 (2.99)	44.1–55.8
≥65	735,663	40.6 (2.22)	36.3–45.0	501,026	40.4 (2.40)	35.7–45.2	225,840	37.3 (3.57)	30.6–44.5
Race and ethnicity	p=0.705			p=0.227			p=0.0945		
White NH	2,655,388	41.3 (1.26)	38.9–43.8	2,465,587	47.1 (1.47)	44.3–50.0	1,269,582	49.2 (1.84)	45.6–52.8
Black NH	756,840	43.4 (2.82)	38.0–49.0	505,711	43.4 (3.08)	37.5–49.5	136,046	39.2 (4.48)	30.8–48.2
AI/AN NH	37,630	55.8 (14.26)	28.9–79.7	22,116	50.9 (15.94)**	22.9–78.3	35,129	29.6 (5.15)	20.6–40.6
Asian NH	234,361	41.3 (5.02)	31.9–51.3	65,940	55.8 (8.44)	39.2–71.2	13,983	64.4 (17.00)	29.7–88.6

Characteristic	Asthma attacks								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Multiple NH	140,032	50.1 (7.06)	36.6–63.6	188,887	53.3 (5.08)	43.4–63.0	61,756	52.7 (8.14)	37.0–67.9
Hispanic	697,638	42.8 (3.63)	35.9–50.0	510,459	44.8 (3.51)	38.1–51.8	82,722	37.3 (8.56)	22.5–54.9
	p=0.394			p=0.908			p=0.401 [§]		
Puerto Rican [¶]	186,300	50.6 (7.17)	36.9–64.3	78,364	46.4 (8.28)	31.1–62.5	— ^{††}	— ^{††}	— ^{††}
Mexican [¶]	278,972	38.3 (5.26)	28.7–49.0	151,755	45.5 (5.64)	34.8–56.6	21,339	29.5 (10.35)**	13.6–52.6
Other Hispanic [¶]	232,366	43.5 (6.28)	31.8–56.0	64,614	49.8 (8.58)	33.6–66.1	— ^{††}	— ^{††}	— ^{††}
Ratio of family income to federal poverty threshold	p=0.0138 [§]			p=0.303			p=0.155		
<100% FPL	793,828	47.8 (2.64)	42.7–53.0	569,045	49.1 (2.98)	43.3–54.9	327,054	49.4 (3.49)	42.6–56.2
100% to <250% FPL	1,145,969	45.1 (2.32)	40.6–49.7	830,348	47.8 (2.45)	43.0–52.6	429,582	48.2 (2.90)	42.5–53.9
250% to <450% FPL	992,694	38.2 (2.34)	33.7–42.8	659,205	43.7 (2.68)	38.5–49.0	248,685	39.0 (3.48)	42.5–53.9
≥450% FPL	1,591,343	40.5 (1.82)	37.0–44.1	744,424	43.3 (2.58)	38.4–48.5	224,883	47.7 (4.50)	39.0–56.5

Abbreviations: MSA = metropolitan statistical area; Prev = prevalence percent, the proportion of the population with current asthma who reported having one or more asthma attacks in the past 12 months;; SE = standard error; CI = confidence interval; NH = non-Hispanic; AI/AN = American Indian or Alaska Native; FPL = Federal Poverty Level.

* Having had one or more episode of asthma or an asthma attack in the past 12 months

[†] Includes persons who answered “yes” to the questions: “Have you EVER been told by a doctor or other health professional that you had asthma?” and “Do you still have asthma?”

[§] p-value for chi-square test is statistically significant at 0.05.

[¶] As a subset of Hispanic

** Relative standard error is 30%–50%; estimate is unreliable

^{††} Suppressed because of small cell size

Table S9. Percentage with one or more asthma attacks* in the past 12 months by year and metropolitan statistical area (MSA) status among all ages, children, and adults with current asthma[†] — 2006–2018 National Health Interview Survey

Characteristic	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)
All ages	52.0 (1.25)	51.7 (1.48)	52.6 (1.25)	49.5 (1.24)	51.6 (1.14)	49.1 (0.99)	50.7 (1.06)	49.9 (1.11)	44.7 (1.21)	46.9 (1.25)	46.9 (1.14)	45.6 (1.19)	45.4 (1.23)
Large MSA	52.8 (1.69)	49.8 (2.01)	52.9 (1.77)	50.4 (1.65)	51.0 (1.51)	49.0 (1.42)	53.1 (1.54)	50.8 (1.59)	44.7 (2.00)	47.6 (1.67)	45.8 (1.61)	45.2 (1.83)	44.8 (1.68)
Small MSA	51.3 (2.18)	53.7 (2.03)	53.5 (2.23)	47.7 (2.20)	52.0 (1.89)	50.4 (1.71)	48.3 (1.83)	48.7 (2.03)	46.0 (1.76)	45.1 (2.25)	48.0 (1.84)	46.6 (2.02)	45.6 (2.25)
Non-MSA	51.3 (3.48)	52.7 (3.80)	50.2 (2.90)	49.6 (2.97)	52.9 (2.81)	47.2 (2.46)	47.6 (2.62)	49.5 (2.60)	42.1 (2.66)	48.2 (2.70)	48.9 (2.41)	44.5 (2.53)	47.5 (3.71)
Children	56.1 (2.22)	54.8 (2.30)	57.2 (2.16)	53.9 (2.11)	58.3 (1.90)	55.5 (1.70)	55.2 (1.62)	57.9 (1.71)	48.0 (2.18)	47.5 (2.19)	53.7 (2.01)	51.6 (2.34)	53.8 (2.70)
Large MSA	52.6 (2.97)	52.1 (2.99)	59.7 (2.95)	52.8 (2.97)	59.1 (2.29)	54.8 (2.29)	58.7 (2.50)	58.8 (2.56)	48.0 (3.27)	45.5 (2.65)	54.3 (3.07)	55.2 (3.25)	57.5 (3.36)
Small MSA	60.5 (3.71)	57.1 (3.85)	53.3 (4.04)	56.9 (3.62)	58.1 (3.55)	57.1 (2.98)	51.1 (3.15)	54.9 (3.42)	48.4 (3.20)	47.9 (4.14)	51.2 (3.15)	46.8 (3.59)	51.5 (4.71)
Non-MSA	56.3 (5.57)	58.3 (7.64)	57.7 (6.23)	52.4 (5.25)	56.2 (4.10)	54.9 (5.05)	51.1 (3.96)	61.0 (4.71)	47.2 (5.09)	53.8 (5.49)	57.2 (4.31)	48.6 (4.84)	42.3 (8.41)
Adults	50.3 (1.40)	50.4 (1.72)	50.7 (1.48)	47.7 (1.47)	49.1 (1.32)	46.7 (1.24)	49.0 (1.27)	47.0 (1.34)	43.6 (1.36)	46.6 (1.46)	44.9 (1.33)	43.6 (1.33)	43.0 (1.38)
Large MSA	52.9 (1.99)	48.8 (2.52)	49.8 (2.21)	49.4 (2.02)	47.8 (1.84)	46.6 (1.77)	51.0 (1.83)	47.7 (1.89)	43.5 (2.07)	48.3 (2.02)	43.2 (1.84)	42.1 (2.02)	41.2 (1.87)
Small MSA	46.8 (2.66)	52.3 (2.45)	53.6 (2.65)	44.2 (2.62)	49.9 (2.15)	48.0 (2.11)	47.2 (2.15)	46.5 (2.33)	45.2 (2.21)	44.2 (2.48)	47.0 (2.23)	46.5 (2.30)	43.9 (2.62)
Non-MSA	49.8 (3.71)	50.7 (4.17)	47.3 (3.54)	48.6 (3.48)	51.7 (3.22)	44.7 (2.83)	46.5 (3.01)	45.7 (3.13)	40.7 (2.83)	46.2 (3.31)	46.4 (2.83)	43.4 (3.02)	48.9 (3.45)

Abbreviations: Prev = prevalence percent, the proportion of the population with current asthma who reported having one or more asthma attacks in the past 12 months; SE = standard error; MSA = metropolitan statistical area.

* Having had one or more episode of asthma or an asthma attack in the past 12 months

[†] Includes persons who answered “yes” to the questions: “Have you EVER been told by a doctor or other health professional that you had asthma?” and “Do you still have asthma?”

Table S10. Percentage with one or more asthma attacks* in the past 12 months by U.S. Census regions and divisions and metropolitan statistical area (MSA) status among all ages, children, and adults with current asthma[†] — 2016–2018 National Health Interview Survey

Characteristic	Asthma attacks								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
U.S. Census region and divisions									
All ages									
Region	p=0.0738			p=0.0844			p=0.111		
Northeast	1,412,467	44.9 (2.09)	40.9–49.1	600,646	40.1 (3.02)	34.4–46.2	201,743	49.2 (2.70)	43.9–54.5
	p=0.459			p=0.445			p=0.0105 [§]		
New England	338,608	42.4 (3.87)	35.0–50.1	227,711	37.2 (5.71)	26.8–48.9	85,817	42.2 (3.60)	35.3–49.4
Middle Atlantic	1,073,859	45.8 (2.46)	41.0–50.7	372,935	42.2 (3.29)	35.9–48.7	115,925	56.1 (1.92)	52.3–59.8
Midwest	1,144,694	40.7 (1.98)	36.9–44.6	816,369	49.9 (3.13)	43.8–56.0	596,449	49.3 (2.35)	44.7–53.9
	p=0.0021 [§]			p=0.428			p=0.253		
East North Central	826,331	37.7 (2.32)	33.3–42.4	572,607	51.4 (4.06)	43.5–59.3	359,325	51.5 (3.51)	44.6–58.3
West North Central	318,363	51.0 (3.68)	43.9–58.2	243,762	46.6 (4.37)	38.2–55.2	237,123	46.3 (2.73)	41.0–51.7
South	4,697,364	47.2 (1.75)	43.8–50.7	1,377,224	48.4 (2.01)	44.4–52.3	560,479	41.9 (3.17)	35.8–48.2
	p=0.338			p=0.746			p=0.0327 [§]		

Characteristic	Asthma attacks								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
South Atlantic	1,363,554	49.1 (2.13)	44.9–53.3	715,795	48.1 (2.74)	42.8–53.5	276,354	52.3 (5.39)	41.8–62.6
East South Central	213,551	49.4 (4.10)	41.5–57.4	241,827	46.2 (2.94)	40.5–52.0	157,816	40.0 (3.50)	33.3–47.0
West South Central	642,011	43.2 (3.67)	36.1–50.4	419,602	50.2 (4.43)	41.6–58.7	126,309	30.4 (5.70)	20.5–42.6
West	1,545,308	46.8 (2.18)	42.5–51.1	977,114	46.8 (1.78)	43.3–50.3	252,037	54.6 (3.99)	46.7–62.2
	p=0.518			p=0.169			p=0.230		
Mountain	436,333	44.8 (3.30)	38.4–51.3	400,573	44.1 (2.32)	39.6–48.7	124,017	50.2 (5.34)	39.9–60.5
Pacific	1,108,975	47.6 (2.75)	42.3–53.0	576,541	48.9 (2.58)	43.8–53.9	128,020	59.7 (4.25)	51.1–67.7
Children									
Region	p=0.116			p=0.348			p=0.116		
Northeast	427,907	59.2 (4.25)	50.7–67.2	148,248	42.1 (4.93)	32.8–51.9	43,416	64.3 (6.32)	51.2–75.6
	p=0.195			p=0.292			p=0.369		
New England	86,050	48.9 (9.30)	31.6–66.5	61,006	48.8 (7.55)	34.5–63.3	23,818	59.4 (7.74)	43.8–73.3
Middle Atlantic	341,857	62.6 (4.67)	53.1–71.2	87,243	38.4 (6.19)	27.2–51.0	— [¶]	— [¶]	— [¶]
Midwest	289,469	48.0 (4.40)	39.5–56.6	179,598	51.9 (4.71)	42.7–61.0	155,568	54.1 (5.84)	42.7–65.2
	p=0.967			p=0.588			p=0.431		
East North Central	224,162	47.9 (5.32)	37.7–58.3	124,008	50.2 (5.31)	39.9–60.4	99,394	57.5 (8.88)	39.9–73.4
West North Central	65,307	48.3 (6.83)	35.3–61.5	55,590	56.1 (9.76)	37.0–73.6	56,174	49.0 (6.04)	37.5–60.7

Characteristic	Asthma attacks								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
South	654,941	54.1 (2.97)	48.2–59.8	399,287	49.7 (3.23)	43.4–56.0	129,057	41.7 (5.14)	32.1–52.0
	p=0.153			p=0.0429 [§]			p=0.238		
South Atlantic	401,093	57.2 (3.92)	49.4–64.6	183,768	47.5 (4.48)	38.8–56.2	56,047	47.3 (6.69)	34.6–60.3
East South Central	63,142	63.3 (8.67)	45.3–78.2	91,839	65.1 (5.39)	53.9–74.8	41,147	51.5 (8.49)	35.3–67.4
West South Central	190,706	46.5 (5.27)	36.5–56.9	123,679	45.0 (6.19)	33.4–57.2	31,863	28.7 (8.82)**	14.7–48.4
West	425,436	61.3 (4.03)	53.2–68.9	241,200	53.9 (3.89)	46.2–61.4	52,462	57.0 (6.69)	43.7–69.4
	p=0.572			p=0.805			p=0.682		
Mountain	124,165	57.6 (8.25)	41.2–72.5	99,642	55.0 (4.77)	45.6–64.1	21,589	60.3 (9.07)	41.9–76.1
Pacific	301,271	63.0 (4.44)	54.0–71.2	141,558	53.2 (5.62)	42.2–63.9	30,873	54.9 (8.73)	37.9–70.9
Adults									
Region	p=0.172			p=0.164			p=0.272		
Northeast	984,561	40.7 (2.38)	36.1–45.4	452,398	39.5 (3.67)	32.6–46.9	158,327	46.2 (3.33)	39.8–52.8
	p=0.971			p=0.242			p=0.0193		
New England	252,558	40.5 (4.44)	32.2–49.4	166,706	34.2 (7.10)	21.9–49.1	61,999	38.0 (3.63)	31.1–45.3
Middle Atlantic	732,002	40.7 (2.81)	35.3–46.3	285,692	43.5 (3.65)	36.5–50.7	96,328	53.7 (2.63)	48.5–58.8
Midwest	855,226	38.7 (2.09)	34.7–42.9	636,771	49.4 (3.37)	42.8–55.9	440,881	47.8 (2.46)	43.0–52.6
	p=0.0005 [§]			p=0.247			p=0.407		

Characteristic	Asthma attacks								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
East North Central	602,169	35.0 (2.41)	30.4–39.8	448,600	51.8 (4.41)	43.2–60.3	259,931	49.5 (3.61)	42.5–56.5
West North Central	253,057	51.8 (4.09)	43.8–59.7	188,172	44.4 (4.27)	36.2–52.8	180,950	45.5 (3.11)	39.5–51.7
South	1,564,175	44.9 (2.00)	41.0–48.8	977,938	47.8 (2.34)	43.3–52.4	431,422	41.9 (3.62)	35.0–49.2
	p=0.659			p=0.0698			p=0.0390 [§]		
South Atlantic	962,460	46.4 (2.34)	41.8–51.0	532,027	48.3 (3.23)	42.1–54.7	220,307	53.7 (6.45)	41.1–65.9
East South Central	150,409	45.3 (5.38)	35.1–55.9	149,988	39.2 (3.71)	32.2–46.7	116,669	37.0 (4.79)	28.2–46.8
West South Central	451,306	41.9 (4.32)	33.7–50.5	295,923	52.7 (4.86)	43.1–62.0	94,446	31.0 (6.24)	20.2–44.4
West	1,119,873	42.9 (2.29)	38.5–47.4	735,915	44.8 (2.01)	40.9–48.8	199,575	54.0 (4.77)	44.6–63.1
	p=0.578			p=0.108			p=0.176		
Mountain	312,168	41.1 (3.34)	34.8–47.8	300,931	41.3 (2.29)	36.9–45.9	102,428	48.5 (5.93)	37.2–60.0
Pacific	807,704	43.6 (2.91)	38.0–49.4	434,983	47.6 (3.02)	41.7–53.5	97,147	61.3 (5.77)	49.6–71.9

Abbreviations: MSA = metropolitan statistical area; Prev = prevalence percent, the proportion of the population with current asthma who reported having one or more asthma attacks in the past 12 months; SE = standard error; CI = confidence interval.

* Having had one or more episode of asthma or an asthma attack in the past 12 months.

† Includes persons who answered “yes” to the questions: “Have you EVER been told by a doctor or other health professional that you had asthma?” and “Do you still have asthma?”

§ p-value for chi-square test is statistically significant at 0.05.

¶ Suppressed because of small cell size.

** Relative standard error is 30%–50%; estimate is unreliable.

Table S11. Percentage with one or more asthma attacks* in the past 12 months by urban-rural classification (sex–levels) among all ages, children, and adults with current asthma[†] — 2016–2018 National Health Interview Survey

Characteristic	Asthma attacks								
	All ages			Children			Adults		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Urban-rural classification	p=0.797			p=0.279			p=0.166		
Large Central Metropolitan	3,308,972	45.2 (1.32)	42.6–47.8	928,878	54.8 (2.64)	49.6–59.9	2,380,094	42.3 (1.44)	39.5–45.2
Large Fringe Metropolitan	3,051,464	45.6 (1.46)	42.8–48.5	873,512	56.7 (2.77)	51.2–62.0	2,177,951	42.3 (1.58)	39.2–45.4
Medium Metropolitan	2,538,772	45.8 (1.49)	42.9–48.7	687,147	49.7 (2.49)	44.9–54.6	1,851,625	44.5 (1.74)	41.1–47.9
Small Metropolitan	1,193,733	48.3 (1.97)	44.4–52.2	276,547	49.7 (3.81)	41.8–56.6	917,186	48.0 (2.13)	43.9–52.2
Micropolitan	1,014,584	47.7 (1.98)	43.8–51.6	225,660	47.9 (4.06)	40.1–55.9	788,924	47.6 (2.33)	43.1–52.2
Non-core	596,123	46.1 (2.76)	40.8–51.5	154,843	54.2 (6.28)	41.9–66.1	441,280	43.8 (2.93)	38.1–49.6

Abbreviations: Prev = prevalence percent, the proportion of the population with current asthma who reported having one or more asthma attacks in the past 12 months; SE = standard error; CI = confidence interval.

* Having had one or more episode of asthma or an asthma attack in the past 12 months.

[†] Includes persons who answered “yes” to the questions: “Have you EVER been told by a doctor or other health professional that you had asthma?” and “Do you still have asthma?”

Table S12. Percentage with one or more asthma attacks* in the past 12 months by state and metropolitan statistical area (MSA) status among persons with current asthma[†] — 2016–2018 National Health Interview Survey

State	Asthma attacks								p-value
	Total		Large MSA		Small MSA		Non-MSA		
	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	
Alabama	46.8 (3.62)	39.8–53.9	44.6 (7.65)	30.5–59.7	49.1 (4.95)	39.5–58.7	45.8 (2.96)	40.0–51.6	0.827
Alaska	60.3 (8.00)	44.0–74.5	—	—	63.5 (9.42)	44.0–79.5	51.6 (0.00)	51.6–51.6	0.324
Arizona	44.2 (4.65)	35.4–53.4	45.6 (6.07)	34.1–57.5	40.5 (5.80)	29.8–52.2	—	—	0.530
Arkansas	55.8 (7.32)	41.3–69.3	—	—	60.6 (7.71)	44.9–74.3	38.5 (3.20)	32.4–44.9	0.0645
California	46.2 (2.50)	41.4–51.1	45.3 (3.28)	39.0–51.8	47.3 (3.56)	40.4–54.3	59.7 (0.00)	59.7–59.7	0.568
Colorado	44.6 (3.13)	38.5–50.7	48.8 (6.53)	36.3–61.4	42.6 (3.31)	36.3–49.2	34.1 (0.00)	34.1–34.1	0.427
Connecticut	33.8 (5.36)	24.2–45.0	43.3 (9.54)	26.3–62.1	28.4 (6.05)	18.1–41.5	32.0 (14.01) [§]	11.8–62.5	0.490
Delaware	48.6 (4.32)	40.2–57.0	53.0 (5.95)	41.4–64.3	45.1 (5.68)	34.3–56.3	—	—	0.363
District of Columbia	50.0 (6.25)	38.0–62.0	50.0 (6.25)	38.0–62.0	—	—	—	—	—
Florida	49.0 (3.03)	43.1–54.9	50.7 (3.86)	43.1–58.2	47.2 (4.78)	38.0–56.5	— [¶]	— [¶]	0.498
Georgia	51.3 (4.70)	42.1–60.4	49.5 (6.23)	37.5–61.5	44.2 (7.96)	29.7–59.9	67.0 (6.77)	52.7–78.8	0.149
Hawaii	47.9 (5.86)	36.7–59.3	—	—	47.3 (7.04)	34.0–61.0	50.7 (2.59)	45.6–55.7	0.684
Idaho	52.7 (7.38)	38.4–66.6	—	—	43.0 (7.43)	29.4–57.8	76.3 (7.33)	59.2–87.7	0.120
Illinois	41.3 (4.22)	33.3–49.7	37.8 (5.30)	28.1–48.6	50.9 (8.36)	35.0–66.6	42.6 (5.44)	32.4–53.5	0.437
Indiana	46.1 (2.93)	40.5–51.9	40.3 (5.34)	30.4–51.1	55.4 (2.56)	50.4–60.4	48.7 (3.11)	42.7–54.8	0.106

State	Asthma attacks								
	Total		Large MSA		Small MSA		Non-MSA		p-value
	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	
Iowa	37.0 (4.68)	28.4–46.6	—	—	33.7 (7.09)	21.4–48.6	41.7 (2.55)	36.8–46.8	0.323
Kansas	60.2 (4.28)	51.6–68.2	59.9 (13.46)	33.2–81.8	62.2 (2.96)	56.2–67.8	58.6 (3.54)	51.5–65.3	0.769
Kentucky	39.0 (3.81)	31.9–46.7	38.4 (4.29)	30.4–47.1	49.4 (10.05)	30.7–68.2	35.9 (6.86)	23.8–50.2	0.511
Louisiana	40.6 (6.61)	28.6–54.0	36.5 (8.88)	21.3–54.9	41.8 (9.89)	24.4–61.5	41.7 (12.98) [§]	20.1–67.1	0.903
Maine	40.3 (5.25)	30.6–50.9	—	—	41.4 (8.00)	27.0–57.5	38.9 (6.36)	27.4–51.9	0.806
Maryland	42.5 (5.00)	33.1–52.4	42.5 (5.00)	33.1–52.4	—	—	—	—	—
Massachusetts	40.4 (5.55)	30.1–51.6	39.5 (5.58)	29.2–50.8	41.0 (12.89) [§]	19.6–66.4	52.7 (10.40)	32.9–71.6	0.598
Michigan	48.6 (4.49)	39.9–57.3	40.4 (5.33)	30.5–51.1	59.5 (10.97)	37.6–78.2	55.0 (6.55)	42.1–67.2	0.113
Minnesota	49.6 (5.03)	39.9–59.4	48.3 (6.70)	35.6–61.3	50.8 (0.00)	50.8–50.8	52.3 (10.60)	32.3–71.6	0.923
Mississippi	50.2 (4.07)	42.3–58.1	— [¶]	— [¶]	— [¶]	— [¶]	42.0 (6.34)	30.3–54.7	0.208
Missouri	51.1 (3.90)	43.5–58.7	51.1 (4.24)	42.9–59.4	58.8 (15.08)	29.6–82.9	45.2 (2.65)	40.1–50.4	0.360
Montana	55.7 (4.48)	46.8–64.2	—	—	64.1 (3.68)	56.6–71.0	53.1 (5.14)	43.0–62.9	0.150
Nebraska	34.3 (7.08)	22.0–49.2	—	—	38.9 (8.16)	24.5–55.5	N/A	N/A	0.263
Nevada	37.2 (4.03)	29.7–45.4	38.8 (5.12)	29.4–49.2	— [¶]	— [¶]	— [¶]	— [¶]	0.439
New Hampshire	48.2 (4.15)	40.2–56.3	44.2 (5.16)	34.4–54.4	— [¶]	— [¶]	— [¶]	— [¶]	0.255
New Jersey	37.8 (4.31)	29.8–46.5	38.8 (4.86)	29.8–48.6	33.5 (9.43)	18.0–53.6	—	—	0.620

State	Asthma attacks								
	Total		Large MSA		Small MSA		Non-MSA		p-value
	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	
New Mexico	43.3 (5.78)	32.5–54.8	—	—	44.8 (7.68)	30.6–59.9	39.9 (4.84)	30.9–49.7	0.632
New York	44.8 (3.10)	38.8–51.0	46.2 (3.52)	39.4–53.2	29.9 (4.35)	22.1–39.0	58.7 (1.05)	56.6–60.7	0.0002**
North Carolina	53.3 (3.77)	45.9–60.5	42.9 (7.03)	30.0–56.9	57.0 (5.32)	46.4–67.0	62.5 (7.35)	47.4–75.5	0.141
North Dakota	39.1 (6.16)	27.8–51.6	—	—	49.0 (0.00)	49.0–49.0	32.4 (3.37)	26.2–39.3	0.0190**
Ohio	42.1 (3.44)	35.5–48.9	33.7 (3.34)	27.5–40.5	49.2 (7.59)	34.8–63.7	51.8 (7.02)	38.2–65.1	0.0430**
Oklahoma	34.2 (7.42)	21.4–49.8	37.8 (8.58)	22.9–55.4	52.6 (14.00)	26.9–76.9	23.0 (11.27) [§]	7.9–51.0	0.347
Oregon	59.2 (3.91)	51.3–66.6	59.3 (7.48)	44.3–72.8	56.7 (4.62)	47.5–65.5	63.3 (0.00)	63.3–63.3	0.534
Pennsylvania	50.9 (2.59)	45.9–56.0	51.5 (4.64)	42.5–60.5	50.4 (2.57)	45.3–55.4	50.1 (2.18)	45.8–54.4	0.965
Rhode Island	49.8 (7.25)	35.9–63.6	49.8 (7.25)	35.9–63.6	—	—	—	—	—
South Carolina	38.8 (4.19)	31.0–47.3	—	—	36.1 (4.28)	28.2–44.8	50.4 (12.04)	28.3–72.3	0.397
South Dakota	41.0 (0.30)	40.4–41.6	—	—	41.1 (0.45)	40.2–41.9	41.0 (0.00)	41.0–41.0	0.863
Tennessee	47.1 (4.07)	39.3–55.1	66.5 (7.44)	50.7–79.2	33.8 (4.55)	25.5–43.2	40.4 (6.81)	28.0–54.1	0.0079**
Texas	43.9 (3.30)	37.5–50.4	44.1 (4.13)	36.3–52.3	49.1 (6.06)	37.5–60.8	28.4 (5.06)	19.6–39.2	0.0769
Utah	47.7 (3.98)	40.0–55.5	44.1 (5.24)	34.2–54.4	— [¶]	— [¶]	— [¶]	— [¶]	0.527
Vermont	47.2 (7.62)	32.9–62.0	—	—	52.0 (9.39)	34.1–69.4	39.8 (0.00)	39.8–39.8	0.284
Virginia	51.5 (3.73)	44.2–58.8	56.0 (3.62)	48.8–62.9	40.3 (4.76)	31.4–49.8	39.9 (10.06)	22.6–60.2	0.106

State	Asthma attacks								
	Total		Large MSA		Small MSA		Non-MSA		p-value
	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	Prev, % (SE)	95% CI	
Washington	52.4 (3.53)	45.5–59.3	54.5 (4.55)	45.6–63.2	46.1 (4.71)	37.0–55.3	59.9 (17.06)	27.1–85.8	0.326
West Virginia	55.3 (11.98)	32.3–76.2	—	—	59.4 (15.08)	30.1–83.3	44.1 (6.94)	31.3–57.9	0.404
Wisconsin	42.7 (4.27)	34.6–51.2	38.6 (5.43)	28.6–49.6	33.6 (3.58)	27.0–41.0	53.5 (9.63)	35.0–71.1	0.179
Wyoming	60.9 (5.53)	49.7–71.1	—	—	68.1 (0.00)	68.1–68.1	57.9 (5.84)	46.3–68.8	0.269

Abbreviations: Prev = prevalence percent, the proportion of the population with current asthma who reported having one or more asthma attacks in the past 12 months; SE = standard error; CI = confidence interval; N/A = relative standard error is ≥50%; — = no counties in the MSA level within the state.

* Having had one or more episode of asthma or an asthma attack in the past 12 months.

† Includes persons who answered “yes” to the questions: “Have you EVER been told by a doctor or other health professional that you had asthma?” and “Do you still have asthma?”

§ Relative standard error is 30%–50%; estimate is unreliable.

¶ p-value for chi-square test is statistically significant at 0.05.

** Suppressed because of small cell size.

Table S13. Percentage with emergency department/urgent care center visits* because of asthma in the past 12 months by selected characteristics among all ages, children, and adults with current asthma† — 2016–2018 National Health Interview Survey

Characteristic	Emergency department/urgent care center visits								
	All ages			Children			Adults		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Total	3,029,309	11.9 (0.42)	11.1–12.7	1,063,589	17.9 (1.02)	16.0–20.0	1,965,720	10.1 (0.46)	9.2–11.0
Sex	p=0.179			p=0.367			p<0.001 [§]		
Male	1,137,952	11.2 (0.70)	9.9–12.6	631,498	18.7 (1.37)	16.2–21.6	506,454	7.4 (0.75)	6.1–9.1
Female	1,891,357	12.4 (0.52)	11.4–13.5	432,091	16.9 (1.53)	14.1–20.1	1,459,266	11.5 (0.56)	10.4–12.6
Age group (years)	p<0.001 [§]			p<0.001 [§]			p=0.329		
0–4	276,510	34.9 (3.47)	28.4–41.9	276,510	34.9 (3.47)	28.4–41.9	—	—	—
5–11	489,721	19.3 (1.74)	16.1–22.9	489,721	19.3 (1.74)	16.1–22.9	—	—	—
12–17	297,358	11.4 (1.13)	9.4–13.8	297,358	11.4 (1.13)	9.4–22.9	—	—	—
18–24	227,781	8.8 (1.36)	6.5–11.8	—	—	—	227,781	8.8 (1.36)	6.5–11.8
25–34	287,941	9.3 (1.21)	7.2–11.9	—	—	—	287,941	9.3 (1.21)	7.2–11.9
35–64	1,106,909	10.9 (0.64)	9.7–12.2	—	—	—	1,106,99	10.9 (0.64)	9.7–12.2
≥65	343,088	9.4 (0.82)	7.9–11.1	—	—	—	343,088	9.4 (0.82)	7.9–11.1
Race and ethnicity	p<0.001 [§]			p<0.001 [§]			p<0.001 [§]		
White NH	1,326,734	8.6 (0.43)	7.8–9.4	309,321	12.1 (1.21)	9.9–14.7	1,017,414	7.9 (0.46)	7.0–8.8
Black NH	787,812	19.0 (1.19)	16.7–21.4	369,074	26.6 (2.62)	21.7–32.0	418,739	15.1 (1.41)	12.6–18.2
AI/AN NH	20,306	8.1 (2.41)	4.4–14.2	N/A	N/A	N/A	11,927	6.3 (3.00) [¶]	2.5–15.5

Characteristic	Emergency department/urgent care center visits								
	All ages			Children			Adults		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Asian NH	123,834	14.9 (2.69)	10.4–21.0	38,981	27.4 (7.14)	15.7–43.3	84,854	12.4 (2.84)	7.8–19.1
Multiple NH	141,839	14.9 (2.18)	11.1–19.7	77,519	19.4 (3.91)	12.9–28.3	64,320	11.6 (2.37)	7.7–17.1
Hispanic	619,157	16.5 (1.65)	13.5–20.0	260,315	18.9 (2.18)	14.9–23.5	358,842	15.2 (2.06)	11.5–19.7
	p=0.0089 [§]			p=0.552			p=0.0445 [§]		
Puerto Rican**	157,563	20.2 (3.16)	14.7–27.1	53,580	23.5 (6.07)	13.7–37.3	103,983	18.8 (4.07)	12.1–28.1
Mexican**	260,980	13.6 (1.75)	10.5–17.4	125,531	16.0 (2.68)	11.4–22.0	135,449	11.9 (2.00)	8.5–16.5
Other Hispanic**	200,614	19.1 (4.15)	12.2–28.6	803,274	22.0 (4.54)	14.3–32.1	119,410	17.6 (4.98)	9.8–29.5
Ratio of family income to federal poverty threshold	p<0.001 [§]			p=0.0001 [§]			p<0.001 [§]		
<100% FPL	890,700	18.1 (1.24)	15.8–20.7	334,707	23.3 (2.59)	18.6–28.9	555,993	15.9 (1.30)	14.0–19.3
100% to <250% FPL	1,042,397	14.4 (0.81)	12.9–16.1	411,563	20.2 (1.72)	17.0–23.8	630,834	12.2 (0.92)	9.3–12.8
250% to < 450% FPL	580,740	9.6 (0.84)	8.1–11.4	189,438	14.6 (1.83)	11.3–18.6	391,302	8.2 (0.96)	6.3–9.9
≥450% or above FPL	515,472	7.1 (0.60)	6.0–8.4	127,881	10.9 (1.81)	7.9–15.0	387,590	6.3 (0.65)	6.3–9.0
US Census regions and divisions									
Region	p=0.0004 [§]			p=0.727			p=0.0012 [§]		
Northeast	546,245	10.8 (0.80)	9.3–12.5	204,250	17.9 (2.05)	14.2–22.3	341,995	8.8 (0.86)	7.2–10.6
	p=0.858			p=0.643			p=0.990		

Characteristic	Emergency department/urgent care center visits								
	All ages			Children			Adults		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
New England	1,78,730	11.1 (1.80)	8.0–15.1	67,484	19.8 (5.06)	11.7–31.6	111,246	8.7 (1.71)	5.9–12.7
Middle Atlantic	367,515	10.7 (1.01)	8.9–12.9	136,766	17.1 (2.74)	12.3–23.1	230,749	8.8 (1.07)	6.9–11.1
Midwest	547,697	9.7 (0.76)	8.3–11.3	195,903	15.8 (2.15)	12.0–20.5	351,793	7.9 (0.75)	6.6–9.6
	p=0.692			p=0.872			p=0.766		
East North Central	394,147	9.8 (1.10)	7.9–12.2	142,416	15.9 (2.60)	11.5–21.7	251,732	8.1 (1.07)	6.2–10.5
West North Central	153,549	9.2 (1.01)	7.4–11.4	534,88	15.2 (3.45)	9.6–23.3	100,062	7.6 (1.05)	5.8–10.0
South	1,263,983	14.2 (0.79)	12.7–15.8	437,283	18.9 (1.79)	15.6–22.6	826,700	12.6 (0.92)	10.9–14.5
	p=0.296			p=0.984			p=0.0966		
South Atlantic	730,697	15.2 (1.23)	13.0–17.8	224,414	18.7 (2.33)	14.5–23.7	506,283	14.1 (1.49)	11.4–17.2
East South Central	191,838	14.2 (1.81)	11.0–18.1	62,909	19.6 (4.81)	11.8–30.7	128,929	12.5 (1.85)	9.3–16.6
West South Central	341,448	12.4 (1.29)	10.1–15.2	149,960	18.8 (3.05)	13.6–25.6	191,488	9.8 (1.30)	7.6–12.7
West	671,384	11.5 (0.94)	9.7–13.4	226,153	18.3 (2.17)	14.4–22.9	445,231	9.6 (1.00)	7.8–11.8
	p=0.517			p=0.708			p=0.521		
Mountain	262,596	12.3 (1.47)	9.7–15.5	84,196	19.4 (3.51)	13.4–27.2	178,400	10.5 (1.55)	7.8–14.0
Pacific	408,788	11.0 (1.45)	8.4–14.2	141,957	17.7 (2.97)	12.6–24.3	266,830	9.1 (1.47)	6.6–12.5
MSA status	p=0.0012 [§]			p=0.0149 [§]			p=0.0247 [§]		
Large MSA	1,831,355	13.1 (0.69)	11.8–14.5	651,142	20.1 (1.51)	17.3–23.3	1,180,213	11.0 (0.74)	9.6–12.5

Characteristic	Emergency department/urgent care center visits								
	All ages			Children			Adults		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Small MSA	900,517	11.1 (0.69)	9.9–12.6	320,476	16.4 (1.74)	13.3–20.1	580,040	9.5 (0.75)	8.1–11.0
Non-MSA	297,437	8.7 (0.93)	7.0–10.7	91,970	12.2 (2.15)	8.5–17.0	205,467	7.7 (0.93)	6.1–9.7

Abbreviations: Prev = prevalence percent, the proportion of the population with current asthma who reported having emergency department/urgent care center visits because of asthma in the past 12 months; SE = standard error; CI = confidence interval; N/A = relative standard error is $\geq 50\%$; NH = non-Hispanic; AI/AN = American Indian or Alaska Native; FPL = Federal Poverty Level; MSA = metropolitan statistical area.

* Having had one or more emergency room or urgent care center because of asthma in the past 12 months among people with current asthma

† Includes persons who answered “yes” to the questions: “Have you EVER been told by a doctor or other health professional that you had asthma?” and “Do you still have asthma?”

§ p-value for chi-square test is statistically significant at 0.05.

¶ Relative standard error is 30%–50%; estimate is unreliable.

** As a subset of Hispanic.

Table S14. Percentage with emergency department/urgent care center visits* because of asthma in the past 12 months by selected characteristics among all ages, children, and adults with current asthma† — 2016–2018 National Health Interview Survey

Characteristic	Emergency department/urgent care center visits								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
All ages									
Total	1,831,355	13.1 (0.69)	11.8–14.5	900,517	11.1 (0.69)	9.9–12.6	297,437	8.7 (0.93)	7.0–10.7
Sex	p=0.422			p=0.507			p=0.153		
Male	698,110	12.5 (1.10)	10.5–14.8	340,347	10.6 (1.10)	8.6–13.0	99,495	7.2 (1.25)	5.2–10.1
Female	1,133,245	13.5 (0.82)	12.0–15.2	560,170	11.5 (0.85)	9.9–13.3	197,942	9.7 (1.23)	7.5–12.4
Age group (years)	p<0.001 [§]			p=0.0018 [§]			p=0.0033 [§]		
0–4	168,712	37.8 (5.05)	28.5–48.1	79,599	28.8 (4.85)	20.3–39.1	28,199	40.1 (10.19)	22.6–60.6
5–11	299,230	20.9 (2.36)	16.6–25.9	152,757	18.0 (3.09)	12.7–24.9	37,735	14.3 (3.16)	9.2–21.7
12–17	183,200	13.5 (1.81)	10.3–17.5	88,121	10.7 (1.83)	7.6–14.8	26,036	6.2 (2.00) [¶]	3.2–11.4
18–24	142,021	10.5 (2.18)	6.9–15.6	59,418	6.9 (2.02)	3.8–12.1	26,343	7.0 (2.36) [¶]	3.6–13.3
25–34	196,833	10.7 (1.82)	7.6–14.8	77,798	8.3 (1.89)	5.2–12.8	13,310	4.3 (1.75) [¶]	1.9–9.4
35–64	662,676	11.6 (0.99)	9.8–13.7	319,080	10.4 (1.01)	8.5–12.5	125,154	9.1 (1.30)	6.9–12.0
≥65	178,683	9.9 (1.22)	7.7–12.5	123,745	9.9 (1.31)	7.7–12.8	40,660	6.7 (1.88)	3.8–11.5

Characteristic	Emergency department/urgent care center visits								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Race and ethnicity	p<0.001 [§]			p=0.001 [§]			p=0.0215 [§]		
White NH	693,405	9.1 (0.68)	7.8–10.5	451,577	8.6 (0.71)	7.3–10.1	181,752	7.0 (0.90)	5.5–9.0
Black NH	—**	—**	—**	—**	—**	—**	46,985	13.5 (2.13)	9.9–18.3
AI/AN NH	—**	—**	—**	—**	—**	—**	9,871	8.3 (2.57) [¶]	4.5–15.0
Asian NH	109,672	15.9 (3.10)	10.7–23.0	13,650	11.6 (5.01) [¶]	4.8–25.5	—**	—**	—**
Multiple NH	81,388	17.0 (3.60)	11.1–25.3	40,544	11.4 (2.96)	6.7–18.6	—**	—**	—**
Hispanic	396,918	16.6 (2.37)	12.5–21.8	189,156	16.6 (2.17)	12.8–21.3	33,083	14.9 (5.13) [¶]	7.3–27.9
	p=0.0713			p=0.0911			p=0.336		
Puerto Rican ⁺⁺	100,617	20.4 (4.51)	13.0–30.7	50,054	20.4 (4.95)	12.3–31.7	—**	—**	—**
Mexican ⁺⁺	126,495	11.3 (2.20)	7.7–16.4	117,198	18.1 (3.13)	12.7–25.1	—**	—**	—**
Other Hispanic ⁺⁺	169,806	21.8 (5.58)	12.8–34.7	21,905	9.0 (3.34) [¶]	4.2–18.0	8,904	31.8 (11.16) [¶]	14.6–56.1
Ratio of family income to federal poverty threshold	p<0.001 [§]			p<0.001 [§]			p=0.0501		
<100% FPL	472,879	20.0 (1.94)	16.4–24.0	306,639	18.3 (1.83)	15.0–22.2	111,182	12.7 (1.96)	9.3–17.0
100% to < 250% FPL	618,234	17.5 (1.44)	14.8–20.5	336,824	13.7 (1.31)	11.3–16.5	87,339	7.2 (1.26)	5.1–10.1

Characteristic	Emergency department/urgent care center visits								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
250% to <450% FPL	376,097	11.3 (1.34)	8.9–14.2	142,838	7.4 (1.12)	5.5–9.9	61,805	8.0 (1.81)	5.1–12.3
≥450% FPL	364,144	7.7 (0.83)	6.2–9.5	114,217	5.7 (0.99)	4.0–8.0	37,111	6.7 (1.58)	4.2–10.6
Children									
Total	1,831,355	13.1 (0.69)	11.8–14.5	900,517	11.1 (0.69)	9.9–12.6	297,437	8.7 (0.93)	7.0–10.7
Sex	p=0.563			p=0.277			p=0.535		
Male	378,123	20.9 (2.00)	17.3–25.1	206,256	18.1 (2.32)	14.0–23.1	47,119	11.1 (2.65)	6.9–17.4
Female	273,020	19.2 (2.29)	15.1–24.0	114,220	14.2 (2.68)	9.7–20.3	44,851	13.5 (3.20)	8.4–21.1
Age group (years)	p<0.001 [§]			p=0.0009 [§]			p=0.0017 [§]		
0–4	168,712	37.8 (5.05)	28.5–48.1	79,599	28.8 (4.85)	20.3–39.1	28,199	40.1 (10.19)	22.6–60.6
5–11	299,230	20.9 (2.36)	16.6–25.9	152,757	18.0 (3.09)	12.7–24.9	37,735	14.3 (3.16)	9.2–21.7
12–17	183,200	13.5 (1.81)	10.3–17.5	88,121	10.7 (1.83)	7.6–14.8	26,036	6.2 (2.00) [¶]	3.2–11.4
Race and ethnicity	p=0.0003 [§]			p=0.596			p=0.641		
White NH	149,254	12.1 (1.97)	8.7–16.5	117,836	13.7 (1.80)	10.5–17.6	42,231	9.2 (2.08)	5.9–14.2
Black NH	256,384	28.5 (3.40)	22.3–35.6	—**	—**	—**	—**	—**	—**

Characteristic	Emergency department/urgent care center visits								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
AI/AN NH	0	—**	—**	—**	—**	—**	—**	—**	—**
Asian NH	35,656	29.3 (7.95)	16.3–46.8	—**	—**	—**	—**	—**	—**
Multiple NH	47,010	23.7 (6.37)	13.5–38.2	—**	—**	—**	—**	—**	—**
Hispanic	162,839	21.5 (3.22)	15.9–28.5	82,634	16.3 (3.52)	10.5–24.4	—**	—**	—**
	p=0.155			p=0.135			p=0.533		
Puerto Rican ^{††}	34,479	27.6 (8.57) [¶]	14.2–47.0	17,385	22.6 (9.71) [¶]	8.9–46.4	—**	—**	—**
Mexican ^{††}	59,636	15.3 (3.55)	9.6–23.6	56,063	17.8 (4.78)	10.3–29.2	—**	—**	—**
Other Hispanic ^{††}	68,724	28.3 (6.73)	17.0–43.0	9,186	8.0 (3.35) [¶]	3.4–17.5	—**	—**	—**
Ratio of family income to federal poverty threshold	p=0.0008 [§]			p=0.0068 [§]			p=0.418		
<100% FPL	179,121	25.2 (3.69)	18.7–33.1	121,259	23.8 (4.68)	15.8–34.1	34,326	15.9 (4.56)	8.9–27.0
100% to < 250% FPL	257,577	25.9 (2.96)	20.5–32.1	124,938	17.4 (2.35)	13.2–22.5	29,048	9.0 (2.69)	4.9–15.9
250% to < 450% FPL	116,101	15.8 (2.74)	11.1–22.0	51,767	12.1 (2.81)	7.6–18.8	21,570	15.6 (5.44) [¶]	7.6–29.5
≥450% FPL	98,343	12.4 (2.32)	8.5–17.7	22,513	7.7 (2.63) [¶]	3.9–14.7	7,025	8.7 (4.07) [¶]	3.4–20.7
Adults									

Characteristic	Emergency department/urgent care center visits								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Total	1,180,213	11.0 (0.74)	9.6–12.5	580,040	9.5 (0.75)	8.1–11.0	205,467	7.7 (0.93)	6.1–9.7
Sex	p=0.005 [§]			p=0.0007 [§]			p=0.0546		
Male	319,987	8.5 (1.18)	6.4–11.1	13,4091	6.5 (1.13)	4.6–9.1	52,376	5.5 (1.16)	3.6–8.3
Female	860,225	12.4 (0.87)	10.8–14.2	445,949	11.0 (0.88)	9.4–12.8	153,091	8.9 (1.28)	6.7–11.8
Age group (years)	p=0.758			p=0.292			p=0.179		
18–24	142,021	10.5 (2.18)	6.9–15.6	59,418	6.9 (2.02)	3.8–12.1	26,343	7.0 (2.36) [¶]	3.6–13.3
25–34	196,833	10.7 (1.82)	7.6–14.8	77,798	8.3 (1.89)	5.2–12.8	13,310	4.3 (1.75) [¶]	1.9–9.4
35–64	662,676	11.6 (0.99)	9.8–13.7	319,080	10.4 (1.01)	8.5–12.5	125,154	9.1 (1.30)	6.9–12.0
≥65	178,683	9.9 (1.22)	7.7–12.5	123,745	9.9 (1.31)	7.7–12.8	40,660	6.7 (1.88)	3.8–11.5
Race and ethnicity	0.0012 [§]			0.0150 [§]			0.0220 [§]		
White NH	544,151	8.5 (0.73)	7.1–10.0	333,741	7.6 (0.75)	6.3–9.2	139,521	6.6 (0.94)	5.0–8.7
Black NH	—**	—**	—**	—**	—**	—**	—**	—**	—**
AI/AN NH	—**	—**	—**	—**	—**	—**	—**	—**	—**
Asian NH	74,016	13.0 (3.25)	7.9–20.8	—**	—**	—**	0	—**	—**

Characteristic	Emergency department/urgent care center visits								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Multiple NH	34,378	12.3 (3.87) [¶]	6.5–22.1	—**	—**	—**	11,597	15.1 (5.55) [¶]	7.1–29.4
Hispanic	234,080	14.4 (2.77)	9.7–20.7	106,522	16.9 (2.51)	12.5–22.4	18,240	17.5 (8.60) [¶]	6.2–40.6
	p=0.192			p=0.416			p=0.309		
Puerto Rican ^{††}	66,139	18.0 (5.54) [¶]	9.5–31.4	32,669	19.4 (5.81)	10.4–33.2	—**	—**	—**
Mexican ^{††}	66,859	9.2 (2.76) [¶]	5.0–16.2	61,135	18.3 (3.35)	12.6–25.8	—**	—**	—**
Other Hispanic ^{††}	101,082	18.9 (6.23)	9.5–34.1	N/A	N/A	N/A	—**	—**	—**
Ratio of family income to federal poverty threshold	p<0.001 [§]			p<0.001 [§]			p=0.183		
<100% FPL	293,759	17.7 (2.03)	14.1–22.0	185,379	15.9 (1.80)	12.7–19.8	76,855	11.6 (2.22)	7.9–16.7
100% to <250% FPL	360,657	14.2 (1.63)	11.3–17.7	211,886	12.2 (1.47)	9.6–15.4	58,291	6.5 (1.44)	4.2–10.0
250% < 450% FPL	259,996	10.0 (1.56)	7.3–13.5	91,071	6.0 (1.16)	4.1–8.8	40,235	6.3 (1.74)	3.6–10.7
≥450% FPL	265,801	6.8 (0.92)	5.2–8.8	91,704	5.3 (1.11)	3.5–8.0	30,086	6.4 (1.82)	3.6–11.0

Abbreviations: MSA = metropolitan statistical area; Prev = prevalence percent, the proportion of the population with current asthma who reported having emergency department/urgent care center visits because of asthma in the past 12 months; SE = standard error; CI = confidence interval; NH = non-Hispanic; AI/AN= American Indian or Alaska Native; FPL=Federal Poverty Threshold; N/A = Relative standard error is ≥50%.

* Having had one or more emergency room or urgent care center because of asthma in the past 12 months among people with current asthma

[†] Includes persons who answered “yes” to the questions: “Have you EVER been told by a doctor or other health professional that you had asthma?” and “Do you still have asthma?”

[§] p-value for chi-square test is statistically significant at 0.05.

[¶] Relative standard error is 30%–50%; estimate is unreliable.

** Suppressed because of small cell size.

^{††} As a subset of Hispanic.

Table S15. Percentage with emergency department/urgent care center visits* because of asthma in the past 12 months by metropolitan statistical area (MSA) status among all ages, children, and adults with current asthma[†] — 2006–2018 National Health Interview Survey

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Characteristic	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)	Prev, % (SE)
All ages	14.0 (0.83)	13.8 (0.91)	13.7 (0.81)	14.5 (0.86)	13.1 (0.72)	12.3 (0.60)	12.9 (0.65)	12.9 (0.69)	11.3 (0.70)	12.9 (0.78)	11.5 (0.67)	12.4 (0.88)	11.8 (0.76)
Large MSA	14.8 (1.30)	13.4 (1.13)	15.0 (1.24)	15.7 (1.23)	14.2 (1.07)	13.2 (0.88)	14.1 (1.00)	14.5 (1.05)	13.2 (1.00)	13.4 (1.03)	12.5 (1.02)	13.3 (1.39)	13.5 (1.13)
Small MSA	13.0 (1.45)	14.6 (1.78)	12.5 (1.47)	14.2 (1.40)	12.4 (1.29)	10.4 (1.01)	11.9 (1.00)	10.1 (1.11)	10.3 (1.10)	12.3 (1.39)	11.3 (1.05)	12.0 (1.25)	10.1 (1.15)
Non-MSA	13.4 (1.91)	13.2 (2.21)	12.1 (1.94)	11.7 (1.82)	10.9 (1.73)	13.2 (1.57)	11.2 (1.79)	13.5 (1.83)	7.4 (1.59)	12.4 (1.73)	8.1 (1.22)	9.3 (1.54)	8.7 (1.98)
Children	17.2 (1.53)	21.3 (2.05)	18.6 (1.69)	18.8 (1.57)	22.3 (1.65)	17.1 (1.29)	18.2 (1.31)	20.0 (1.45)	14.1 (1.25)	18.5 (1.73)	16.7 (1.68)	18.5 (1.85)	18.6 (1.94)
Large MSA	16.1 (2.05)	21.0 (2.35)	21.8 (2.53)	18.8 (2.00)	23.9 (2.35)	17.6 (1.70)	18.6 (1.98)	20.8 (2.07)	16.7 (1.78)	18.5 (2.07)	18.2 (2.35)	20.4 (2.83)	21.9 (2.80)
Small MSA	18.8 (2.92)	21.9 (4.20)	12.0 (2.19)	24.1 (3.27)	21.1 (2.97)	14.6 (2.15)	17.6 (2.33)	16.2 (2.81)	12.4 (2.20)	19.2 (3.84)	15.7 (2.86)	17.4 (2.86)	16.2 (3.12)
Non-MSA	17.0 (4.19)	20.9 (5.12)	22.4 (4.99)	9.6 (2.57)	19.4 (3.78)	19.9 (3.98)	17.6 (3.46)	24.6 (4.37)	7.5 (1.97)	17.0 (3.74)	13.6 (3.27)	12.7 (3.56)	9.4 (3.50) [§]
Adults	12.6 (0.98)	10.7 (0.90)	11.5 (0.98)	12.8 (1.02)	9.7 (0.71)	10.5 (0.67)	11.0 (0.72)	10.3 (0.79)	10.4 (0.83)	11.0 (0.81)	9.9 (0.73)	10.4 (0.87)	9.9 (0.84)

Large MSA	14.3 (1.59)	10.0 (1.22)	11.9 (1.40)	14.4 (1.54)	10.4 (1.02)	11.4 (1.02)	12.4 (1.13)	12.0 (1.15)	11.8 (1.22)	11.6 (1.16)	10.8 (1.16)	11.1 (1.40)	11.1 (1.18)
Small MSA	10.2 (1.57)	11.6 (1.63)	12.7 (1.95)	10.3 (1.47)	9.4 (1.28)	8.9 (1.11)	9.9 (1.11)	7.9 (1.10)	9.6 (1.27)	10.2 (1.24)	10.0 (1.09)	10.1 (1.32)	8.3 (1.27)
Non-MSA	12.3 (1.83)	10.6 (2.21)	8.2 (1.74)	12.5 (2.27)	7.9 (1.65)	11.1 (1.67)	9.3 (1.87)	9.8 (1.94)	7.4 (1.83)	10.8 (2.28)	6.5 (1.12)	8.3 (1.66)	8.6 (2.05)

Abbreviations: MSA = metropolitan statistical area; Prev = prevalence percent, the proportion of the population with current asthma who reported having emergency department/urgent care center visits because of asthma in the past 12 months; SE = standard error.

* Having had one or more emergency room or urgent care center because of asthma in the past 12 months among people with current asthma.

† Includes persons who answered “yes” to the questions: “Have you EVER been told by a doctor or other health professional that you had asthma?” and “Do you still have asthma?”

§ Relative standard error is 30%–50%; estimate is unreliable.

Table S16. Percentage with emergency department/urgent care center visits * because of asthma in the past 12 months by U.S. Census regions and divisions and metropolitan statistical area (MSA) status among all ages, children, and adults with current asthma[†] — 2016–2018 National Health Interview Survey

Characteristic	Emergency department/urgent care center visits								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
U.S. Census region and divisions									
All ages									
Region	p=0.464			p=0.0127 [§]			p=0.918		
Northeast	392,354	12.5 (1.26)	10.2–15.2	118,629	7.9 (1.37)	5.6–11.1	35,263	8.6 (1.64)	5.9–12.4
	p=1.000			p=0.206			p=0.946		
New England	99,741	12.5 (3.10)	7.5–19.9	61,730	10.1 (2.33)	6.3–15.6	17,259	8.5 (1.95)	5.4–13.2
Middle Atlantic	29,2612	12.5 (1.31)	10.1–15.3	56,899	6.4 (1.60)	3.9–10.4	18,004	8.7 (2.64) [¶]	4.7–15.5
Midwest	301,506	10.7 (1.27)	8.4–13.5	151,962	9.3 (1.16)	7.2–11.8	94,229	7.8 (1.90)	4.8–12.4
	p=0.994			p=0.229			p=0.432		
East North Central	234,761	10.7 (1.52)	8.1–14.1	112,989	10.1 (1.49)	7.6–13.5	46,397	6.6 (3.09) [¶]	2.6–15.9
West North Central	66,745	10.7 (2.05)	7.3–15.4	38,973	7.4 (1.64)	4.8–11.4	47,832	9.3 (1.44)	6.9–12.6
South	729,548	15.5 (1.20)	13.3–18.0	409,095	14.3 (1.46)	11.7–17.5	125,340	9.4 (1.40)	7.0–12.5
	p=0.220			p=0.995			p=0.0694		
South Atlantic	450,301	16.2 (1.73)	13.1–19.9	212,428	14.2 (2.12)	10.5–18.9	67,968	12.9 (2.74)	8.4–19.3
East South Central	82,936	19.2 (3.54)	13.2–27.1	74,891	14.3 (3.05)	9.3–21.4	34,011	8.6 (2.46)	4.9–14.8
West South Central	196,311	13.2 (1.77)	10.1–17.0	121,775	14.6 (2.64)	10.1–20.5	23,361	5.6 (1.58)	3.2–9.6

Characteristic	Emergency department/urgent care center visits								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
West	407,947	12.4 (1.74)	9.3–16.2	220,831	10.5 (1.03)	8.7–12.7	42,605	9.2 (2.08)	5.9–14.2
	p=0.286			p=0.720			p=0.719		
Mountain	146,111	15.0 (2.61)	10.5–20.9	92,016	10.1 (1.65)	7.3–13.8	24,469	9.9 (3.34) [¶]	5.0–18.7
Pacific	261,837	11.3 (2.22)	7.6–16.4	128,815	10.9 (1.31)	8.6–13.7	18,136	8.5 (2.08)	5.2–13.5
Children									
Region	p=0.991			p=0.331			p=0.668		
Northeast	142,983	19.8 (3.47)	13.8–27.5	49,583	14.1 (3.28)	8.8–21.8	11,684	17.3 (6.40) [¶]	8.0–33.5
	p=0.801			p=0.199			p=0.160		
New England	31,778	18.1 (8.49) [¶]	6.7–40.5	25,739	20.6 (6.82) [¶]	10.3–37.0	—**	—**	—**
Middle Atlantic	111,205	20.4 (3.73)	14.0–28.6	23,844	10.5 (3.33) [¶]	5.5–19.0	—**	—**	—**
Midwest	119,438	19.6 (3.44)	13.7–27.2	40,356	11.7 (3.04)	6.9–19.1	36,109	12.5 (3.83) [¶]	6.7–22.1
	p=0.547			p=0.910			p=0.448		
East North Central	87,725	18.5 (4.01)	11.9–27.7	29,360	11.9 (3.57) [¶]	6.5–20.8	25,331	14.7 (5.97) [¶]	6.3–30.5
West North Central	31,714	23.2 (6.45)	12.9–38.1	N/A	N/A	N/A	10,779	9.4 (3.45) [¶]	4.5–18.7
South	250,223	20.7 (2.38)	16.5–25.8	156,857	19.5 (3.13)	14.1–26.4	30,203	9.8 (3.21) [¶]	5.0–18.1
	p=0.593			p=0.762			p=0.311		
South Atlantic	136,935	19.7 (2.89)	14.6–25.9	67,827	17.5 (4.39)	10.5–27.8	—**	—**	—**

Characteristic	Emergency department/urgent care center visits								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
East South Central	30,782	30.9 (10.36)	14.7–53.6	26,757	19.0 (7.77) [¶]	8.0–38.7	—**	—**	—**
West South Central	82,507	20.1 (4.31)	13.0–29.9	62,272	22.7 (5.41)	13.8–34.9	—**	—**	—**
West	138,498	19.9 (3.23)	14.3–27.0	73,681	16.5 (3.57)	10.6–24.7	13,974	15.2 (5.31) [¶]	7.4–28.7
	p=0.899			p=0.406			p=0.664		
Mountain	417,74	19.3 (5.71)	10.4–32.9	35,936	19.8 (4.60)	12.3–30.4	6,485	18.1 (8.22) [¶]	6.9–39.6
Pacific	96,724	20.2 (3.92)	13.5–28.9	37,745	14.2 (5.17) [¶]	6.7–27.6	7,489	13.3 (6.00) [¶]	5.3–29.9
Adults									
Region	p=0.0387 [§]			p=0.0365 [§]			p=0.582		
Northeast	249,371	10.3 (1.33)	8.0–13.2	69,046	6.0 (1.17)	4.1–8.8	23,579	6.9 (1.56)	4.4–10.7
	p=0.811			p=0.325			p=0.137		
New England	67,964	10.9 (3.09)	6.2–18.6	35,991	7.4 (1.86)	4.5–12.0	—**	—**	—**
Middle Atlantic	181,407	10.1 (1.43)	7.6–13.3	33,055	5.0 (1.42)	2.9–8.7	—**	—**	—**
Midwest	182,067	8.2 (1.27)	6.1–11.1	111,606	8.6 (1.19)	6.6–11.3	58,120	6.3 (1.74)	3.6–10.7
	p=0.599			p=0.200			p=0.107		
East North Central	147,036	8.5 (1.51)	6.0–12.0	83,629	9.6 (1.49)	7.1–13.0	N/A	N/A	N/A
West North Central	35,031	7.2 (2.13)	4.0–12.6	27,977	6.6 (1.76)	3.9–11.0	37,053	9.3 (1.79)	6.4–13.5
South	479,325	13.7 (1.41)	11.2–16.7	252,238	12.3 (1.72)	9.3–16.1	95,137	9.2 (1.48)	6.7–12.6

Characteristic	Emergency department/urgent care center visits								
	Large MSA			Small MSA			Non-MSA		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
	p=0.187			p=0.781			p=0.219		
South Atlantic	313,366	15.0 (2.09)	11.4–19.6	144,601	13.1 (2.70)	8.6–19.3	48,316	11.8 (2.45)	7.8–17.5
East South Central	52,154	15.7 (3.25)	10.3–23.2	48,134	12.6 (3.12)	7.6–20.1	28,641	9.1 (2.85) [¶]	4.8–16.4
West South Central	113,805	10.5 (1.84)	7.4–14.7	59,503	10.6 (2.52)	6.6–16.6	18,180	6.0 (2.27) [¶]	2.8–12.3
West	269,449	10.3 (1.75)	7.4–14.3	147,150	8.9 (1.19)	6.9–11.6	28,631	7.7 (2.35) [¶]	4.2–13.8
	p=0.182			p=0.354			p=0.677		
Mountain	104,336	13.8 (2.75)	9.2–20.1	56,080	7.7 (1.77)	4.9–12.0	N/A	N/A	N/A
Pacific	165,113	8.9 (2.19)	5.5–14.3	91,070	9.9 (1.58)	7.2–13.5	10,647	6.7 (1.68)	4.1–10.9

Abbreviations: MSA = metropolitan statistical area; Prev = prevalence percent, the proportion of the population with current asthma who reported having emergency department/urgent care center visits because of asthma in the past 12 months; SE = standard error; CI = confidence interval; N/A = Relative standard error is ≥50%.

* Having had one or more emergency room or urgent care center because of asthma in the past 12 months among people with current asthma

[†] Includes persons who answered “yes” to the questions: “Have you EVER been told by a doctor or other health professional that you had asthma?” and “Do you still have asthma?”

[§] p-value for chi-square test is statistically significant at 0.05.

[¶] Relative standard error is 30%–50%; estimate is unreliable.

** Suppressed because of small cell size.

Table S17. Percentage with emergency department/urgent care center visits* because of asthma in the past 12 months by urban-rural classification (six-levels) among all ages, children, and adults with current asthma† — 2016–2018 National Health Interview Survey

Characteristic	Emergency department/urgent care center visits								
	All ages			Children			Adults		
	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI	Weighted, n	Prev, % (SE)	95% CI
Urban-rural classification	p=0.003 [§]			p=0.246			p=0.0587		
Large central metropolitan	1,021,621	14.0 (0.87)	12.3–15.7	390,746	23.0 (2.13)	19.1–27.4	630,875	11.2 (0.92)	9.5–13.2
Large fringe metropolitan	817,672	12.2 (1.08)	10.2–14.5	262,450	17.0 (2.21)	13.1–21.8	555,222	10.8 (1.16)	8.7–13.3
Medium metropolitan	601,975	10.8 (0.79)	9.4–12.5	232,263	16.8 (2.12)	13.0–21.4	369,712	8.9 (0.83)	7.4–10.6
Small metropolitan	290,603	11.8 (1.37)	9.3–14.7	86,159	15.3 (3.07)	10.2–22.3	204,444	10.7 (1.52)	8.1–14.1
Micropolitan	200,120	9.4 (1.14)	7.4–11.9	62,933	13.4 (2.68)	8.9–19.6	137,187	8.3 (1.26)	6.1–11.1
Non-core	97,317	7.5 (1.25)	5.4–10.4	29,037	10.2 (2.86)	5.8–17.3	68,280	6.8 (1.30)	4.6–9.8

Abbreviations: MSA = metropolitan statistical area; Prev = prevalence percent, the proportion of the population with current asthma who reported having emergency department/urgent care center visits because of asthma in the past 12 months; SE = standard error; CI = confidence interval.

* Having had one or more emergency room or urgent care center because of asthma in the past 12 months among people with current asthma.

† Includes persons who answered “yes” to the questions: “Have you EVER been told by a doctor or other health professional that you had asthma?” and “Do you still have asthma?”

[§] p-value for chi-square test is statistically significant at 0.05.

Table S18. Asthma mortality rate by selected characteristics among all ages, children, and adults — 2016–2018 National Vital Statistics System (CDC WONDER)

Characteristic	Asthma mortality								
	All ages			Children			Adults		
	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI
Total	10,523	10.8 (0.11)	10.6–11.0	586	2.7 (0.11)	2.4–2.9	9,936	13.2 (0.13)	12.9–13.4
Sex									
Male	4,103	8.5 (0.13)	8.3–8.8	353	3.1 (0.17)	2.8–3.5	3,749	10.2 (0.17)	9.9–10.5
Female	6,420	13.0 (0.16)	12.6–13.3	233	2.2 (0.14)	1.9–2.4	6,187	16.0 (0.20)	15.6–16.4
Age group (years)									
0–4	98	1.6 (0.17)	1.3–2.0	98	1.6 (0.17)	1.3–2.0	—	—	—
5–11	277	3.2 (0.19)	2.8–3.6	277	3.2 (0.19)	2.8–3.6	—	—	—
12–17	211	2.8 (0.19)	2.4–3.2	211	2.8 (0.19)	2.4–3.2	—	—	—
18–24	404	4.4 (0.22)	4.0–4.8	—	—	—	404	4.4 (0.22)	4.0–4.8
25–34	793	5.8 (0.21)	5.4–6.3	—	—	—	793	5.8 (0.21)	5.4–6.3
35–64	4,233	11.3 (0.17)	10.9–11.6	—	—	—	4,233	11.3 (0.17)	10.9–11.6
≥65	4,506	29.5 (0.44)	28.7–30.4	—	—	—	4,506	29.5 (0.44)	28.7–30.4
Race and ethnicity									
White NH	6,033	10.0 (0.13)	9.7–10.3	142	1.2 (0.10)	1.0–1.4	5,891	12.1 (0.16)	11.8–12.4
Black NH	2,841	22.2 (0.42)	21.4–23.1	346	10.3 (0.56)	9.3–11.4	2,495	26.5 (0.53)	25.4–27.5
AI/AN NH	90	11.0 (1.16)	8.8–13.5	— [†]	— [†]	— [†]	87	14.5 (1.56)	11.6–17.9

Characteristic	Asthma mortality								
	All ages			Children			Adults		
	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI
Asian NH	476	7.9 (0.36)	7.2–8.6	— [†]	— [†]	— [†]	468	9.9 (0.46)	9.0–10.8
Hispanic	1,033	5.9 (0.18)	5.5–6.2	84	1.5 (0.16)	1.2–1.9	949	7.9 (0.26)	7.4–8.4
US Census regions and divisions									
Northeast	1,978	11.7 (0.26)	11.2–12.2	100	2.8 (0.28)	2.3–3.4	1,877	14.0 (0.32)	13.4–14.7
New England	482	10.9 (0.49)	9.9–11.8	17	— [†]	— [†]	465	13.1 (0.61)	11.9–14.3
Middle Atlantic	1,496	12.0 (0.31)	11.4–12.6	83	3.2 (0.35)	2.5–3.9	1,412	14.4 (0.38)	13.6–15.2
Midwest	2,315	11.3 (0.24)	10.9–11.8	157	3.4 (0.27)	2.8–3.9	2,158	13.7 (0.29)	13.1–14.2
East North Central	1,539	10.9 (0.28)	10.4–11.5	104	3.3 (0.32)	2.7–3.9	1,435	13.2 (0.35)	12.5–13.9
West North Central	776	12.2 (0.44)	11.3–13.0	53	3.5 (0.49)	2.7–4.6	723	14.8 (0.55)	13.7–15.9
South	3,649	9.8 (0.16)	9.5–10.2	250	2.9 (0.19)	2.6–3.3	3,399	11.9 (0.20)	11.5–12.3
South Atlantic	1,947	10.0 (0.23)	9.6–10.5	114	2.7 (0.25)	2.2–3.2	1,833	12.1 (0.28)	11.5–12.6
East South Central	680	11.9 (0.46)	11.0–12.8	55	4.2 (0.57)	3.2–5.5	625	14.2 (0.57)	13.1–15.3
West South Central	1,022	8.5 (0.27)	8.0–9.1	81	2.7 (0.30)	2.1–3.3	941	10.5 (0.34)	9.9–11.2
West	2,581	11.1 (0.22)	10.7–11.6	79	1.5 (0.17)	1.2–1.8	2,502	14.0 (0.28)	13.5–14.6
Mountain	835	11.5 (0.40)	10.7–12.3	24	1.4 (0.28)	0.9–2.1	811	14.7 (0.52)	13.7–15.7
Pacific	1,746	10.9 (0.26)	10.4–11.5	55	1.5 (0.21)	1.1–2.0	1,691	13.7 (0.33)	13.1–14.4

Characteristic	Asthma mortality								
	All ages			Children			Adults		
	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI
MSA status									
Large MSA	5,597	10.3 (0.14)	10.0–10.5	348	2.8 (0.15)	2.5–3.1	5,248	12.5 (0.17)	12.1–12.8
Small MSA	3,212	11.0 (0.19)	10.6–11.3	164	2.5 (0.19)	2.1–2.9	3,048	13.4 (0.24)	13.0–13.9
Non-MSA	1,714	12.4 (0.30)	11.8–13.0	74	2.4 (0.28)	1.9–3.1	1,640	15.2 (0.38)	14.5–15.9

Abbreviations: SE = standard error; CI = confidence interval; NH = non-Hispanic; AI/AN = American Indian or Alaska Native; MSA = metropolitan statistical area.

* Underlying cause of death is asthma (ICD-10-CM codes: J45–J46).

† Unreliable because 10–19 persons.

Table S19. Asthma mortality rate by selected characteristics and metropolitan statistical area (MSA) status among all ages — 2016–2018 National Vital Statistics System (CDC WONDER)

Characteristic	Asthma mortality								
	Large MSA			Small MSA			Non-MSA		
	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI
All ages									
Total	5,597	10.3 (0.14)	10.0–10.5	3,212	11.0 (0.19)	10.6–11.3	1,714	12.4 (0.30)	11.8–13.0
Sex									
Male	2,195	8.2 (0.18)	7.9–8.6	1,270	8.8 (0.25)	8.3–9.3	638	9.2 (0.36)	8.5–9.9
Female	3,402	12.2 (0.21)	11.8–12.7	1,942	13.1 (0.30)	12.5–13.7	1,076	15.6 (0.48)	14.7–16.5
Age group (years)									
0–4	51	1.5 (0.21)	1.1–2.0	33	1.8 (0.32)	1.3–2.6	14	— [†]	— [†]
5–11	175	3.6 (0.27)	3.1–4.2	72	2.8 (0.33)	2.2–3.5	21	3.0 (0.65)	1.8–4.5
12–17	122	2.9 (0.26)	2.4–3.4	59	2.6 (0.34)	2.0–3.4	30	2.9 (0.52)	1.9–4.1
18–24	215	4.4 (0.30)	3.8–5.0	121	4.0 (0.36)	3.3–4.7	68	5.4 (0.66)	4.2–6.9
25–34	440	5.5 (0.26)	5.0–6.0	239	6.1 (0.40)	5.3–6.9	114	7.0 (0.65)	5.7–8.2
35–64	2,319	10.9 (0.23)	10.4–11.3	1,256	11.5 (0.33)	10.9–12.2	658	12.5 (0.49)	11.5–13.4
≥65	2,274	29.2 (0.61)	28.0–30.4	1,432	29.6 (0.78)	28.1–31.1	800	30.5 (1.08)	28.4–32.6
Race and ethnicity									
White NH	2,560	8.7 (0.17)	8.4–9.0	2,147	10.7 (0.23)	10.3–11.2	1,326	12.1 (0.33)	11.5–12.8

Characteristic	Asthma mortality								
	Large MSA			Small MSA			Non-MSA		
	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI
Black NH	1,922	23.0 (0.53)	22.0–24.1	645	19.9 (0.78)	18.4–21.5	274	23.0 (1.39)	20.3–25.8
AI/AN NH	23	10.0 (2.08)	6.3–15.0	27	10.2 (1.97)	6.7–14.9	40	12.3 (1.95)	8.8–16.8
Asian NH	338	7.2 (0.39)	6.5–8.0	123	10.6 (0.96)	8.7–12.5	15	— [†]	— [†]
Hispanic	721	6.1 (0.23)	5.7–6.6	258	5.6 (0.35)	4.9–6.3	54	4.5 (0.62)	3.4–5.9

Abbreviations: MSA = metropolitan statistical area; SE = standard error; CI = confidence interval; NH = non-Hispanic; AI/AN = American Indian or Alaska Native.

* Underlying cause of death is asthma (ICD-10-CM codes: J45–J46).

[†] Unreliable because 10–19 persons.

Table S20. Asthma mortality rate by metropolitan statistical area (MSA) status among all ages, children, and adults — 2006–2018 National Vital Statistics System (CDC WONDER)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	Rate*,† (SE)	Rate*,† (SE)	Rate*,† (SE)	Rate*,† (SE)	Rate*,† (SE)	Rate*,† (SE)	Rate*,† (SE)	Rate*,† (SE)	Rate*,† (SE)	Rate*,† (SE)	Rate*,† (SE)	Rate*,† (SE)	Rate*,† (SE)
All ages	12.1 (0.20)	11.4 (0.19)	11.2 (0.19)	11.0 (0.19)	11.0 (0.19)	10.7 (0.19)	11.2 (0.19)	11.5 (0.19)	11.5 (0.19)	11.2 (0.19)	10.9 (0.18)	10.9 (0.18)	10.5 (0.18)
Large MSA	11.5 (0.27)	10.9 (0.26)	10.6 (0.25)	11.0 (0.26)	10.6 (0.25)	10.7 (0.25)	10.6 (0.25)	11.3 (0.25)	11.1 (0.25)	10.8 (0.25)	10.3 (0.24)	10.6 (0.24)	9.9 (0.23)
Small MSA	12.3 (0.37)	11.2 (0.35)	11.4 (0.34)	10.5 (0.34)	11.1 (0.35)	9.7 (0.32)	11.3 (0.35)	10.7 (0.34)	11.1 (0.34)	11.3 (0.34)	10.9 (0.33)	11.1 (0.34)	10.9 (0.33)
Non-MSA	13.9 (0.55)	14.0 (0.55)	12.8 (0.53)	12.3 (0.52)	12.6 (0.52)	12.9 (0.53)	13.4 (0.54)	13.7 (0.54)	13.6 (0.54)	12.9 (0.53)	13.1 (0.53)	12.2 (0.51)	11.9 (0.51)
Children	2.3 (0.18)	2.5 (0.18)	2.6 (0.19)	2.8 (0.19)	2.5 (0.18)	2.7 (0.19)	2.4 (0.18)	3.0 (0.20)	2.5 (0.19)	3.0 (0.20)	2.8 (0.20)	2.5 (0.18)	2.6 (0.19)
Large MSA	2.3 (0.24)	2.8 (0.26)	2.8 (0.26)	3.0 (0.27)	2.5 (0.25)	3.3 (0.28)	2.5 (0.24)	2.9 (0.27)	2.5 (0.25)	3.2 (0.28)	3.0 (0.27)	2.8 (0.26)	2.6 (0.25)
Small MSA	2.5 (0.34)	2.0 (0.30)	2.1 (0.31)	2.5 (0.34)	2.2 (0.31)	1.8 (0.28)	2.5 (0.34)	2.8 (0.36)	2.2 (0.32)	3.0 (0.37)	2.7 (0.35)	2.2 (0.32)	2.5 (0.34)
Non-MSA	1.8 (0.41)	2.3 (0.46)	2.4 (0.47)	2.1 (0.45)	3.1 (0.54)	2.5 (0.49)	2.3 (0.47)	3.4 (0.57)	3.2 (0.56)	— [§]	2.4 (0.48)	2.2 (0.46)	2.8 (0.52)
Adults	15.3 (0.26)	14.3 (0.25)	13.9 (0.25)	13.7 (0.24)	13.7 (0.24)	13.2 (0.24)	13.9 (0.24)	14.1 (0.24)	14.1 (0.24)	13.7 (0.24)	13.3 (0.23)	13.4 (0.23)	12.8 (0.22)
Large MSA	14.6 (0.35)	13.6 (0.33)	13.2 (0.32)	13.6 (0.33)	13.1 (0.32)	13.1 (0.32)	13.2 (0.32)	13.9 (0.32)	13.7 (0.32)	13.1 (0.31)	12.5 (0.30)	12.9 (0.30)	12.1 (0.29)
Small MSA	15.5 (0.48)	14.1 (0.45)	14.3 (0.45)	13.0 (0.43)	13.9 (0.44)	12.2 (0.41)	14.0 (0.44)	13.1 (0.42)	13.7 (0.43)	13.7 (0.43)	13.3 (0.42)	13.7 (0.43)	13.4 (0.42)
Non-MSA	17.7 (0.71)	17.6 (0.71)	16.0 (0.67)	15.4 (0.66)	15.4 (0.66)	16.0 (0.67)	16.6 (0.68)	16.7 (0.68)	16.6 (0.68)	16.0 (0.67)	16.1 (0.67)	15.0 (0.65)	14.5 (0.63)

Abbreviation: SE = standard error; MSA = metropolitan statistical area.

* Underlying cause of death is asthma (ICD-10-CM codes: J45–J46).

† Death rate per million.

§ Unreliable because 10–19 persons.

Table S21. Asthma mortality rate by U.S. Census regions and divisions and metropolitan statistical area (MSA) status among all ages, children, and adults — 2016–2018 National Vital Statistics System (CDC WONDER)

Characteristic	Asthma mortality								
	Large MSA			Small MSA			Non-MSA		
	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI
U.S. Census region and divisions									
All ages									
Northeast	1,362	12.0 (0.33)	11.4–12.7	468	11.2 (0.52)	10.2–12.2	148	10.8 (0.89)	9.1–12.5
New England	213	9.3 (0.63)	8.0–10.5	200	12.3 (0.87)	10.6–14.0	69	13.3 (1.60)	10.3–16.8
Middle Atlantic	1,149	12.7 (0.38)	12.0–13.5	268	10.5 (0.64)	9.2–11.8	79	9.3 (1.04)	7.4–11.6
Midwest	1,153	11.6 (0.34)	10.9–12.3	607	10.2 (0.41)	9.3–11.0	555	12.3 (0.52)	11.3–13.3
East North Central	882	11.5 (0.39)	10.8–12.3	392	10.2 (0.51)	9.2–11.2	265	10.3 (0.63)	9.1–11.5
West North Central	271	11.7 (0.71)	10.3–13.1	215	10.1 (0.69)	8.7–11.4	290	14.9 (0.88)	13.2–16.6
South	1,688	8.9 (0.22)	8.5–9.4	1,248	10.2 (0.29)	9.6–10.8	713	12.1 (0.45)	11.2–12.9
South Atlantic	1,003	9.4 (0.30)	8.8–10.0	673	10.4 (0.40)	9.6–11.1	271	12.3 (0.75)	10.8–13.8
East South Central	179	10.3 (0.77)	8.8–11.8	256	11.9 (0.75)	10.5–13.4	245	13.4 (0.86)	11.7–15.1
West South Central	506	7.8 (0.35)	7.1–8.5	319	8.8 (0.49)	7.9–9.8	197	10.4 (0.74)	9.0–11.9
West	1,394	9.8 (0.26)	9.2–10.3	889	12.9 (0.43)	12.0–13.7	298	14.7 (0.85)	13.0–16.4
Mountain	354	10.7 (0.57)	9.6–11.8	317	11.6 (0.65)	10.3–12.8	164	13.7 (1.07)	11.6–15.8
Pacific	1,040	9.5 (0.29)	8.9–10.1	572	13.8 (0.58)	12.7–14.9	134	16.2 (1.40)	13.4–18.9

Characteristic	Asthma mortality								
	Large MSA			Small MSA			Non-MSA		
	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI
Children									
Northeast	80	3.3 (0.37)	2.7–4.2	17	— [†]	— [†]	— [§]	— [§]	— [§]
New England	11	— [†]	— [†]	— [§]	— [§]	— [§]	— [§]	— [§]	— [§]
Middle Atlantic	69	3.6 (0.43)	2.8–4.5	13	— [†]	— [†]	— [§]	— [§]	— [§]
Midwest	97	4.2 (0.43)	3.4–5.1	38	2.8 (0.46)	2.0–3.9	22	2.2 (0.47)	1.4–3.3
East North Central	66	3.8 (0.46)	2.9–4.8	25	3.0 (0.59)	1.9–4.4	13	— [†]	— [†]
West North Central	31	5.7 (1.02)	3.9–8.1	13	— [†]	— [§]	— [§]	— [§]	— [§]
South	120	2.7 (0.25)	2.2–3.2	87	3.2 (0.34)	2.5–3.9	43	3.3 (0.50)	2.4–4.4
South Atlantic	64	2.7 (0.33)	2.1–3.4	36	2.7 (0.45)	1.9–3.7	14	— [†]	— [†]
East South Central	13	— [†]	— [†]	25	5.2 (1.04)	3.4–7.7	17	— [†]	— [†]
West South Central	43	2.6 (0.39)	1.9–3.5	26	2.8 (0.55)	1.8–4.1	12	— [†]	— [†]
West	51	1.6 (0.22)	1.2–2.1	22	1.3 (0.28)	0.8–2.0	— [§]	— [§]	— [§]
Mountain	17	— [†]	— [†]	— [§]	— [§]	— [§]	— [§]	— [§]	— [§]
Pacific	34	1.4 (0.24)	1.0–1.9	17	— [†]	— [†]	— [§]	— [§]	— [§]
Adults									
Northeast	1,281	14.3 (0.40)	13.5–15.1	451	13.6 (0.64)	12.4–14.9	145	13.1 (1.09)	11.0–15.2
New England	202	11.0 (0.77)	9.5–12.5	196	15.2 (1.08)	13.0–17.3	67	15.8 (1.93)	12.3–20.1

Characteristic	Asthma mortality								
	Large MSA			Small MSA			Non-MSA		
	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI
Middle Atlantic	1,079	15.2 (0.46)	14.3–16.1	255	12.6 (0.79)	11.1–14.2	78	11.4 (1.29)	9.0–14.2
Midwest	1,056	13.8 (0.42)	13.0–14.6	569	12.3 (0.52)	11.3–13.3	533	15.2 (0.66)	13.9–16.5
East North Central	816	13.9 (0.49)	12.9–14.8	367	12.2 (0.64)	11.0–13.5	252	12.5 (0.79)	11.0–14.0
West North Central	240	13.6 (0.88)	11.9–15.3	202	12.4 (0.87)	10.7–14.1	281	18.8 (1.12)	16.6–21.0
South	1,568	10.9 (0.27)	10.3–11.4	1,161	12.2 (0.36)	11.5–12.9	670	14.6 (0.56)	13.5–15.7
South Atlantic	939	11.3 (0.37)	10.6–12.0	637	12.4 (0.49)	11.4–13.3	257	14.8 (0.92)	13.0–16.6
East South Central	166	12.5 (0.97)	10.6–14.4	231	13.9 (0.91)	12.1–15.7	228	16.1 (1.07)	14.0–18.2
West South Central	463	9.6 (0.45)	8.8–10.5	293	10.9 (0.64)	9.7–12.2	185	12.8 (0.94)	11.0–14.7
West	1,343	12.2 (0.33)	11.5–12.8	867	16.6 (0.56)	15.5–17.7	292	18.6 (1.09)	16.5–20.7
Mountain	337	13.4 (0.73)	12.0–14.8	312	15.0 (0.85)	13.3–16.6	162	17.7 (1.39)	15.0–20.4
Pacific	1,006	11.8 (0.37)	11.1–12.5	555	17.7 (0.75)	16.2–19.1	130	19.8 (1.74)	16.4–23.3

Abbreviations: MSA = metropolitan statistical area; SE = standard error, CI = confidence interval.

* Underlying cause of death is asthma (ICD-10-CM codes: J45–J46).

† Unreliable because 10–19 persons.

§ Suppressed because ≤9 persons.

Table S22. Asthma mortality rate by urban-rural classification (six-levels) among all ages, children, and adults — 2016–2018 National Vital Statistics System (CDC WONDER)

Characteristic	Asthma mortality								
	All ages			Children			Adults		
	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI	N*	Rate* per million (SE)	95% CI
Urban-rural classification									
Large central metropolitan	3,454	11.5 (0.20)	11.1–11.9	229	3.4 (0.22)	2.9–3.8	3,225	13.8 (0.24)	13.4–14.3
Large fringe metropolitan	2,143	8.8 (0.19)	8.4–9.2	119	2.1 (0.19)	1.7–2.5	2,023	10.8 (0.24)	10.3–11.2
Medium metropolitan	2,223	10.9 (0.23)	10.4–11.3	116	2.5 (0.23)	2.0–2.9	2,107	13.4 (0.29)	12.8–14.0
Small metropolitan	989	11.1 (0.35)	10.4–11.8	48	2.5 (0.35)	1.8–3.2	941	13.6 (0.44)	12.7–14.4
Micropolitan	957	11.7 (0.38)	11.0–12.4	46	2.5 (0.37)	1.9–3.4	911	14.3 (0.47)	13.4–15.2
Non-core	757	13.4 (0.49)	12.4–14.4	28	2.3 (0.43)	1.5–3.3	729	16.5 (0.61)	15.3–17.7

Abbreviations: SE = standard error; CI = confidence interval.

* Underlying cause of death is asthma (ICD-10-CM codes: J45–J46).

Table S23. Joinpoint trend test results for all four asthma indicators for asthma surveillance by geographic including rural and urban, 2006–2018

Current asthma prevalence			
Characteristics	APC	APC p-value	Slope p-value
All ages			
Overall	-0.2	0.7	0.695
Large MSA	-0.2	0.7	0.691
Small MSA	-0.0	1.0	0.955
Non-core	0.1	0.9	0.884
Children			
Overall	-1.6	0.0	0.000841*
Large MSA	2006–2011: 1.8 2011–2018: -4.0	0.2 0.0	0.189 0.000897*
Small MSA	-1.5	0.0	0.0157*
Non-core	2006–2009: 8.9 2009–2018: -2.1	0.1 0.1	0.124 0.0687
Adult			
Overall	0.3	0.5	0.496
Large MSA	0.5	0.3	0.340
Small MSA	0.6	0.2	0.209
Non-core	0.2	0.7	0.714
Asthma attack prevalence			
Characteristics	APC	APC p-value	Slope p-value

All ages			
Overall	-1.3	0.0	0.000130*
Large MSA	-1.3	0.0	0.00137*
Small MSA	-1.3	0.0	0.000436*
Non-core	-1.0	0.0	0.0268*
Children			
Overall	-0.8	0.1	0.103
Large MSA	-0.2	0.7	0.726
Small MSA	-1.8	0.0	0.000899*
Non-core	-0.8	0.2	0.243
Adult			
Overall	-1.3	0.0	0.000036*
Large MSA	-1.7	0.0	0.000519*
Small MSA	-1.0	0.0	0.0186*
Non-core	-0.8	0.1	0.0925
Emergency department/urgent care center visits			
Characteristics	APC	APC p-value	Slope p-value
All ages			
Overall	-1.6	0.0	0.00141*
Large MSA	-1.0	0.0	0.0329*
Small MSA	-2.0	0.0	0.0239*

Non-core	-3.2	0.0	0.0214*
Children			
Overall	-0.9	0.4	0.380
Large MSA	-0.1	0.9	0.942
Small MSA	-1.8	0.3	0.287
Non-core	-3.6	0.2	0.211
Adult			
Overall	-1.4	0.0	0.0294*
Large MSA	-1.0	0.2	0.232
Small MSA	-1.3	0.1	0.134
Non-core	-3.3	0.0	0.0232*
Mortality rate			
Characteristics	APC	APC p-value	Slope p-value
All ages			
Overall	2006–2009: -3.4 2009–2014: 1.2 2014–2018: -2.1	0.0 0.2 0.0	0.0424* 0.205 0.0487*
Large MSA	-0.6	0.0	0.0408*
Small MSA	-0.4	0.3	0.349
Non-core	2006–2009: -4.7 2009–2013: 2.9 2013–2018: -2.8	0.0 0.2 0.0	0.0382* 0.154 0.0161*
Children			

Overall	0.7	0.3	0.258
Large MSA	0.5	0.5	0.549
Small MSA	1.4	0.2	0.200
Non-core	1.9	0.2	0.236
Adult			
Overall	2006–2009: -3.8 2009–2014: 0.9 2014–2018: -2.2	0.0 0.4 0.1	0.0455* 0.381 0.0622
Large MSA	-0.9	0.0	0.00708*
Small MSA	-0.6	0.1	0.125
Non-core	2006–2009: -5.0 2009–2014: 1.8 2014–2018: -3.6	0.0 0.1 0.0	0.0250* 0.144 0.0191*

Abbreviations: APC = Annual Percent Change; MSA = metropolitan statistical area.

* p-value is statistically significant at 0.05.