

Adverse Childhood Experiences Among U.S. Adults: National and State Estimates by Adversity Type, 2019-2020

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Appendix Table 1: Definition of the Variables Used in the Small Area Estimation Predictive Models

Variables	Definition
Outcome	
ACEs type	Exposure to each ACEs type categorized as “yes” or “no”.
Individual-level characteristics of a BRFSS respondent ^a	
<i>Sociodemographic characteristics</i>	
Sex	Sex at birth identifier; categorized as male/female
Race/ethnicity	Race/ethnicity identifier; categorized as White (non-Hispanic), African American (non-Hispanic), Asian (non-Hispanic), American Indian or Alaskan Native (non-Hispanic), Hispanic, other
Age, years	Respondent's age in years; categorized as 18-34, 35-54, and 55 years or older
Education	Respondent's education identifier; categorized as did not graduate from high school; graduated from high school; or attended college or graduated from college
Marital status	Marital status identifier; categorized as married, divorced, widowed, separated, never married, member of an unmarried couple, missing/invalid
Language	Language identifier; categorized as English or other
Annual household income from all sources, USD	Annual household income identifier; categorized as less than \$25,000 or missing, \$25,000-\$50,000, and \$50,000 or more
Employment status	Employment status identifier; categorized as employed for wage, self-employed/homemaker/student, out of work, retired, unable to work, missing/invalid
Home ownership	Home ownership identifier; categorized as own, rent, other arrangements, or missing/invalid
Metropolitan statistical area (MSA) status	MSA identifier; categorized as metropolitan/non-metropolitan areas
Urbanicity	Identifier for urban/rural counties
Bureau of Economic Analysis (BEA) region ^b	Bureau of Economic Analysis (BEA) region identifier; categorized as New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont), Mideast (Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania), Great Lakes (Illinois, Indiana, Michigan, Ohio, and Wisconsin), Plains (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota), Southeast (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia), Southwest (Arizona, New Mexico, Oklahoma, and Texas), Rocky Mountain (Colorado, Idaho, Montana, Utah, and Wyoming), and Far West (Alaska, California, Hawaii, Nevada, Oregon, and Washington)
<i>Access to care</i>	
Access to a personal healthcare provider	Access to a personal healthcare provider identifier; categorized as yes (access to one or more providers) or no
Any health care coverage	Identifier for any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare, or Indian Health Service Health care coverage identifier; categorized as yes or no
Skipped medical visits due to cost	Identifier for respondents who had to skip medical visits within the past 12 months due to inability to cover medical costs; categorized as yes or no
<i>Health outcomes associated with ACEs</i>	
General health status	General health identifier; categorized as excellent, very good, good, fair, or poor/missing/invalid
Hearing impairment status	Identifier for serious hearing impairment; categorized as yes, no, or missing/invalid

Vision impairment status	Indicator of serious difficulty seeing (even when wearing glasses); categorized as yes, no, or missing/invalid
Smoking status	Four-level smoker status; categorized as current everyday smoker, current someday smoker, former smoker, never smoker, missing/invalid
Heavy drinker status	Heavy drinker identifier; categorized as yes, no, or missing/invalid
HIV risk group	HIV risk group status (if injects drugs, has sexually transmitted infections, or exchanges sex for money/drugs); categorized as yes, no, or missing/invalid
Diagnosis of	
depressive disorder	Identifier for ever having a depressive disorder
coronary heart disease	Identifier for ever being diagnosed with coronary heart disease or myocardial infarction; categorized as yes, no, or missing/invalid
cancer	Identifier for ever being diagnosed with cancer; categorized as yes, no, or missing/invalid
asthma	Identifier for ever being diagnosed with asthma; categorized as yes, no, or missing/invalid
chronic obstructive pulmonary disease (COPD)	Identifier for ever being diagnosed with COPD; categorized as yes, no, or missing/invalid
arthritis	Identifier for ever being diagnosed with arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia; categorized as yes, no, or missing/invalid
diabetes	Identifier for non-gestational diabetes; categorized as yes, no, or missing/invalid
kidney disease	Identifier for ever having a kidney disease (except for kidney stones, bladder infection or incontinence); categorized as yes, no, or missing/invalid
State-level ACEs-related factors that were not available at BRFSS	
<i>Data on mental health from CDC Wonder ^c for 2018-2019</i>	
Suicide rate	Single-race suicide rate stratified by race/ethnicity, per 100,000 U.S. Standard Population (base on the 2000 U.S. population)
Homicide rate	Single-race homicide rate stratified by race/ethnicity, per 100,000 U.S. Standard Population (base on the 2000 U.S. population)
Drug-induced death rate	Single-race drug-induced death rate stratified by race/ethnicity, per 100,000 U.S. Standard Population (base on the 2000 U.S. population)
Alcohol-induced death rate	Single-race alcohol-induced death rate stratified by race/ethnicity, per 100,000 U.S. Standard Population (base on the 2000 U.S. population)
<i>Data on maternal health from Guttmacher Institute ^d for 2017</i>	
Abortions, %	Percentage of pregnancies ending in abortion among females aged 15–44
Unwanted pregnancies, %	Percentage of the wanted-later or unwanted pregnancies ending in birth among females aged 15–44
Birthrate, ages 15-17	Birthrate (the number of births per 1,000 females aged 15-17), by state of residence
Birthrate, ages 18-19	Birthrate (the number of births per 1,000 females aged 18-19), by state of residence
<i>Data on infectious diseases from CDC AtlasPlus ^e for 2019</i>	
Syphilis rate	Rate of primary and secondary syphilis among all age groups stratified by race/ethnicity, per 100,000 population
HIV rate	HIV rate among ages 13 years and older stratified by race/ethnicity and sex, per 100,000 population
Chlamydia rate	Chlamydia rate among all age groups stratified by race/ethnicity and sex, per 100,000 population
Gonorrhea rate	Gonorrhea rate among all age groups stratified by race/ethnicity and sex, per 100,000 population
<i>Data on Illicit drugs use from the National Survey on Drug Use and Health^f for 2019</i>	

Illicit drug use, ages 12+	Estimated percentage of population who used illicit drugs ^g in the past month, ages 12 and older
Illicit drug use, ages 12-17	Estimated percentage of population who used illicit drugs in the past month, ages 12-17
Illicit drug use, ages 18-25	Estimated percentage of population who used illicit drugs in the past month, ages 18-25
Illicit drug use, ages 26+	Estimated percentage of population who used illicit drugs in the past month, ages 26 and older
<i>Data on poverty from U.S. Census Bureau ^h for 2019–2020</i>	
Poverty, %	Percentage of population in poverty, a 2-year average estimate (with the annual poverty thresholds ⁱ defined by the U.S. Census Bureau base on the family income and size)

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^a Source: Centers for Disease Control and Prevention. 2020 BRFSS Survey Data and Documentation 2021.

https://www.cdc.gov/brfss/annual_data/annual_data.htm

^b Source: Bureau of Economic Analysis. 2020 Statistical Areas. <https://apps.bea.gov/regional/docs/msalist.cfm>

^c Source: CDC WONDER Multiple Cause of Death, 2018-2019. Centers for Disease Control and Prevention, Atlanta, GA,

<https://wonder.cdc.gov/mcd.html>

^d Source: Guttmacher Institute Data Center, 2021. Guttmacher Institute, Washington, DC., <https://data.guttmacher.org/states>

^e Source: Centers for Disease Control and Prevention. NCHHSTP AtlasPlus, <https://gis.cdc.gov/grasp/nchhstpatlas/maps.html>; 2021

^f Source: National Survey on Drug Use and Health (NSDUH) Population Data, 2019. Substance Abuse and Mental Health Data Archive (SAMHDA), Rockville, MD,

<https://www.samhsa.gov/data/sites/default/files/reports/rpt32885/2019NSDUHsaeSpecStates/NSDUHsaeSpecificStates2019.htm>

^g Illicit Drug Use includes the misuse of prescription psychotherapeutics or the use of marijuana, cocaine (including crack), heroin, hallucinogens, inhalants, or methamphetamine.

^h Source: Income and Poverty in the United States: 2020. United States Census Bureau, Washington, DC.,

<https://www.census.gov/data/tables/2021/demo/income-poverty/p60-273.html>

ⁱ Source: Poverty Thresholds:2020. United States Census Bureau, Washington, DC.,

<https://www.census.gov/data/tables/2021/demo/income-poverty/p60-273.html>

Appendix Table 2: Percent of Respondents in 2019–2020 BRFSS Surveys Who Received and Skipped ACEs Questions

State ^a	BRFSS respondents who received ACEs questions in 2019–2020	% Respondents who skipped the question ^b									
		Household Member with Mental Illness	Household Member Substance Abuse	Household Member Incarceration	Parental separation	Domestic violence	Experiencing Physical Abuse	Experiencing Verbal Abuse	Experiencing Sexual Abuse	At least 1 ACEs question	All ACEs questions
Alabama	2019 and 2020; all respondents	16.4	16.0	16.1	16.4	17.5	16.9	17.2	16.8	20.3	15.8
Arizona	2020; all respondents	20.9	20.3	20.6	21.1	22.2	21.8	22.1	21.5	25.4	20.1
California	2020 (survey split ^c 2; 21.8% of all BRFSS respondents)	16.8	16.2	16.4	16.3	17.6	16.8	17.1	16.7	19.5	16.1
Delaware	2019; all respondents	19.9	19.5	19.7	20.0	20.9	21.0	21.5	20.1	24.6	19.1
DC	2020; all respondents	20.6	19.7	19.9	20.4	21.9	21.1	21.5	20.8	25.2	19.5
Florida	2019 and 2020; all respondents	25.9	25.4	25.7	26.3	27.4	26.8	27.2	26.4	30.9	25.2
Georgia	2020; all respondents	22.9	22.4	22.7	23.2	24.3	23.7	24.1	23.5	27.5	22.2
Hawaii	2020; all respondents	10.7	10.3	10.4	10.6	12.2	11.4	11.8	11.0	14.5	10.1
Idaho	2020; all respondents	16.0	15.1	15.5	15.7	17.0	16.3	17.1	16.2	21.1	14.8
Indiana	2019; all respondents	16.5	15.9	16.2	16.9	17.4	16.6	17.6	16.9	21.3	15.7
Iowa	2019 and 2020; all respondents	16.0	15.4	15.6	15.8	16.7	16.9	16.9	16.0	19.8	15.2
Kansas	2019 (survey split ^c 2; 25.0% of all BRFSS responders) and 2020 (split ^c 2; 24.4%)	13.5	12.6	12.9	12.9	14.1	13.7	14.4	13.3	17.8	12.3
Kentucky	2020; all respondents	16.4	15.8	16.2	16.5	17.5	16.9	17.9	17.2	21.2	15.7
Maryland	2020 (survey split ^c 3; 19.9% of all BRFSS respondents)	17.5	17.1	17.3	17.8	18.6	17.9	18.5	17.9	21.6	16.9
Massachusetts	2020 (survey split ^c 1; 24.4% of all BRFSS respondents)	21.1	20.6	20.6	21.0	21.8	21.5	22.1	21.9	25.8	19.9
Michigan	2019; all respondents	10.5	9.9	10.2	10.3	11.4	11.1	12.2	11.0	15.4	9.8
Mississippi	2019 and 2020; all respondents	9.3	8.4	8.7	9.1	10.6	9.6	10.0	9.2	14.3	8.2
Missouri	2019 and 2020; all respondents	13.4	12.9	13.1	13.3	14.5	13.9	14.5	13.7	17.6	12.7
Montana	2020; all respondents	11.1	10.2	10.5	10.8	11.9	11.2	12.0	10.8	15.9	9.9
Nevada	2020; all respondents	28.6	27.8	27.9	28.2	29.5	29.1	29.5	28.9	33.1	27.5
New Jersey	2020 (survey split ^c 2; 19.5% of all BRFSS respondents)	21.2	20.4	20.8	21.4	22.9	22.8	23.1	21.9	27.5	20.1
New Mexico	2019; all respondents	13.8	13.0	13.2	13.5	14.4	14.1	14.3	13.7	17.1	12.9
New York	2019 (survey split ^c 3; 16.9% of all BRFSS respondents)	18.6	17.9	18.2	19.0	20.2	19.6	20.1	18.8	24.4	17.7
North Dakota	2019 and 2020; all respondents	9.4	8.9	9.0	9.2	10.4	10.0	10.6	9.8	13.5	8.8
Ohio	2019 (survey split ^c 1; 34.1% of all BRFSS respondents)	14.6	14.0	14.1	14.7	15.8	15.1	15.9	14.9	19.2	13.9

Oklahoma	2019 (survey split ^c 2; 23.8% of all BRFSS respondents) and 2020 (split ^c 2; 25.4%)	15.9	15.0	15.5	15.7	17.2	16.3	16.9	16.1	20.8	14.8
Pennsylvania	2019; all respondents	17.4	16.7	16.9	17.1	18.0	17.7	18.0	17.5	21.0	16.6
Rhode Island	2019 and 2020; all respondents	17.8	17.2	17.5	17.7	18.8	18.4	18.9	18.1	22.0	17.0
South Carolina	2019 and 2020; all respondents	17.5	16.8	17.1	17.5	18.7	17.9	18.5	15.5	22.3	16.6
South Dakota	2020; all respondents	14.2	13.5	13.6	14.3	15.2	14.9	15.7	17.5	19.4	13.1
Tennessee	2019; all respondents	23.6	22.9	23.3	23.6	24.5	24.3	24.6	23.9	27.8	22.8
Texas	2020; all respondents	26.4	25.6	25.9	26.6	27.4	27.1	27.3	26.5	31.1	25.3
Utah	2020; all respondents	13.2	12.3	12.5	12.6	13.3	13.1	13.5	12.8	16.2	12.1
Virginia	2019 and 2020; all respondents	19.6	19.1	19.3	19.7	20.9	20.4	20.8	20.0	24.2	18.9
West Virginia	2019; all respondents	10.9	10.0	10.2	10.3	11.7	11.0	11.7	10.7	14.7	10.0
Wisconsin	2019 and 2020; all respondents	17.3	16.6	16.9	17.7	18.1	18.5	18.8	17.2	23.1	16.4
Wyoming	2020; all respondents	13.6	13.1	13.4	13.7	14.8	15.1	15.4	14.0	19.2	12.8

Abbreviations: ACEs: adverse childhood experiences; BRFSS: Behavioral Risk Factor Surveillance System.

Data source: Behavioral Risk Factor Surveillance System (BRFSS) for 2019–2020.

^a Alaska, Arkansas, Colorado, Connecticut, Illinois, Louisiana, Maine, Minnesota, Nebraska, New Hampshire, North Carolina, Oregon, Vermont, and Washington did not include ACEs questions in their 2019–2020 BRFSS surveys.

^b Percent of respondents who skipped ACEs questions was only estimates for those BRFSS respondents who received the questions. All estimates are weighted.

^c In order to allow for a wider range of questions in optional modules, annual BRFSS data may include up to three split versions of the questionnaire. Chronic conditions (or the “Core “ component of the survey) is offered to all BRFSS respondents, while the optional modules (e.g., exposure to ACEs) may be offered only to respondents from one of the survey splits. If ACEs questions were included in one of BRFSS splits, this table specifies the split and the percentage of BRFSS respondents randomly assigned to this split. For instance, in California, ACEs questions were offered in split 2 that included a random sample of 21.8% of all BRFSS respondents.

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Appendix Table 3: Comparison of the Direct Estimates from BRFSS and Model-based Small Area Estimates of the Proportion of Population with Reported Adverse Childhood Experiences, United States, 2019-2020 ^a

	Household Member Incarceration		Experiencing Sexual Abuse		Witnessing Intimate Partner Violence		Household Member with Mental Illness		Experiencing Physical Abuse		Household Member Substance Abuse		Parental separation		Experiencing Emotional Abuse	
	Direct, % ^b	Model-based, % ^c	Direct, % ^b	Model-based, % ^c	Direct, % ^b	Model-based, % ^c	Direct, % ^b	Model-based, % ^c	Direct, % ^b	Model-based, % ^c	Direct, % ^b	Model-based, % ^c	Direct, % ^b	Model-based, % ^c	Direct, % ^b	Model-based, % ^c
National estimates	9.16 (8.92; 9.40)	9.25 (9.01; 9.5)	13.26 (12.99; 13.54)	13.34 (13.07; 13.62)	17.21 (16.89; 17.52)	16.87 (16.55; 17.18)	17.69 (17.39; 17.99)	17.65 (17.35; 17.94)	24.70 (24.34; 25.05)	24.93 (24.57; 25.3)	27.30 (26.95; 27.66)	27.24 (26.88; 27.59)	29.86 (29.48; 30.24)	30.06 (29.68; 30.45)	34.31 (33.93; 34.70)	34.61 (34.22; 35)
Metropolitan Statistical Area (MSA)																
<i>Yes</i>	9.08 (8.79; 9.36)	9.36 (9.07; 9.65)	13.36 (13.03; 13.68)	13.40 (13.08; 13.73)	17.26 (16.89; 17.63)	16.99 (16.62; 17.36)	17.96 (17.61; 18.31)	17.93 (17.58; 18.27)	25.26 (24.84; 25.68)	25.68 (25.25; 26.11)	27.25 (26.83; 27.67)	27.29 (26.88; 27.70)	30.17 (29.73; 30.61)	30.94 (30.48; 31.39)	34.93 (34.47; 35.38)	35.85 (35.39; 36.31)
<i>No</i>	9.53 (9.12; 9.94)	8.77 (8.38; 9.17)	12.84 (12.43; 13.26)	13.07 (12.65; 13.49)	16.97 (16.49; 17.44)	16.32 (15.85; 16.79)	16.98 (16.49; 17.47)	16.41 (15.93; 16.88)	22.20 (21.67; 22.74)	21.61 (21.09; 22.13)	27.54 (26.97; 28.11)	27.00 (26.43; 27.56)	28.49 (27.92; 29.07)	26.18 (25.58; 26.78)	31.59 (30.99; 32.02)	29.11 (28.51; 29.7)
Sex																
<i>Male</i>	9.74 (9.37; 10.11)	9.99 (9.62; 10.37)	7.44 (7.13; 7.75)	5.00 (4.80; 5.19)	15.97 (15.54; 16.41)	13.37 (12.96; 13.79)	14.70 (14.30; 15.10)	12.11 (11.76; 12.46)	25.60 (25.07; 26.13)	26.3 (25.76; 26.84)	25.57 (25.06; 26.08)	22.17 (21.69; 22.64)	29.77 (29.22; 30.33)	30.18 (29.61; 30.76)	34.09 (33.52; 34.65)	33.88 (33.31; 34.45)
<i>Female</i>	8.63 (8.31; 8.96)	8.58 (8.25; 8.91)	18.58 (18.14; 19.01)	22.79 (22.32; 23.26)	18.32 (17.88; 18.77)	20.04 (19.57; 20.5)	20.57 (20.14; 21.01)	22.66 (22.21; 23.11)	23.88 (23.39; 24.37)	23.70 (23.21; 24.2)	28.87 (28.38; 29.37)	31.84 (31.33; 32.36)	29.94 (29.43; 30.46)	29.96 (29.42; 30.49)	34.52 (33.99; 35.06)	35.27 (34.73; 35.81)
Race/ethnicity																
<i>White, Non-Hispanic</i>	7.78 (7.54; 8.01)	5.84 (5.64; 6.04)	13.03 (12.75; 13.32)	13.22 (12.93; 13.50)	15.79 (15.49; 16.10)	13.96 (13.68; 14.24)	19.78 (19.45; 20.11)	20.01 (19.68; 20.34)	23.46 (23.1; 23.82)	21.54 (21.19; 21.88)	28.55 (28.17; 28.93)	28.86 (28.48; 29.24)	27.51 (27.13; 27.89)	25.76 (24.39; 26.13)	35.5 (35.10; 35.90)	36.28 (35.88; 36.69)
<i>Hispanic</i>	10.23 (9.29; 11.18)	11.17 (10.29; 12.04)	13.08 (12.02; 14.13)	12.46 (11.49; 13.44)	20.74 (19.50; 21.99)	24.00 (22.66; 25.34)	14.05 (12.99; 15.12)	13.16 (12.16; 14.16)	30.36 (28.91; 31.81)	33.19 (31.67; 34.71)	25.55 (24.22; 26.88)	24.37 (23.07; 25.68)	32.27 (30.81; 33.73)	35.75 (34.21; 37.28)	31.44 (29.98; 32.90)	33.10 (31.59; 34.60)
<i>Other race/ethnicity categories</i>	13.22 (12.54; 13.89)	15.02 (14.18; 16.06)	14.20 (13.53; 14.88)	14.48 (13.76; 15.19)	19.52 (18.72; 20.32)	21.98 (21.13; 22.83)	13.62 (12.96; 14.29)	12.78 (12.13; 13.42)	24.75 (23.88; 25.61)	25.89 (25.03; 26.75)	24.25 (23.41; 25.08)	23.72 (22.92; 24.51)	36.40 (35.42; 37.38)	41.22 (40.22; 42.23)	32.34 (31.37; 33.30)	29.86 (28.94; 30.78)
Age, years																
<i>18-34</i>	16.93 (16.28; 17.59)	18.71 (18.02; 19.40)	13.40 (12.8; 13.99)	14.90 (14.27; 15.54)	19.93 (19.21; 20.64)	23.26 (22.49; 24.04)	28.56 (27.79; 29.34)	29.32 (28.54; 30.1)	25.78 (24.98; 26.58)	27.37 (26.57; 28.17)	31.77 (30.95; 32.59)	34.17 (33.34; 35.00)	41.26 (40.39; 42.13)	43.61 (42.72; 44.49)	43.85 (42.96; 44.74)	46.12 (45.22; 47.02)
<i>35-54</i>	9.63 (9.18; 10.07)	11.08 (10.60; 11.56)	15.68 (15.13; 16.24)	15.89 (15.38; 16.41)	19.52 (18.92; 20.11)	20.66 (20.06; 21.26)	18.84 (18.31; 19.37)	20.98 (20.43; 21.53)	26.90 (26.23; 27.57)	27.56 (26.89; 28.24)	29.80 (29.13; 30.47)	31.41 (30.75; 32.07)	35.10 (34.38; 35.81)	37.23 (36.49; 37.97)	37.01 (36.3; 37.72)	39.15 (38.53; 39.98)
<i>55+</i>	4.25 (4.01; 4.49)	3.38 (3.21; 3.54)	11.44 (11.1; 11.79)	10.60 (10.25; 10.95)	13.93 (13.54; 14.32)	12.34 (11.98; 13.70)	10.64 (10.31; 10.97)	8.65 (8.37; 8.92)	22.47 (21.99; 22.95)	20.21 (19.73; 20.69)	22.87 (22.42; 23.33)	20.56 (20.11; 21.00)	19.39 (18.92; 19.85)	19.63 (19.26; 20.00)	26.71 (26.21; 27.22)	24.94 (24.38; 25.5)

Income																
<i>Less than \$25,000 or missing</i>	10.64 (10.22; 11.07)	13.48 (13.02; 13.95)	14.75 (14.27; 15.23)	16.89 (16.42; 17.36)	18.33 (17.81; 18.86)	21.06 (20.51; 21.6)	17.35 (16.87; 17.84)	19.33 (18.83; 19.83)	26.16 (25.56; 26.77)	28.82 (28.2; 29.44)	27.42 (26.84; 28.00)	30.20 (29.61; 30.79)	31.90 (31.25; 32.54)	34.37 (33.71; 35.02)	32.55 (31.90; 33.19)	32.16 (31.54; 32.79)
<i>\$25,000-\$50,000</i>	10.68 (10.14; 11.23)	12.37 (11.77; 12.97)	14.55 (13.90; 15.20)	14.67 (14.08; 15.27)	19.00 (18.30; 19.70)	21.66 (20.92; 22.4)	19.08 (18.41; 19.76)	18.62 (17.98; 19.26)	26.96 (26.14; 27.79)	28.84 (28.02; 29.66)	29.22 (28.43; 30.02)	31.77 (30.98; 32.56)	32.35 (31.51; 33.19)	35.30 (34.43; 36.17)	35.05 (34.20; 35.90)	36.41 (35.57; 37.26)
<i>\$50,000 or more</i>	7.19 (6.84; 7.54)	6.21 (5.90; 6.51)	11.40 (11.02; 11.79)	9.71 (9.30; 10.12)	15.45 (14.98; 15.91)	13.18 (12.73; 14.63)	17.57 (17.11; 18.03)	15.77 (15.32; 16.21)	22.43 (21.91; 22.95)	20.87 (20.33; 21.41)	26.34 (25.79; 26.89)	23.94 (23.40; 24.47)	27.00 (26.44; 27.56)	24.73 (24.14; 25.32)	35.50 (34.90; 36.09)	35.90 (35.28; 36.51)
Education																
<i>Did not graduate from high school</i>	14.10 (13.15; 15.04)	16.68 (15.66; 17.70)	14.85 (13.85; 15.85)	16.91 (15.93; 17.89)	22.52 (21.35; 23.69)	25.06 (23.89; 26.33)	15.00 (14.07; 15.92)	15.65 (14.78; 16.51)	30.06 (28.69; 31.43)	33.60 (32.21; 34.99)	30.79 (29.51; 32.07)	32.60 (31.28; 33.91)	34.31 (32.94; 35.67)	36.22 (34.83; 37.62)	30.73 (29.41; 32.05)	30.93 (29.66; 32.20)
<i>Graduated from high school</i>	10.95 (10.46; 11.44)	12.15 (11.62; 12.67)	12.99 (12.46; 13.53)	11.55 (11.08; 12.01)	18.21 (17.60; 18.81)	19.22 (18.6; 19.84)	16.73 (16.17; 17.30)	15.56 (15.01; 16.11)	25.16 (24.50; 25.83)	24.92 (24.25; 25.59)	28.94 (28.26; 29.63)	30.18 (29.49; 30.86)	33.88 (33.16; 34.61)	36.95 (36.2; 37.71)	32.98 (32.26; 33.71)	31.22 (30.51; 31.93)
<i>Attended college or graduated from college</i>	7.35 (7.07; 7.63)	5.8 (5.53; 6.06)	13.10 (12.77; 13.43)	13.28 (12.93; 13.63)	15.73 (15.35; 16.10)	14.05 (13.68; 14.43)	18.86 (18.48; 19.24)	19.06 (18.68; 19.44)	23.44 (23.01; 23.88)	22.50 (22.06; 22.94)	25.89 (25.46; 26.32)	23.88 (23.46; 24.31)	27.15 (26.69; 27.60)	24.75 (24.28; 25.22)	35.69 (35.2; 36.17)	37.02 (36.53; 37.52)
Bureau of Economic Analysis (BEA) region																
<i>New England</i>	5.63 (4.96; 6.3)	4.93 (4.33; 5.53)	11.30 (10.4; 12.21)	11.94 (11.03; 12.86)	15.15 (14.1; 16.19)	14.80 (13.79; 15.81)	18.51 (17.4; 19.63)	19.26 (18.16; 20.36)	24.43 (23.18; 25.68)	24.89 (23.65; 26.13)	26.11 (24.86; 27.36)	24.83 (23.61; 26.04)	24.91 (23.7; 26.11)	25.17 (23.98; 26.35)	34.25 (32.87; 35.63)	33.84 (32.5; 35.18)
<i>Mideast</i>	7.69 (7.08; 8.3)	7.86 (7.27; 8.45)	11.40 (10.76; 12.05)	11.94 (11.27; 12.61)	15.84 (15.06; 16.62)	15.15 (14.38; 15.92)	16.87 (16.08; 17.67)	16.67 (15.89; 17.44)	25.54 (24.62; 26.46)	25.76 (24.85; 26.67)	24.86 (23.96; 25.76)	24.89 (23.98; 25.8)	26.21 (25.28; 27.14)	26.58 (25.63; 27.53)	34.56 (33.55; 35.56)	34.77 (33.77; 35.78)
<i>Great Lakes</i>	8.92 (8.43; 9.4)	9.08 (8.58; 9.58)	13.37 (12.86; 13.88)	13.22 (12.7; 13.74)	17.02 (16.44; 17.6)	16.88 (16.28; 17.48)	19.58 (18.96; 20.2)	20.49 (19.86; 21.12)	25.79 (25.12; 26.46)	25.72 (25.04; 26.41)	28.59 (27.9; 29.27)	28.34 (27.65; 29.04)	27.80 (27.1; 28.5)	27.07 (26.36; 27.78)	37.93 (37.19; 38.66)	38.66 (37.91; 39.41)
<i>Plains</i>	9.64 (9.19; 10.09)	10.71 (10.22; 11.21)	13.20 (12.73; 13.67)	14.02 (13.53; 14.51)	16.27 (15.74; 16.79)	15.98 (15.44; 16.52)	21.29 (20.71; 21.88)	21.12 (20.55; 21.70)	22.53 (21.96; 23.11)	22.39 (21.81; 22.97)	28.60 (27.98; 29.22)	29.18 (28.54; 29.82)	29.16 (28.52; 29.80)	29.39 (28.72; 30.05)	35.83 (35.17; 36.49)	34.47 (33.82; 35.12)
<i>Southeast</i>	9.93 (9.5; 10.35)	9.49 (9.07; 9.91)	13.58 (13.13; 14.02)	13.31 (12.88; 13.74)	17.11 (16.63; 17.59)	17.37 (16.85; 17.89)	16.87 (16.40; 17.34)	16.54 (16.07; 17.01)	22.95 (22.41; 23.50)	23.11 (22.52; 23.69)	27.40 (26.84; 27.97)	28.26 (27.68; 28.83)	32.21 (31.58; 32.83)	32.95 (32.30; 33.60)	31.92 (31.31; 32.52)	32.11 (31.49; 32.72)
<i>Southwest</i>	8.78 (8.01; 9.55)	10.12 (9.27; 10.97)	13.04 (12.13; 13.95)	14.00 (13.03; 14.96)	18.14 (17.00; 19.27)	17.23 (16.18; 18.29)	15.99 (15.00; 16.99)	15.71 (14.76; 16.66)	26.33 (25.03; 27.63)	24.89 (23.73; 26.05)	26.06 (24.83; 27.29)	24.98 (23.85; 26.12)	30.24 (28.94; 31.53)	29.76 (28.43; 31.09)	32.57 (31.23; 33.90)	34.00 (32.63; 35.37)
<i>Rocky Mountain</i>	10.35 (9.76; 10.93)	9.76 (9.17; 10.36)	14.68 (14.05; 15.31)	13.66 (13.05; 14.27)	17.01 (16.32; 17.70)	15.64 (15.00; 16.28)	25.05 (24.27; 25.83)	24.34 (23.58; 25.11)	26.19 (25.4; 26.98)	24.86 (24.09; 25.62)	28.69 (27.88; 29.50)	27.01 (26.23; 27.80)	28.25 (27.43; 29.06)	29.11 (28.28; 29.94)	40.28 (39.41; 41.15)	40.31 (39.44; 41.17)
<i>Far West</i>	8.33 (7.1; 9.55)	7.90 (6.73; 9.07)	14.41 (12.77; 16.06)	13.88 (12.28; 15.48)	19.95 (18.11; 21.79)	18.68 (16.89; 20.48)	16.30 (14.64; 17.97)	15.53 (13.92; 17.15)	29.62 (27.49; 31.75)	30.80 (28.68; 32.93)	28.02 (25.96; 30.07)	27.15 (25.12; 29.18)	28.94 (26.88; 31.00)	28.97 (26.92; 31.01)	38.35 (36.08; 40.63)	38.82 (36.57; 41.07)

State																
<i>Alabama</i>	10.57 (9.67; 11.47)	12.3 (11.29; 12.3)	14.58 (13.64; 15.51)	14.44 (13.53; 15.36)	18.69 (17.61; 19.76)	19.18 (18.12; 20.24)	19.36 (18.28; 20.43)	21.47 (20.38; 22.56)	20.14 (19.05; 21.22)	21.85 (20.74; 22.96)	29.34 (28.13; 30.55)	32.4 (31.15; 33.64)	34.49 (33.22; 35.75)	36.29 (35.01; 37.57)	31.51 (30.27; 32.74)	31.41 (30.18; 32.64)
<i>Arizona</i>	10.27 (9.25; 11.3)	11.80 (10.73; 12.88)	13.62 (12.55; 14.68)	13.10 (12.06; 14.14)	17.44 (16.19; 18.69)	18.67 (17.43; 19.91)	17.73 (16.49; 18.97)	17.76 (16.56; 18.97)	26.81 (25.38; 28.23)	27.23 (25.79; 28.66)	28.33 (26.9; 29.76)	25.47 (24.1; 26.84)	32.61 (31.08; 34.14)	35.41 (33.85; 36.97)	36.12 (34.58; 37.67)	36.53 (34.99; 38.07)
<i>California</i>	7.81 (6.29; 9.32)	6.98 (5.54; 8.43)	14.53 (12.49; 16.58)	14.07 (12.07; 16.07)	19.86 (17.58; 22.14)	18.36 (16.14; 20.58)	16.33 (14.25; 18.41)	15.39 (13.37; 17.40)	30.13 (27.47; 32.78)	31.43 (28.78; 34.08)	27.63 (25.08; 30.19)	26.85 (24.32; 29.39)	28.00 (25.45; 30.56)	28.26 (25.72; 30.80)	38.60 (35.77; 41.44)	38.63 (35.83; 41.43)
<i>Delaware</i>	8.91 (7.23; 10.59)	11.18 (9.27; 13.1)	11.87 (10.29; 13.45)	11.41 (9.8; 13.02)	18.00 (16.00; 20.00)	19.68 (17.43; 21.92)	17.32 (15.25; 19.38)	16.97 (14.95; 18.99)	29.46 (27.15; 31.76)	29.13 (26.84; 31.42)	28.25 (25.85; 30.65)	29.78 (27.35; 32.22)	27.60 (25.27; 29.93)	25.64 (23.34; 27.95)	35.66 (33.24; 38.09)	38.41 (35.87; 40.96)
<i>DC</i>	10.33 (8.49; 12.17)	9.68 (7.87; 11.48)	12.80 (11.04; 14.57)	10.86 (9.14; 12.58)	14.92 (13.12; 16.73)	12.47 (10.69; 14.25)	18.37 (16.36; 20.37)	21.40 (19.2; 23.6)	21.82 (19.74; 23.90)	21.07 (18.79; 23.35)	22.83 (20.71; 24.95)	22.33 (20.09; 24.58)	33.49 (30.99; 36.00)	31.01 (28.37; 33.64)	37.09 (34.55; 39.62)	40.02 (37.44; 42.59)
<i>Florida</i>	9.85 (8.84; 10.86)	9.53 (8.52; 10.53)	13.47 (12.42; 14.52)	14.09 (13.08; 15.11)	17.15 (16.02; 18.28)	18.25 (16.99; 19.51)	14.96 (13.88; 16.04)	14.88 (13.8; 15.96)	25.86 (24.56; 27.16)	28.29 (26.85; 29.73)	26.88 (25.56; 28.2)	28.16 (26.83; 29.49)	33.52 (32.02; 35.01)	36.56 (35.01; 38.11)	31.78 (30.35; 33.21)	33.22 (31.75; 34.68)
<i>Georgia</i>	10.06 (8.75; 11.38)	8.47 (7.25; 9.69)	13.82 (12.41; 15.23)	13.04 (11.68; 14.41)	16.66 (15.23; 18.10)	16.70 (15.2; 18.21)	15.11 (13.72; 16.49)	14.91 (13.49; 16.32)	22.35 (20.66; 24.04)	19.50 (17.96; 21.04)	25.11 (23.42; 26.8)	25.31 (23.56; 27.07)	32.84 (30.95; 34.73)	34.07 (32.08; 36.07)	32.68 (30.79; 34.56)	20.80 (18.99; 32.61)
<i>Hawaii</i>	9.51 (8.56; 10.47)	11.50 (10.36; 12.65)	10.97 (10.02; 11.92)	9.82 (8.94; 10.7)	17.48 (16.29; 18.67)	16.30 (15.12; 17.47)	13.45 (12.41; 14.50)	13.05 (12.04; 14.06)	26.02 (24.61; 27.42)	23.67 (22.3; 25.04)	23.70 (22.37; 25.03)	23.15 (21.82; 24.48)	26.41 (24.99; 27.83)	24.21 (22.85; 24.57)	34.43 (32.92; 35.95)	33.55 (32.03; 35.06)
<i>Idaho</i>	11.81 (10.4; 13.21)	13.08 (11.57; 14.6)	13.74 (12.36; 15.12)	13.09 (11.79; 14.39)	15.56 (14.07; 17.05)	14.43 (12.94; 15.91)	21.06 (19.40; 22.73)	23.17 (21.5; 24.84)	23.55 (21.83; 25.28)	20.82 (19.21; 22.42)	28.92 (27.08; 30.77)	25.16 (23.40; 26.92)	30.56 (28.68; 32.44)	32.53 (30.59; 34.48)	37.46 (35.50; 39.41)	35.35 (33.43; 37.26)
<i>Indiana</i>	9.90 (8.91; 10.89)	9.31 (8.31; 10.31)	14.24 (13.19; 15.29)	15.25 (14.15; 16.36)	18.04 (16.86; 19.22)	18.23 (17.01; 19.44)	20.08 (18.83; 21.32)	21.40 (20.13; 22.67)	25.63 (24.32; 26.94)	26.05 (24.74; 27.36)	27.54 (26.2; 28.89)	25.11 (23.79; 26.42)	30.64 (29.22; 32.06)	31.17 (29.7; 32.65)	36.25 (34.81; 37.70)	34.69 (33.26; 36.12)
<i>Iowa</i>	8.46 (7.89; 9.03)	7.51 (7.00; 8.02)	11.94 (11.33; 12.55)	11.47 (10.86; 12.08)	16.23 (15.53; 16.94)	13.92 (13.24; 14.6)	20.00 (19.23; 20.76)	18.93 (18.18; 19.68)	22.33 (21.56; 23.10)	22.97 (22.17; 23.77)	26.55 (25.74; 27.37)	24.81 (23.99; 25.62)	25.24 (24.43; 26.06)	23.11 (22.32; 22.90)	36.44 (35.55; 37.33)	36.79 (35.9; 37.68)
<i>Kansas</i>	7.11 (6.52; 7.71)	8.21 (7.57; 8.85)	14.33 (13.54; 15.12)	16.38 (15.54; 17.22)	14.90 (14.08; 15.71)	13.86 (13.07; 14.65)	20.58 (19.66; 21.50)	21.40 (20.46; 22.33)	23.12 (22.17; 24.08)	24.66 (23.68; 25.64)	26.54 (25.54; 27.54)	26.25 (25.26; 27.24)	26.29 (25.30; 27.28)	23.74 (22.79; 24.69)	35.74 (34.65; 36.83)	36.24 (35.15; 37.32)
<i>Kentucky</i>	13.08 (11.51; 14.65)	11.24 (9.78; 12.7)	14.57 (13.01; 16.13)	13.50 (12.02; 14.97)	17.46 (15.77; 19.15)	18.27 (16.51; 20.03)	22.35 (20.53; 24.18)	20.60 (18.82; 22.37)	21.76 (19.96; 23.57)	19.35 (17.6; 21.11)	30.08 (28.06; 32.11)	28.57 (26.58; 30.56)	32.44 (30.37; 34.51)	30.46 (28.39; 32.53)	33.18 (31.07; 35.28)	31.64 (29.58; 33.7)
<i>Maryland</i>	5.74 (4.89; 6.59)	5.600 (4.75; 6.45)	11.19 (10.02; 12.37)	11.98 (10.79; 13.18)	14.60 (13.30; 15.91)	13.94 (12.64; 15.24)	14.81 (13.48; 16.14)	14.14 (12.85; 15.42)	21.62 (20.11; 23.14)	20.90 (19.4; 22.4)	22.97 (21.43; 24.51)	22.92 (21.38; 24.46)	25.93 (24.29; 27.57)	26.59 (24.97; 28.21)	30.56 (28.86; 32.26)	28.12 (26.45; 29.78)
<i>Massachusetts</i>	5.13 (4.17; 6.09)	4.22 (3.38; 5.07)	11.31 (9.93; 12.70)	11.71 (10.33; 13.09)	14.16 (12.61; 15.72)	13.25 (11.77; 14.73)	18.08 (16.42; 19.75)	18.79 (17.16; 20.41)	23.48 (21.58; 25.37)	23.31 (21.43; 25.19)	25.47 (23.59; 27.36)	23.46 (21.65; 25.27)	22.07 (20.31; 23.84)	21.26 (19.57; 22.96)	33.02 (30.94; 35.09)	32.17 (30.17; 34.17)
<i>Michigan</i>	9.91 (8.95; 10.88)	11.6 (10.58; 12.62)	14.34 (13.37; 15.31)	15.86 (14.82; 16.89)	17.85 (16.76; 18.95)	18.51 (17.36; 19.65)	21.07 (19.91; 22.23)	22.14 (20.98; 23.31)	25.94 (24.72; 27.16)	27.11 (25.86; 28.36)	31.08 (29.79; 32.38)	33.11 (31.79; 35.44)	29.96 (28.66; 31.27)	32.19 (30.82; 33.56)	38.34 (36.99; 39.69)	39.44 (38.08; 40.8)

<i>Mississippi</i>	10.31 (9.42; 11.20)	9.17 (8.3; 10.03)	11.54 (10.7; 12.37)	12.28 (11.42; 13.14)	16.30 (15.32; 17.29)	15.65 (14.64; 16.66)	15.82 (14.80; 16.84)	14.70 (13.75; 15.66)	15.44 (14.45; 16.43)	15.88 (14.86; 16.90)	26.65 (25.47; 27.82)	25.23 (24.06; 26.41)	33.69 (32.42; 34.96)	33.06 (31.76; 34.36)	25.78 (24.58; 26.99)	24.72 (23.53; 25.90)
<i>Missouri</i>	11.10 (10.32; 11.89)	12.9 (11.02; 13.79)	14.04 (13.23; 14.86)	15.15 (14.31; 16.00)	17.12 (16.21; 18.03)	18.11 (17.18; 19.05)	22.76 (21.75; 23.77)	22.86 (21.87; 23.86)	22.82 (21.83; 23.80)	21.95 (20.96; 22.93)	30.41 (29.33; 31.48)	32.55 (31.44; 33.65)	32.69 (31.57; 33.80)	34.45 (34.3; 35.59)	35.77 (34.64; 36.90)	32.97 (31.86; 34.07)
<i>Montana</i>	10.88 (9.74; 12.02)	11.36 (10.16; 12.56)	14.61 (13.44; 15.78)	12.64 (11.49; 13.79)	18.40 (17.08; 19.72)	18.06 (16.71; 19.4)	24.83 (23.38; 26.27)	24.91 (23.45; 26.36)	25.28 (23.85; 26.70)	24.17 (23.52; 25.62)	35.14 (33.58; 36.71)	36.68 (35.12; 38.25)	32.30 (30.73; 33.87)	35.53 (33.92; 37.14)	39.48 (37.89; 41.07)	42.33 (40.73; 43.93)
<i>Nevada</i>	10.60 (8.50; 12.70)	11.09 (8.95; 13.23)	15.65 (13.25; 18.05)	15.61 (13.32; 17.89)	21.84 (18.89; 24.78)	21.85 (18.95; 24.75)	17.76 (15.37; 20.15)	17.76 (15.31; 20.21)	28.72 (25.68; 31.75)	31.20 (28.1; 34.29)	32.56 (29.53; 35.6)	31.04 (28.08; 34.01)	35.67 (32.50; 38.84)	37.20 (34.01; 40.4)	39.12 (35.87; 42.38)	41.80 (38.52; 45.09)
<i>New Jersey</i>	4.70 (3.92; 5.49)	4.04 (3.31; 4.78)	8.56 (7.46; 9.66)	9.43 (8.30; 10.56)	13.64 (12.30; 14.98)	12.91 (11.67; 14.15)	12.41 (11.18; 13.64)	12.68 (11.40; 13.96)	25.23 (23.47; 26.99)	25.72 (23.95; 27.48)	20.21 (18.67; 21.75)	19.76 (18.23; 21.29)	20.94 (19.38; 22.49)	20.87 (19.30; 22.44)	32.82 (30.93; 34.71)	34.74 (32.86; 36.62)
<i>New Mexico</i>	9.20 (8.00; 10.4)	9.06 (7.84; 10.27)	16.76 (15.27; 18.24)	14.8 (13.38; 16.21)	19.88 (18.28; 21.48)	20.73 (19.09; 22.38)	20.94 (19.31; 22.57)	19.64 (17.13; 20.15)	29.02 (27.21; 30.83)	27.77 (26.01; 28.52)	32.62 (30.80; 34.44)	34.71 (32.84; 36.58)	30.07 (28.22; 31.92)	27.54 (25.75; 29.33)	36.41 (34.51; 38.32)	32.28 (31.43; 35.14)
<i>New York</i>	4.01 (3.23; 4.79)	3.06 (2.43; 3.69)	11.68 (10.41; 12.95)	12.13 (10.86; 13.4)	14.47 (13.09; 15.84)	14.34 (12.94; 15.75)	13.90 (12.56; 15.24)	13.11 (11.86; 14.37)	26.19 (24.47; 27.91)	26.24 (24.52; 27.96)	20.07 (18.54; 21.59)	20.42 (18.9; 21.94)	23.81 (22.16; 25.45)	21.99 (20.4; 23.59)	32.00 (30.17; 33.83)	29.28 (27.51; 31.05)
<i>North Dakota</i>	8.27 (7.35; 9.18)	7.88 (6.46; 8.51)	10.81 (9.84; 11.79)	11.37 (10.29; 12.45)	14.00 (12.90; 15.09)	13.17 (12; 14.35)	18.40 (17.13; 19.67)	18.07 (16.79; 19.35)	20.94 (19.68; 22.21)	20.12 (18.8; 21.45)	27.54 (26.17; 28.90)	27.48 (26.04; 28.92)	23.60 (22.22; 24.99)	21.26 (19.83; 21.69)	34.30 (32.84; 35.76)	34.41 (32.92; 35.89)
<i>Ohio</i>	8.39 (7.47; 9.31)	7.05 (6.18; 7.93)	13.17 (12.09; 14.25)	12.94 (11.86; 14.01)	16.62 (15.44; 17.79)	16.45 (15.24; 17.66)	18.26 (17.02; 19.50)	17.66 (16.42; 18.9)	24.47 (23.12; 25.83)	25.05 (23.68; 26.42)	27.34 (25.95; 28.73)	25.63 (24.23; 27.03)	27.00 (25.58; 28.42)	25.42 (24.03; 26.81)	36.40 (34.87; 37.92)	36.62 (35.08; 38.15)
<i>Oklahoma</i>	8.96 (8.01; 9.91)	10.65 (9.63; 11.68)	14.45 (13.30; 15.60)	14.27 (13.12; 15.43)	17.71 (16.45; 18.98)	18.68 (17.39; 19.98)	19.99 (18.66; 21.31)	20.10 (18.78; 21.42)	20.88 (19.53; 22.22)	22.14 (20.77; 23.51)	28.56 (27.08; 30.04)	29.37 (27.88; 30.87)	32.40 (30.85; 33.94)	30.56 (29.04; 32.07)	30.79 (29.26; 32.33)	29.65 (28.14; 31.17)
<i>Pennsylvania</i>	10.16 (9.06; 11.27)	10.98 (9.89; 12.06)	11.81 (10.74; 12.88)	12.48 (11.36; 13.61)	17.04 (15.71; 18.37)	16.22 (14.91; 17.52)	19.46 (18.08; 20.84)	19.35 (17.99; 20.7)	25.81 (24.28; 27.34)	26.14 (24.63; 27.66)	28.31 (26.75; 29.86)	28.21 (26.64; 29.78)	28.05 (26.46; 29.63)	29.70 (28.08; 31.32)	36.52 (34.83; 38.21)	37.78 (36.09; 39.47)
<i>Rhode Island</i>	6.38 (5.53; 7.24)	5.97 (5.17; 6.78)	11.28 (10.33; 12.23)	12.28 (11.28; 13.29)	16.60 (15.42; 17.78)	17.09 (15.87; 18.32)	19.15 (17.87; 20.43)	19.96 (18.66; 21.26)	25.83 (24.48; 27.19)	26.34 (24.98; 27.70)	27.05 (25.69; 28.41)	28.30 (26.91; 29.70)	29.08 (27.65; 30.51)	30.90 (29.40; 32.40)	36.05 (34.53; 37.58)	36.29 (34.78; 37.8)
<i>South Carolina</i>	10.81 (9.87; 11.74)	10.76 (9.81; 11.7)	14.89 (13.86; 15.92)	16.00 (14.94; 17.07)	17.39 (16.31; 18.47)	19.32 (18.14; 20.5)	19.38 (18.25; 20.52)	18.85 (17.7; 19.99)	22.88 (21.70; 24.05)	22.38 (21.15; 23.61)	29.59 (28.29; 30.89)	31.04 (29.68; 32.4)	31.13 (29.77; 32.49)	29.70 (28.28; 31.13)	33.12 (31.78; 34.47)	35.13 (33.74; 36.52)
<i>South Dakota</i>	8.09 (6.39; 9.79)	9.79 (7.55; 12.04)	10.74 (8.98; 12.49)	12.34 (11.96; 14.73)	12.60 (10.74; 14.46)	12.35 (10.08; 14.61)	17.05 (14.57; 19.53)	16.55 (14.04; 19.07)	20.67 (18.39; 22.96)	21.00 (18.32; 23.67)	26.25 (23.63; 28.87)	25.35 (22.66; 28.04)	26.73 (23.97; 29.49)	24.76 (22.11; 27.41)	35.31 (32.47; 38.15)	33.28 (30.4; 36.16)
<i>Tennessee</i>	11.10 (9.66; 12.55)	11.88 (10.43; 13.34)	16.02 (14.48; 17.56)	14.34 (13; 15.68)	19.03 (17.39; 20.66)	21.38 (19.72; 23.05)	20.49 (18.82; 22.16)	19.48 (17.87; 21.09)	24.72 (22.95; 26.48)	26.29 (24.43; 28.15)	31.79 (29.86; 33.72)	34.18 (32.26; 36.11)	34.64 (32.67; 36.61)	36.01 (34.02; 37.99)	34.94 (32.97; 36.90)	34.08 (32.14; 36.01)
<i>Texas</i>	8.22 (7.05; 9.39)	9.59 (8.29; 10.88)	12.25 (10.86; 13.63)	14.15 (12.68; 15.63)	18.26 (16.52; 20.01)	16.17 (14.56; 17.78)	14.24 (12.73; 15.75)	14.09 (12.65; 15.52)	26.87 (24.87; 28.87)	25.81 (23.91; 27.72)	24.24 (22.36; 26.12)	22.81 (21.09; 24.53)	29.10 (27.12; 31.09)	28.31 (26.26; 30.35)	31.36 (29.32; 33.40)	31.22 (31.11; 35.32)

<i>Utah</i>	9.14 (8.34; 9.93)	7.90 (7.17; 8.64)	15.70 (14.74; 16.66)	14.44 (13.51; 15.37)	17.26 (16.23; 18.30)	15.50 (14.62; 16.38)	28.26 (27.07; 29.45)	25.85 (24.70; 27)	28.15 (26.96; 29.35)	28.90 (27.7; 30.1)	25.89 (24.72; 27.05)	22.50 (21.36; 23.63)	24.80 (23.64; 25.95)	22.56 (21.4; 23.72)	42.73 (41.44; 44.02)	42.72 (41.43; 44.02)
<i>Virginia</i>	7.72 (7.10; 8.34)	6.86 (6.31; 7.41)	11.89 (11.18; 12.6)	9.28 (8.69; 9.87)	15.53 (14.74; 16.33)	13.17 (12.45; 13.89)	15.97 (15.17; 16.78)	14.29 (13.53; 15.04)	21.91 (20.98; 22.83)	19.18 (18.3; 20.07)	25.14 (24.21; 26.07)	23.76 (22.83; 24.68)	27.45 (26.45; 28.45)	25.09 (24.14; 26.03)	32.33 (31.28; 33.38)	30.59 (29.56; 31.61)
<i>West Virginia</i>	9.21 (7.91; 10.51)	7.79 (6.63; 8.96)	13.25 (11.92; 14.57)	14.82 (13.48; 16.16)	18.33 (16.80; 19.86)	20.50 (18.89; 22.11)	20.11 (18.45; 21.78)	21.98 (20.32; 23.65)	20.71 (19.10; 22.32)	17.94 (16.45; 19.42)	28.03 (26.28; 29.78)	30.1 (28.30; 31.90)	27.61 (25.83; 29.39)	22.58 (23.79; 27.37)	30.73 (28.94; 32.53)	31.25 (29.44; 33.05)
<i>Wisconsin</i>	7.77 (6.86; 8.68)	7.96 (6.97; 8.94)	12.09 (11.11; 13.07)	9.78 (8.82; 10.73)	15.91 (14.77; 17.05)	14.85 (13.68; 16.01)	18.79 (17.55; 20.03)	20.32 (19.05; 21.58)	26.65 (25.29; 28.00)	27.92 (26.53; 29.31)	27.69 (26.35; 29.03)	27.20 (25.81; 28.59)	24.65 (23.28; 26.02)	22.42 (21.09; 23.76)	39.54 (38.05; 41.02)	41.78 (40.27; 43.29)
<i>Wyoming</i>	11.39 (9.69; 13.10)	9.84 (8.23; 11.45)	12.15 (10.63; 13.66)	13.25 (11.62; 14.89)	17.21 (15.38; 19.03)	14.97 (13.18; 16.76)	20.24 (18.26; 22.22)	18.64 (16.68; 20.61)	25.36 (23.30; 27.42)	26.90 (24.75; 29.05)	30.02 (27.89; 32.16)	28.93 (26.83; 31.04)	31.66 (29.46; 33.87)	32.63 (30.35; 34.91)	37.11 (34.86; 39.37)	35.00 (32.73; 37.27)

Abbreviations: ACEs: adverse childhood experiences; BRFSS: Behavioral Risk Factor Surveillance System

^a All estimates in this table are weighted.

^b Based on the BRFSS respondents who in 2019-2020 received and answered ACEs questions.

^c Estimates obtained by using predictive small area estimation (SAE) models. Modelled estimates are only reported for those BRFSS respondents who in 2019-2020 received and answered ACEs questions. These estimates - when compared to the direct estimates - demonstrate the predictive performance of SAE models.

Appendix Table 4: Predictive Performance of the Models Used to Estimate Exposure to Each ACEs Type Among U.S. Adults in 2019–2020 ^a

	Household Member Incarceration	Experiencing Sexual Abuse	Witnessing Intimate Partner Violence	Household Member with Mental Illness	Experiencing Physical Abuse	Household Member Substance Abuse	Parental Separation	Experiencing Emotional Abuse
% Total variance in the outcome explained by the model								
Null model (with random effects alone)	1.45	0.69	0.52	0.91	1.23	0.55	1.11	0.89
Full model (with random effects and individual- and state-level variables) ^b	99.73	99.98	99.93	99.70	99.93	99.92	99.86	99.99
Pearson correlation coefficient between the directly estimated and predicted ACEs exposures ^c								
State level	0.82	0.74	0.85	0.93	0.81	0.90	0.88	0.86
BEA region level	0.92	0.83	0.95	0.98	0.86	0.94	0.97	0.96

Abbreviations: ACEs: adverse childhood experiences; BRFSS: Behavioral Risk Factor Surveillance System

^a All estimates in this table are weighted.

^b Individual-level variables included respondent’s socio-demographic characteristics (sex, race/ethnicity, age, education, marital status, language, annual household income from all sources, employment status, home ownership, metropolitan statistical area [MSA] status, urbanicity, state of residence), access to care (insurance coverage, ability to cover medical costs, access to a personal healthcare provider), and health outcomes associated with ACEs (status of: general health, hearing or vision impairment, smoking, heavy drinking; HIV risk group; diagnosis of: HIV, depressive disorder, coronary heart disease, cancer, asthma, chronic obstructive pulmonary disease, arthritis, diabetes, or kidney disease). State-level variables included maternal health (percentage of unwanted pregnancies; percentage of pregnancies ending in abortion or fetal loss; pregnancy rate and birth rate among teens aged 15-19 years), mental health (suicide and homicide rates stratified by race/ethnicity), risk behaviors listed as contributing causes of death (drug- or alcohol-induced death rates stratified by race/ethnicity), prevalence of Illicit drugs use (percentage of population using illicit drugs stratified by age), infectious diseases (rates of primary and secondary syphilis stratified by race/ethnicity; rates of HIV, gonorrhea, and chlamydia stratified by race/ethnicity and gender), percentage of people in poverty, and the Bureau of Economic Analysis region flag. All individual- and state-level variables were described in detail in Appendix A.

^c All estimates in this table are based on those BRFSS respondents who in 2019–2020 received and answered ACEs questions. Direct estimates reflected the actual answers reported in the 2019–2020 survey. Predicted estimates were obtained through multilevel mixed-effects logistic regressions or logistic small area estimation (SAE) regressions. Predicted estimates - when compared to the direct estimates - demonstrate predictive performance of SAE models.

Appendix Table 5: Estimated Percentage of Males and Females in Each State Exposed to Select ACEs Types, United States, 2019–2020.

	Experiencing Sexual Abuse				Household Member with Mental Illness				Household Member Substance Abuse			
	Males ^a		Females ^a		Males ^a		Females ^a		Males ^a		Females ^a	
	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95% CI	%	95% CI
National estimates	5.4	(5.2; 5.6)	22.2	(21.9; 22.5)	14.6	(14.3; 14.8)	22.6	(22.3; 22.9)	23.2	(22.9; 23.5)	29.2	(28.9; 29.5)
State ^b												
<i>Alabama</i>	7.4	(6.4; 8.4)	21.2	(19.9; 22.5)	15.4	(14.0; 16.8)	22.0	(20.6; 23.3)	26.3	(24.6; 27.9)	30.7	(29.2; 32.2)
<i>Alaska</i>	6.9	(5.5; 8.3)	24.9	(22.4; 27.4)	14.7	(12.6; 16.7)	25.1	(22.7; 27.5)	28.0	(25.6; 30.5)	34.8	(32.2; 37.4)
<i>Arizona</i>	7.0	(6.2; 7.9)	25.8	(24.4; 27.2)	26.9	(25.4; 28.4)	31.4	(29.9; 32.8)	25.2	(23.7; 26.7)	29.9	(28.4; 31.3)
<i>Arkansas</i>	1.4	(0.9; 1.8)	12.6	(11.2; 14.0)	10.5	(9.2; 11.8)	23.8	(22.0; 25.5)	19.5	(17.8; 21.2)	31.8	(30.0; 33.6)
<i>California</i>	7.5	(6.5; 8.4)	25.9	(24.5; 27.3)	17.3	(16.1; 18.4)	22.9	(21.6; 24.2)	25.0	(23.6; 26.4)	29.1	(27.7; 30.5)
<i>Colorado</i>	7.8	(7.2; 8.5)	25.0	(23.9; 26.1)	25.0	(23.9; 26.0)	38.1	(36.9; 39.3)	29.1	(28.0; 30.2)	37.0	(35.8; 38.2)
<i>Connecticut</i>	2.5	(2.0; 3.0)	12.6	(11.6; 13.7)	10.5	(9.5; 11.5)	18.2	(17.0; 19.4)	17.8	(16.6; 19.0)	23.5	(22.2; 24.7)
<i>Delaware</i>	4.2	(3.3; 5.0)	14.5	(13.1; 16.0)	12.5	(11.0; 14.1)	19.9	(18.2; 21.7)	24.4	(22.3; 26.5)	29.9	(28.0; 31.9)
<i>DC</i>	5.2	(4.1; 6.3)	16.0	(14.3; 17.7)	18.9	(16.8; 20.9)	26.6	(24.5; 28.8)	21.9	(19.8; 24.1)	25.4	(23.3; 27.4)
<i>Florida</i>	6.0	(5.2; 6.9)	21.4	(20.0; 22.9)	11.1	(10.0; 12.3)	17.6	(16.3; 18.8)	23.2	(21.7; 24.7)	28.1	(26.6; 29.6)
<i>Georgia</i>	4.8	(3.9; 5.7)	21.5	(20.1; 22.9)	10.8	(9.7; 11.9)	18.0	(16.7; 19.3)	21.0	(19.5; 22.5)	26.5	(25.1; 28.0)
<i>Hawaii</i>	7.6	(6.8; 8.4)	17.9	(16.8; 19.0)	12.8	(11.8; 13.8)	16.8	(15.8; 17.8)	25.4	(24.1; 26.8)	24.5	(23.3; 25.7)
<i>Idaho</i>	6.6	(5.6; 7.5)	25.0	(23.3; 26.7)	19.4	(17.7; 21.0)	31.4	(29.6; 33.3)	24.0	(22.2; 25.8)	29.3	(27.5; 31.0)
<i>Illinois</i>	2.4	(1.8; 3.0)	21.3	(19.6; 23.0)	13.0	(11.7; 14.3)	21.5	(20.0; 23.1)	21.1	(19.5; 22.8)	29.0	(27.3; 30.8)
<i>Indiana</i>	5.2	(4.6; 5.8)	24.8	(23.7; 25.9)	15.5	(14.5; 16.6)	25.1	(23.9; 26.2)	20.9	(19.7; 22.0)	26.8	(25.6; 28.0)
<i>Iowa</i>	6.2	(5.6; 6.9)	18.3	(17.4; 19.3)	15.8	(14.9; 16.7)	22.8	(21.8; 23.8)	23.3	(22.3; 24.3)	27.3	(26.3; 28.4)
<i>Kansas</i>	5.4	(4.9; 5.9)	28.0	(27.0; 28.9)	16.0	(15.2; 16.8)	27.9	(26.9; 28.8)	22.9	(22.0; 23.8)	31.4	(30.5; 32.4)
<i>Kentucky</i>	5.5	(4.6; 6.5)	24.0	(22.4; 25.5)	16.7	(15.3; 18.2)	27.3	(25.7; 28.9)	25.5	(23.7; 27.2)	33.1	(31.3; 34.8)
<i>Louisiana</i>	2.8	(2.1; 3.5)	23.0	(21.5; 24.5)	11.3	(10.0; 12.5)	20.6	(19.2; 22.0)	25.6	(23.7; 27.4)	33.7	(32.1; 35.4)
<i>Maine</i>	7.0	(6.1; 7.8)	32.8	(31.5; 34.2)	17.7	(16.3; 19.1)	30.6	(29.2; 31.9)	29.7	(28.2; 31.3)	38.5	(37.1; 39.9)
<i>Maryland</i>	4.0	(3.5; 4.4)	18.1	(17.3; 18.9)	12.0	(11.2; 12.8)	18.9	(18.1; 19.7)	23.4	(22.4; 24.4)	29.4	(28.5; 30.4)
<i>Massachusetts</i>	4.8	(4.2; 5.4)	21.5	(20.4; 22.7)	14.4	(13.4; 15.5)	23.6	(22.5; 24.8)	21.1	(19.9; 22.4)	26.2	(25.0; 27.4)
<i>Michigan</i>	4.9	(4.3; 5.5)	25.1	(23.9; 26.4)	15.1	(14.1; 16.2)	25.4	(24.2; 26.6)	25.0	(23.7; 26.3)	34.8	(33.5; 36.2)
<i>Minnesota</i>	2.4	(2.1; 2.7)	19.7	(19.0; 20.5)	14.7	(14.0; 15.4)	28.1	(27.3; 29.0)	27.4	(26.5; 28.3)	39.1	(38.2; 40.0)
<i>Mississippi</i>	5.9	(4.9; 6.9)	17.2	(16.0; 18.4)	13.6	(12.1; 15.0)	17.9	(16.6; 19.2)	25.6	(23.9; 27.4)	26.7	(25.2; 28.1)
<i>Missouri</i>	6.4	(5.6; 7.1)	21.8	(20.6; 23.1)	18.9	(17.6; 20.2)	26.6	(25.3; 27.9)	27.6	(26.2; 29.0)	32.3	(31.0; 33.7)
<i>Montana</i>	7.3	(6.5; 8.1)	25.1	(23.8; 26.5)	18.6	(17.4; 19.8)	32.9	(31.4; 34.3)	28.7	(27.3; 30.1)	40.0	(38.5; 41.5)
<i>Nebraska</i>	2.5	(2.1; 2.9)	22.0	(21.0; 23.0)	12.6	(11.8; 13.5)	23.9	(22.9; 25.0)	16.9	(16.0; 17.9)	25.0	(24.0; 26.1)
<i>Nevada</i>	7.8	(6.2; 9.3)	29.0	(26.6; 31.3)	22.3	(20.1; 24.5)	29.4	(27.0; 31.9)	28.4	(26.0; 30.8)	35.4	(32.9; 37.9)
<i>New Hampshire</i>	3.6	(2.9; 4.4)	21.8	(20.4; 23.2)	14.7	(13.2; 16.1)	27.9	(26.3; 29.5)	25.8	(24.1; 27.6)	35.3	(33.7; 37.0)
<i>New Jersey</i>	3.5	(2.9; 4.1)	13.0	(12.0; 14.0)	9.6	(8.7; 10.5)	15.7	(14.7; 16.8)	16.5	(15.4; 17.7)	23.0	(21.8; 24.3)

<i>New Mexico</i>	7.5	(6.5; 8.6)	27.7	(26.0; 29.4)	23.8	(22.1; 25.5)	29.2	(27.5; 30.9)	32.0	(30.2; 33.9)	35.2	(33.4; 36.9)
<i>New York</i>	4.4	(4.0; 4.9)	16.7	(15.9; 17.5)	11.6	(10.8; 12.3)	17.2	(16.4; 18.0)	18.9	(18.0; 19.8)	24.1	(23.2; 25.0)
<i>North Carolina</i>	3.0	(2.4; 3.6)	22.3	(21.0; 23.7)	11.2	(10.0; 12.3)	22.2	(20.9; 23.6)	21.5	(20.0; 23.0)	31.3	(29.8; 32.8)
<i>North Dakota</i>	5.6	(4.7; 6.6)	17.6	(15.9; 19.3)	15.0	(13.4; 16.5)	22.8	(20.9; 24.7)	25.6	(23.8; 27.4)	28.8	(26.9; 30.7)
<i>Ohio</i>	3.4	(2.9; 3.8)	21.1	(20.1; 22.0)	13.1	(12.2; 14.0)	23.4	(22.4; 24.3)	21.3	(20.2; 22.4)	28.4	(27.3; 29.4)
<i>Oklahoma</i>	5.3	(4.6; 5.9)	24.9	(23.8; 26.1)	15.2	(14.1; 16.3)	26.8	(25.6; 28.0)	23.6	(22.3; 24.9)	33.9	(32.6; 35.2)
<i>Oregon</i>	6.9	(6.1; 7.7)	27.3	(25.9; 28.6)	16.3	(15.2; 17.4)	28.3	(26.9; 29.6)	30.3	(28.9; 31.7)	39.2	(37.7; 40.7)
<i>Pennsylvania</i>	5.4	(4.6; 6.1)	19.4	(18.1; 20.7)	14.5	(13.3; 15.6)	24.3	(22.9; 25.8)	24.0	(22.5; 25.4)	30.4	(28.8; 31.9)
<i>Rhode Island</i>	7.1	(6.0; 8.2)	18.2	(16.8; 19.6)	15.8	(14.2; 17.4)	21.7	(20.1; 23.4)	24.1	(22.3; 25.9)	28.2	(26.5; 29.9)
<i>South Carolina</i>	7.4	(6.4; 8.4)	21.5	(20.0; 22.9)	15.6	(14.3; 17.0)	22.0	(20.5; 23.4)	27.2	(25.5; 28.9)	30.3	(28.7; 31.9)
<i>South Dakota</i>	3.1	(2.3; 3.9)	21.1	(19.0; 23.2)	12.5	(10.6; 14.4)	20.3	(18.3; 22.4)	21.5	(19.2; 23.9)	28.1	(25.8; 30.4)
<i>Tennessee</i>	6.0	(5.0; 7.0)	24.3	(22.7; 25.8)	13.7	(12.3; 15.0)	23.7	(22.2; 25.3)	25.5	(23.7; 27.3)	35.0	(33.3; 36.8)
<i>Texas</i>	4.4	(3.7; 5.1)	24.7	(23.2; 26.2)	11.5	(10.4; 12.6)	19.5	(18.2; 20.8)	20.3	(18.8; 21.7)	25.4	(24.0; 26.9)
<i>Utah</i>	6.5	(5.8; 7.1)	25.1	(24.0; 26.1)	27.5	(26.5; 28.6)	36.4	(35.2; 37.5)	21.6	(20.6; 22.6)	25.3	(24.2; 26.3)
<i>Vermont</i>	6.7	(5.6; 7.8)	31.6	(29.9; 33.3)	19.1	(17.4; 20.8)	31.2	(29.5; 32.9)	27.6	(25.7; 29.4)	36.1	(34.4; 37.9)
<i>Virginia</i>	6.1	(5.4; 6.9)	16.6	(15.6; 17.6)	12.2	(11.3; 13.1)	17.8	(16.8; 18.8)	22.2	(21.0; 23.4)	25.8	(24.6; 26.9)
<i>Washington</i>	8.6	(7.9; 9.2)	29.0	(27.9; 30.0)	16.3	(15.4; 17.1)	27.8	(26.8; 28.8)	25.6	(24.6; 26.6)	34.2	(33.1; 35.3)
<i>West Virginia</i>	4.8	(4.0; 5.6)	21.3	(19.9; 22.6)	15.9	(14.5; 17.3)	25.8	(24.3; 27.2)	25.1	(23.5; 26.7)	31.3	(29.7; 32.8)
<i>Wisconsin</i>	5.2	(4.3; 6.1)	19.4	(17.8; 20.9)	14.5	(13.0; 15.9)	23.0	(21.4; 24.7)	24.0	(22.3; 25.7)	28.6	(26.9; 30.3)
<i>Wyoming</i>	6.9	(5.8; 8.0)	25.1	(23.2; 27.0)	15.7	(14.1; 17.4)	25.9	(23.9; 27.8)	24.0	(22.1; 25.9)	29.9	(27.9; 31.9)

^a Estimates in this tables are reported for all 50 states and the District of Columbia. For those BRFSS respondents who actually answered the question, we reported the direct BRFSS estimates. For those respondents who did not receive or answer the question, we reported predicted estimates obtained through multilevel mixed-effects logistic regressions or logistic small area estimation (SAE) regressions. All estimates are weighted.

^b Alabama, Arizona, District of Columbia, Delaware, Florida, Georgia, Hawaii, Idaho, Indiana, Iowa, Kentucky, Michigan, Mississippi, Missouri, Montana, Nevada, New Mexico, North Dakota, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, West Virginia, Wisconsin, and Wyoming: <33% of ACEs estimates were predicted, since states offered ACEs questions to all BRFSS respondents, and up to 33% of respondents skipped at least one ACEs question.

California, Kansas, Massachusetts, Maryland, New Jersey, New York, Ohio, and Oklahoma: >70% of ACEs estimates were predicted, since states offered ACEs questions only to a fraction of BRFSS respondents.

Alaska, Arkansas, Colorado, Connecticut, Illinois, Louisiana, Maine, Minnesota, Nebraska, New Hampshire, North Carolina, Oregon, Vermont, and Washington: all ACEs estimates were predicted, since states did not include ACEs questions in their 2019-2020 BRFSS surveys.

Appendix Table 6: Estimated Percentage of Adults with ACEs Exposures by Socio-Economic Group, United States, 2019–2020

	ACEs Type, % (95% CI) ^a								
	Household Member Incarceration	Experiencing Sexual Abuse	Witnessing Intimate Partner Violence	Household Member with Mental Illness	Experiencing Physical Abuse	Household Member Substance Abuse	Parental Separation	Experiencing Emotional Abuse	Exposure to at Least One ACE
National estimates	10.6 (10.4; 10.8)	14.1 (13.9; 14.2)	18.1 (17.9; 18.3)	18.7 (18.5; 18.9)	25.2 (24.9; 25.4)	26.3 (26.1; 26.5)	29.4 (29.2; 29.7)	34.5 (34.3; 34.8)	62.8 (62.6; 63.0)
Income									
<i>Less than \$25,000 or missing</i>	15.3 (14.9; 15.6)	18.1 (17.8; 18.4)	20.8 (20.5; 21.1)	19.5 (19.2; 19.8)	28.8 (28.4; 29.2)	26.4 (26; 26.7)	31.6 (31.2; 32)	30.3 (30; 30.7)	56.2 (55.8; 56.6)
<i>\$25,000-\$50,000</i>	12.5 (12.1; 12.9)	14.6 (14.2; 15)	22.9 (22.4; 23.4)	19.1 (18.6; 19.5)	29.9 (29.3; 30.4)	31.0 (30.5; 31.5)	35.9 (35.4; 36.5)	35.6 (35.1; 36.2)	67.1 (66.6; 67.6)
<i>\$50,000 or more</i>	5.5 (5.3; 5.7)	10.1 (9.8; 10.3)	13.6 (13.3; 13.9)	17.9 (17.6; 18.2)	19.9 (19.5; 20.2)	24.2 (23.9; 24.6)	24.7 (24.4; 25.1)	38.0 (37.6; 38.4)	67.2 (66.9; 67.5)
Education									
<i>Did not graduate from high school</i>	20.2 (19.4; 20.9)	19.9 (19.2; 20.6)	26.8 (26.1; 27.6)	16.6 (16.0; 17.3)	37.4 (36.5; 38.2)	31.6 (30.8; 32.3)	36.7 (35.8; 37.5)	28.7 (27.9; 29.5)	60.6 (59.8; 61.4)
<i>Graduated from high school</i>	13.3 (13.0; 13.7)	12.4 (12.1; 12.8)	20.3 (19.9; 20.7)	17.1 (16.7; 17.4)	25.8 (25.4; 26.2)	28.9 (28.5; 29.4)	37.4 (37.0; 37.9)	31.7 (31.3; 32.1)	64.9 (64.5; 65.3)
<i>Attended college or graduated from college</i>	7.3 (7.1; 7.5)	13.6 (13.3; 13.8)	15.3 (15.1; 15.6)	19.9 (19.7; 20.2)	22.5 (22.3; 22.8)	24.1 (23.8; 24.4)	24.5 (24.2; 24.8)	37.2 (36.9; 37.5)	62.6 (62.3; 62.8)
Access to a personal healthcare provider									
<i>Yes</i>	8.7 (8.6; 8.9)	14.0 (13.8; 14.2)	16.6 (16.4; 16.8)	17.8 (17.6; 18)	23.7 (23.4; 23.9)	25.2 (24.9; 25.4)	26.1 (25.8; 26.3)	32.9 (32.6; 33.1)	61.1 (60.9; 61.4)
<i>No</i>	16.8 (16.4; 17.3)	14.1 (13.7; 14.6)	23.0 (22.6; 23.5)	21.9 (21.4; 22.3)	30.3 (29.8; 30.8)	30.2 (29.7; 30.7)	40.9 (40.3; 41.4)	40.4 (39.9; 41)	68.5 (68.0; 69.0)

Abbreviations: ACEs: adverse childhood experiences; BRFSS: Behavioral Risk Factor Surveillance System.

^a Estimates in this table include BRFSS respondents who did and did not answer ACEs questions in 2019-2002. For those BRFSS respondents who actually answered the question, we reported the direct BRFSS estimates. For those respondents who did not receive or skipped the question, we reported predicted estimates obtained through multilevel mixed-effects logistic regressions or logistic small area estimation (SAE) regressions. All estimates are weighted.

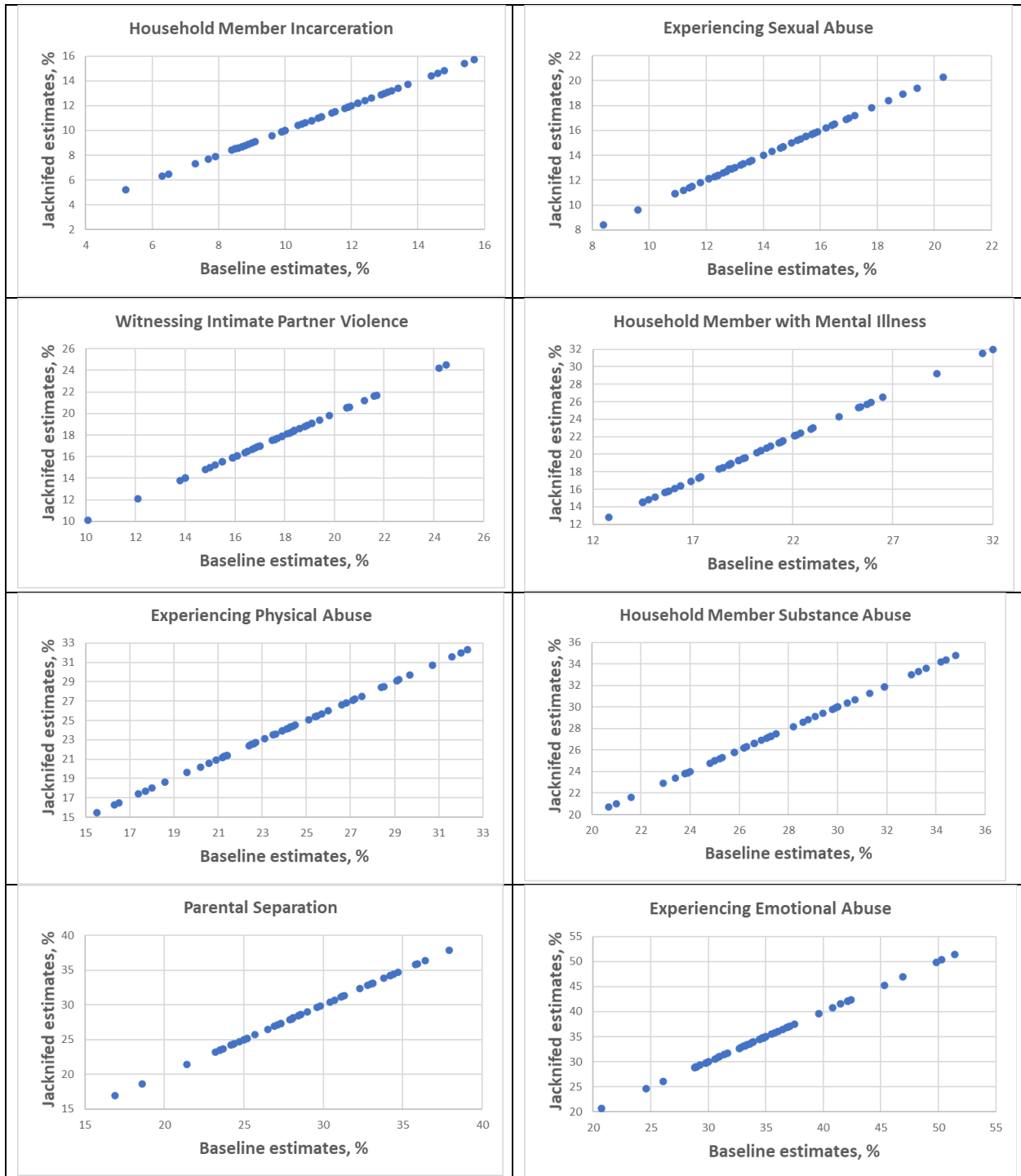
Appendix Table 7: Pearson Correlation Coefficient Between the Baseline Estimates and Jackknifed Estimates of the ACEs Exposures Among U.S. Adults, 2019–2020.

	Household Member Incarceration ^a	Experiencing Sexual Abuse ^a	Witnessing Intimate Partner Violence ^a	Household Member with Mental Illness ^a	Experiencing Physical Abuse ^a	Household Member Substance Abuse ^a	Parental Separation ^a	Experiencing Emotional Abuse ^a
Individual level	1.0000	0.9998	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
State level	1.0000	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Abbreviations: ACEs: adverse childhood experiences; BEA: Bureau of Economic Analysis

^a All estimated in this table are weighted. Baseline estimates were obtained through logistic regressions (LR) or mixed-effects logistic (MMEL) regressions, while jackknifed estimated were obtained through jackknifed LR or MMEL.

Appendix Figure 1: Baseline Versus Jackknifed Estimates of the ACEs Exposures Among U.S. Adults, 2019–2020.



Abbreviations: ACEs: adverse childhood experiences; BRFSS: Behavioral Risk Factor Surveillance System

Baseline estimates were obtained through logistic regressions (LR) or mixed-effects logistic (MMEL) regressions, while jackknifed estimates were obtained through jackknifed LR or MMEL. For every ACEs type, the baseline ACEs estimates plotted

against the jackknifed estimates tightly clustered around a 45-degree line, demonstrating stability of the model estimates and corroborating key findings of this analysis.

Appendix Methods

Small Area Estimation (SAE) Model Specification

In this analysis, all missing ACEs responses (i.e., a state did not offer ACEs questions or offered them in one of the survey splits; respondent skipped the question) were predicted through the SAE indirect domain approach.¹ For each outcome (i.e., ACEs type), we performed several SAE predictive models, including multilevel mixed-effects logistic (MMEL) regressions,²⁻⁴ logistic regressions (LR), and jackknifed MMEL and LR that left out one state at a time (Stata v17.0 *melogit* or *logit*, respectively). MMEL were well-suited to analyze the highly structured BRFSS survey data with individual respondents nested within PSUs/strata. Furthermore, the state-level random effects allowed us to explicitly model the non-independence in responses within a state by allowing each state to have a different intercept.^{3,5} Logistic regressions were used when the MMEL residual intraclass correlation (ICC; Stata v17.0 *estat icc*) did not exceed 0.5%, demonstrating that <0.5% of total variance in the outcome was accounted for by clustering alone.^{5,6} Both MMEL and LR models improved consistency of SAE estimates by using nearly 250,000 unweighted observations that exploited similarities in the observed ACEs-related characteristics across all surveyed respondents to obtain ACEs predictions. In addition, both models benefited from differences in ACEs non-response patterns across states (Appendix Table 2) to mitigate a possible impact of non-response bias on SAE estimates. The jackknifed resampling methods were used as sensitivity analyses, since those methods are less sensitive to parametric model assumptions.^{7,8} Furthermore, the jackknifed MMEL/LR that leave out one state at a time further reduced possible impact of the state-specific non-response bias by resampling $N - 1$ models that left out different ACEs non-response patterns in each model.⁷⁻⁹

Our MMEL models followed the general format: $y = X\beta + Zu + \epsilon$, where y is the vector of outcomes, X is the covariate matrix for fixed effects, and Z is the covariate matrix for the random effects u . Since all outcomes in this analysis were dichotomous (1=yes; 0=no exposure to each ACEs type), we used the mixed-effects logistic regression, where $g(X\beta + Zu)$ was a logit function, and $y \sim \text{Bernoulli}$.^{2,5,10} The random effects u were not directly estimated. Instead, they were characterized by variance components estimated along with the error-covariance parameters.¹⁰ The set of fixed effects included all individual- and state-level covariates. The LR models included only fixed effects. Since LR were performed when MMEL ICC<0.5%, random effects were omitted due to the minimal residual (unexplained by the model) dependence in individual responses within state. In all models in this analysis, we checked for overparameterization that could have affected estimates' precision. We computed variance inflation factor (VIF) of each covariate and included only covariates with VIF<10.^{3,11,12} Among the selected covariates, we identified covariates with substantial variation in ACEs exposures by the covariate sub-category (respondents' sex, race, age, education, and annual household income; MSA status and BEA region) and interacted them with all individual-level covariates to improve model performance. We also included quadratic terms of continuous covariates to capture possible non-linearity. In all models, we obtained the non-weighted individual-level estimates of ACEs responses, since those tend to be more consistent than weighted estimates.¹³

Model prediction

We fitted a separate set of SAE models to predict the probability of exposure to each ACEs type (Stata v17.0 *predict*) and the corresponding random effects (Stata v17.0 *predict ... , reffects*) in those states/splits where ACEs data were available. For each ACEs type, we selected a model

with the best predictive performance by comparing the non-missing direct estimates from BRFSS to predicted SEA estimates by using standard statistics (sensitivity/specificity, positive/negative predicted values, percent predicted to observed answers, mean absolute bias, and Pearson correlation coefficient). Since BRFSS was designed to generate reliable state-level estimates, consistency of predicted and direct estimates at the state level was expected if SAE models were valid.⁵

We then used models with the best predictive performance to obtain predicted exposures to each ACEs type in states/splits where ACEs data were not available. For LR models, we applied the estimated model parameters to the corresponding individual- and state-level covariates. For MMEL models, we additionally incorporated the spatially smoothed⁵ estimated random effects from the adjacent states. Survey-weighted proportions (Stata v17.0 *svy: mean*) and 95% confidence intervals (CIs) of adults exposed to each ACE type were estimated from a combination of direct estimates (if reported in the survey) and predicted SAE estimates (if direct estimates were missing).

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