JAMA | Original Investigation

US State-Level Prevalence of Adult Obesity by Race and Ethnicity From 1990 to 2022 and Forecasted to 2035

Nicole K. DeCleene, BS; Ethan Kahn, MPH; Chun-Wei Yuan, PhD; Emmanuela Gakidou, PhD; Ali H. Mokdad, PhD; Christopher J. L. Murray, MD, DPhil; Catherine O. Johnson, PhD, MPH; Gregory A. Roth, MD, MPH

IMPORTANCE The prevalence of obesity in the US has risen steeply over the past decades, representing a large public health burden with substantial variation by population. There is a lack of detailed population-level estimates and projections of obesity necessary for informing health policy and reducing disparities.

OBJECTIVE To estimate US obesity prevalence from 1990 to 2022 and predict trends through 2035 by race and ethnicity, state, sex, and age (≥20 years).

DESIGN, SETTING, AND PARTICIPANTS Analysis of measured body mass index data from the National Health and Nutrition Examination Survey and bias-corrected body mass index values calculated from self-reported height and weight data from the Behavioral Risk Factor Surveillance System and Gallup Daily Survey using spatiotemporal gaussian process regression and an ensemble of annualized rate of change and meta-regression bayesian spline models. Surveys for input data were conducted using population-based sampling by state and by race and ethnicity group with a total of 11 315 421 US participants. Results are reported for Hispanic, any race; non-Hispanic Black; and non-Hispanic White populations.

MAIN OUTCOMES AND MEASURES Obesity prevalence (BMI ≥30).

RESULTS In 2022, there were an estimated 107 (95% uncertainty interval [UI], 101-113) million adults living with obesity in the US (42.5% [95% UI, 40.2%-45.0%] of the adult population), an increase from 34.7 (95% UI, 31.1-38.3) million in 1990 (19.3% [95% UI, 17.3%-21.3%] of the adult population). By 2035, this is projected to increase to 126 (95% UI, 118-134) million (46.9% [95% UI, 43.9%-49.9%] of the adult population). Nationally, age-standardized prevalence by race and ethnicity group and sex in 2022 ranged from 40.1% (95% UI, 37.8%-42.5%) for non-Hispanic White males to 56.9% (95% UI, 54.1%-59.9%) for non-Hispanic Black females. There were substantial state-level differences, with prevalence highest in Midwestern and Southern states, as well as within-state disparities by race and ethnicity, which were larger for females than males. Prevalence also varied by age, with obesity prevalence highest among middle-aged adults and large increases in the youngest adult ages, especially for females.

CONCLUSIONS AND RELEVANCE While there are large differences by race and ethnicity, sex, age, and state, the prevalence of obesity is high and forecasted to continue increasing for all groups.

Supplemental content

Author Affiliations: Institute for Health Metrics and Evaluation, University of Washington, Seattle (DeCleene, Kahn, Yuan, Gakidou, Mokdad, Murray, Johnson, Roth); Department of Health Metrics Sciences, University of Washington, Seattle (Gakidou, Mokdad, Murray, Roth); Division of Cardiology, Department of Medicine, University of Washington, Seattle (Roth).

Corresponding Author: Catherine O. Johnson, PhD, MPH, Hans Rosling Center for Population Health, 3980 15th Ave NE, Box 351615, Seattle, WA 98195 (johnsoco@uw.edu).

JAMA. doi:10.1001/jama.2025.26817
Published online January 28, 2026.

The prevalence of obesity has increased throughout the US over the past decades.[1] Obesity is associated with an increased risk of mortality and morbidity, including all-cause mortality,[2] cancers,[3] cardiovascular diseases and diabetes,[4,5] musculoskeletal conditions,[6] and Alzheimer disease.[7] Obesity has led to higher disease burden and higher costs for the health care system.[8,9] Large differences in obesity prevalence are observed between states, race and ethnicity groups, ages, and sexes.[10,11]

Despite the significant impact obesity has on public health and the importance of tracking its trends for policy setting, recently updated estimates for current rates of obesity prevalence and projected future trends are not available by race and ethnicity subgroups within US states.[12] To examine patterns of obesity at a detailed level and explore how they may be expected to change in the future, this study estimated the prevalence of obesity from 1990 to 2022 and forecasted estimates through 2035 for the Hispanic, non-Hispanic Black, and non-Hispanic White groups by state, sex, and age group.

Key Points

Question What are the current and future estimates of obesity prevalence in the US by state, race and ethnicity group, sex, and age?

Findings This cross-sectional analysis estimated that in 1990, 19.3% of the US adult population were living with obesity; by 2022, this had increased to 42.5%. By 2035, this was forecasted to increase to 46.9%. There was substantial variation by state and race and ethnicity group, indicating large disparities in obesity prevalence.

Meaning Differences in the prevalence of obesity by population group may be used to develop health policy and interventions to reduce inequities and the large burden of obesity in the US.

Methods

Overview

We used cross-sectional data on body mass index (BMI) from nationally representative surveys, corrected for self-report bias, to generate estimates of mean BMI and prevalence of obesity from 1990 to 2022 and forecasted through 2035. Race and ethnicity were defined in this analysis by self-identification of individuals. We report on the 3 largest mutually exclusive and collectively exhaustive statistical race and ethnicity groups as defined by the 1977 US Office of Management and Budget standards.[13] Statistical race and ethnicity categories are constructed by the design of census and survey questions and reported by government and other institutions, usually for the purpose of achieving social or policy goals and determining disparities in environmental risks and health outcomes. Estimates for non-Hispanic people reporting other races are provided in eFigures 10 and 11 in Supplement 1 and eTables 1 and 2 in Supplement 2. Full methodological details can be found in the eMethods section of Supplement 1; a summary follows. This study complies with the Guidelines for Accurate and Transparent Health Estimate Reporting (GATHER) recommendations[14] (eTable 1 in Supplement 1) and was reviewed and approved by the University of Washington institutional review board; the requirement for patient consent was waived.

Mean BMI Estimation

We used self-reported height and weight data from 2 cross-sectional, nationally representative, state-level telephone surveys, the Behavioral Risk Factor Surveillance System (BRFSS)[15] and Gallup Daily Survey,[16,17] covering 1988-2022 and 2008-2017, respectively. We used the National Health and Nutrition Examination Survey (NHANES),[18] a cross-sectional, nationally representative health examination and interview survey covering 1988 to 2023, to correct for the known bias of self-reported data.[19,20] Additional details on these surveys, including sample sizes and study characteristics, can be found in eTables 2 and 3 in Supplement 1.

Mean self-reported BMI in BRFSS and Gallup was matched with mean measured BMI in NHANES by sex, survey year, age group, race and ethnicity group, and quantiles of self-reported BMI. Following the approach adopted by the Global Burden of Disease (GBD) US Health Disparities Collaborators (Laura Dwyer-Lindgren, PhD, for the GBD US Health Disparities Collaborators, email communication, 2026), integrated nested Laplace approximation models[21] were run on the matched data separately by sex to estimate self-report bias as the log ratio of measured to self-reported mean BMI using random intercepts on age group, race and ethnicity group, survey, and self-reported BMI quantile. These models were applied to the person-level self-reported data; the corrected data were then tabulated by sex, state, race and ethnicity group, age group, and survey year. Estimates of mean BMI were modeled using a 3-stage spatiotemporal gaussian process regression framework.[22]

Obesity Prevalence Calculation and Forecasting

We calculated the prevalence of obesity (defined as BMI ≥30, calculated as weight in kilograms divided by the square of height in meters) as well as the proportion of the population with BMI values between certain thresholds (<18.5, 18.5 to <25, 25 to <30, 30 to <35, 35 to <40, and ≥40) using estimates of mean BMI, standard deviation, and distribution shape (eTable 4 and eFigures 1-8 in Supplement 1). Standard deviation and distribution shape were estimated using BMI data from NHANES.[22]

We forecasted categories of BMI from 2022 through 2035 using an ensemble modeling approach with 12 submodels (eFigure 9 in Supplement 1).[23] Six were annualized rate of change models and 6 were 2-stage meta-regression–bayesian, regularized, trimmed (MR-BRT) spline models. Both model classes used the same set of 6 varying recency weights. The MR-BRT models used sociodemographic index, an indicator estimated as the geometric mean of income, education, and fertility, as a covariate.[23-25] Results for each submodel were estimated from 1990 to 2035. Out-of-sample predictive validity was used to generate weights for each submodel and was assessed using 1990-2012 as a training dataset and validated

Table. Modeled Estimates of Prevalence of Obesity (Body Mass Index ≥30) in the US Over Time[a]

Race and ethnicity group	Sex	1990	2022	2035 (forecasted)	Absolute change		Annualized rate of change, %[b]	
					1990-2022	2022-2035 (forecasted)	1990-2022	2022-2035 (forecasted)
Age-standardized prevalence of obesity, % (95% UI)[c]								
Hispanic, any race	Female	24.2 (21.3-27.3)	49.4 (46.3-52.4)	53.7 (48.7-57.7)	25.2 (21.2-29.6)	4.3 (1.0-5.4)	2.2 (1.8-2.7)	0.6 (0.2-0.8)
	Male	17.4 (14.7-20.4)	42.6 (39.1-46.2)	47.5 (42.5-51.9)	25.2 (20.9-29.8)	4.9 (1.9-6.1)	2.8 (2.2-3.4)	0.8 (0.3-1.0)
Non-Hispanic Black	Female	36.6 (33.0-40.3)	56.9 (54.1-59.9)	59.5 (56.0-62.9)	20.3 (16.0-24.8)	2.6 (0.8-3.4)	1.4 (1.1-1.7)	0.3 (0.1-0.4)
	Male	22.0 (19.3-24.9)	40.4 (37.4-43.3)	43.1 (39.8-46.6)	18.4 (14.7-22.2)	2.7 (1.2-3.6)	1.9 (1.5-2.4)	0.5 (0.2-0.6)
Non-Hispanic White	Female	17.4 (15.6-19.1)	41.5 (39.7-43.4)	47.3 (44.8-49.7)	24.1 (21.3-27.0)	5.9 (4.5-6.5)	2.7 (2.4-3.1)	1.0 (0.8-1.1)
	Male	18.8 (16.9-20.9)	40.1 (37.8-42.5)	44.6 (41.9-47.3)	21.3 (17.9-24.7)	4.5 (3.4-5.3)	2.4 (2.0-2.8)	0.8 (0.6-1.0)
No. of adults living with obesity, millions (95% UI)[c]								
Hispanic, any race	Female	1.55 (1.36-1.75)	10.5 (9.83-11.1)	14.5 (13.1-15.5)	8.94 (8.27-9.62)	3.96 (3.03-4.40)	6.0 (5.6-6.4)	2.5 (2.0-2.6)
	Male	1.21 (1.02-1.41)	9.26 (8.51-10.0)	13.2 (11.9-14.5)	8.06 (7.30-8.86)	3.98 (3.07-4.46)	6.4 (5.8-6.9)	2.8 (2.3-3.0)
Non-Hispanic Black	Female	3.73 (3.36-4.11)	9.72 (9.23-10.2)	11.5 (10.8-12.2)	5.99 (5.40-6.62)	1.80 (1.44-2.01)	3.0 (2.7-3.4)	1.3 (1.1-1.4)
	Male	1.89 (1.66-2.14)	6.13 (5.68-6.57)	7.61 (7.02-8.23)	4.24 (3.78-4.74)	1.49 (1.19-1.68)	3.7 (3.2-4.1)	1.7 (1.4-1.8)
Non-Hispanic White	Female	12.9 (11.6-14.2)	33.4 (31.9-35.0)	36.5 (34.6-38.4)	20.5 (18.3-22.7)	3.17 (2.09-3.70)	3.0 (2.6-3.3)	0.7 (0.5-0.8)
	Male	12.7 (11.4-14.1)	32.1 (30.2-34.1)	34.4 (32.3-36.6)	19.4 (16.8-22.0)	2.32 (1.49-2.93)	2.9 (2.5-3.3)	0.5 (0.3-0.7)

[a] Prevalence of obesity for 1990 and 2022 was estimated using spatiotemporal gaussian process regression. Prevalence of obesity for 2035 was forecasted using an ensemble model of 6 annualized rate of change models and six 2-stage MR-BRT (meta-regression—bayesian, regularized, trimmed) spline models. See eTable 2 in Supplement 1 for numbers and characteristics of the surveys used as input data for modeling.

[b] Annualized rate of change included to compare change between periods of different lengths (1990 to 2022 and 2022 to 2035).

[c] Uncertainty intervals (UIs) are the 2.5th and 97.5th percentiles of the draws from the posterior distribution of the models.

based on 2013-2022 data. Final forecast estimates represent the weighted average of 12 submodels.

Population Estimation and Forecasting

Population estimates were generated from 1990 to 2022 using data from the National Center for Health Statistics and the US Census Bureau.[26,27] Cohort-change ratios were calculated and projected to generate estimates through 2035 based on historic trends of population shifts by state and demographic group.[28]

General Statistical Methods

To generate uncertainty intervals (UIs), we sampled draws from the posterior distribution of the models.[22] Point estimates were calculated as the mean of the draws and the 95% UIs as the 2.5th and 97.5th percentiles of the draws for each demographic group. Age standardization was performed via the direct method using the GBD study population age standard.[29] Change over time was calculated as absolute difference by subtracting prevalence in an earlier year from prevalence in a later year and as annualized rate of change by dividing the log of the ratio of the prevalence at 2 time points by the number of years between them. A significant change was interpreted as a 95% UI that did not cross zero. All analyses were performed using R version 4.4.0 (R Foundation).[30]

Results

All results presented are modeled estimates based on data from 11 243 644 participants in BRFSS and Gallup and 71 777 participants in NHANES (eTable 2 in Supplement 1).

Prevalence of Obesity by Race and Ethnicity Group

Prevalence of obesity has increased across the entire US population since 1990, with the estimated number of individuals 20 years or older living with obesity increasing from 34.7 (95% UI, 31.1-38.3) million in 1990 to 107 (95% UI, 101-113) million in 2022, reflecting an increase from 19.3% (95% UI, 17.3%-21.3%) to 42.5% (95% UI, 40.2%-45.0%) of the population. However, these increases have not been consistent by group at the national level (**Table**). Prevalence of obesity has risen least for non-Hispanic Black males, with an increase in age-standardized prevalence from 22.0% (95% UI, 19.3%-24.9%) in 1990 to 40.4% (95% UI, 37.4%-43.3%) in 2022. The largest increases were among Hispanic females, from 24.2% (95% UI, 21.3%-27.3%) to 49.4% (95% UI, 46.3%-52.4%) and Hispanic males from 17.4% (95% UI, 14.7%-20.4%) to 42.6% (95% UI, 39.1%-46.2%).

In 2022, non-Hispanic Black females were estimated to have the highest age-standardized prevalence of obesity, at 56.9% (95% UI, 54.1%-59.9%), followed by Hispanic females at 49.4% (95% UI, 46.3%-52.4%). Hispanic males, non-Hispanic White males and females, and non-Hispanic Black males had similar prevalence, ranging from 40.1% (95% UI, 37.8%-42.5%) to 42.6% (95% UI, 39.1% to

46.2%). Among those living with obesity in 2022, the level also varied by sex and race and ethnicity group (**Figure 1**). Females had a higher age-standardized prevalence of severe obesity (BMI ≥40), with prevalence ranging from 11.3% (95% UI, 10.4%-12.3%) and 12.1% (95% UI, 10.9%-13.4%) for non-Hispanic White and Hispanic females, respectively, to 20.2% (95% UI, 18.5%-21.9%) for non-Hispanic Black females. For males, prevalence of severe obesity was highest for the non-Hispanic Black group at 8.5% (95% UI, 7.5%-9.6%), followed by the non-Hispanic White group at 6.7% (95% UI, 5.9%-7.5%) and the Hispanic group at 5.2% (95% UI, 4.4%-6.0%).

By 2035, the number of individuals 20 years or older living with obesity was forecasted to be 126 (95% UI, 118-134) million, or 46.9% (95% UI, 43.9%-49.9%) of the population. Age-standardized obesity prevalence was forecasted to be 53.7% (95% UI, 48.7%-57.7%) for Hispanic females, 59.5% (95% UI, 56.0%-62.9%) for non-Hispanic Black females, and 47.3% (95% UI, 44.8%-49.7%) for non-Hispanic White females. For males, prevalence was forecasted to be 47.5% (95% UI, 42.5%-51.9%) for the Hispanic population, 43.1% (95% UI, 39.8%-46.6%) for the non-Hispanic Black population, and 44.6% (95% UI, 41.9%-47.3%) for the non-Hispanic White population.

Prevalence of Obesity Across Age

For all population groups, the estimated prevalence of obesity was highest between ages 45 and 64 years and lower at the youngest and oldest ages (**Figure 2**). The largest increases in obesity prevalence from 1990 to 2022 among females were in those younger than 35 years (eFigure 10 in Supplement 1; eTable 1 in Supplement 2). In both the Hispanic and non-Hispanic White female populations, the largest increase was in the group aged 30 to 34 years (19.8% [95% UI, 17.1%-22.5%] to 50.0% [95% UI, 46.9%-53.0%] and 13.3% [95% UI, 11.7%-14.9%] to 42.1% [95% UI, 40.3%-44.0%], respectively); for the non-Hispanic Black group, the largest increase was in the group aged 25 to 29 years (26.1% [95% UI, 22.9%-29.2%] to 52.9% [95% UI, 50.1%-55.9%]). For males, however, there was no distinct pattern of increase by age for any of the 3 race and ethnicity groups, with the largest increases ranging from the group aged 45 to 49 years for non-Hispanic Black males to the group aged 70 to 74 years for Hispanic and non-Hispanic White males.

State-Level Age-Standardized Prevalence of Obesity

Within each race and ethnicity group, there was a wide range in estimated age-standardized prevalence of obesity at the state level (**Figure 3**; eFigure 11 in Supplement 1; eTable 2 in Supplement 2). For the Hispanic population, obesity was generally highest in the Midwest and the South in 2022 and 2035. In 2022, prevalence was highest in Oklahoma at 54.0% (95% UI, 50.3%-57.6%) for females and Indiana at 47.2% (95% UI, 42.8%-51.7%) for males. By 2035, prevalence for males remained highest in Indiana (53.6% [95% UI, 45.1%-59.3%]) but shifted to South Dakota for females (59.5% [95% UI, 51.8%-64.7%]). These areas also had high rates of obesity in 2022 and 2035 for the non-Hispanic White population. Non-Hispanic White males and females had similar patterns of obesity, with prevalence in 2022 lowest in the District of Columbia (23.8% [95% UI, 21.3%-26.2%] for males and 25.9% [95% UI, 23.8%-28.1%] for females) and highest in West Virginia (47.2% [95% UI, 44.7%-49.9%] for males and 48.9% [95% UI, 46.9%-51.0%] for females). Compared with the non-Hispanic Black female population, prevalence was overall lower for the non-Hispanic Black male population, with the highest prevalence in Oklahoma at 43.9% (95% UI, 40.7%-47.2%) in 2022 and 48.5% (95% UI, 43.0%-53.3%) in 2035. Among non-Hispanic Black females, estimates for the prevalence of obesity were greater than 50% for all locations except Hawai'i (48.5% [95% UI, 45.0%-52.1%]) in 2022; by 2035, this was true for all locations for this population group, although prevalence in Hawai'i continued to be notably lower than in other states.

For non-Hispanic White males and females, there was a significant increase in estimated age-standardized prevalence of obesity between 2022 and 2035 for all locations. For the Hispanic and non-Hispanic Black populations, males were forecasted to have significant increases in 35 and 41 states, respectively, and females in these groups were forecasted to have significant increases in 31 and 34 states, respectively. This is in stark contrast to changes between 1990 and 2022, during which all states experienced significant increases in obesity prevalence. While no locations were predicted to have decreases in obesity prevalence between 2022 and 2035, there were many with small increases over this time. Notably, Mississippi, which had the highest estimated prevalence of obesity for non-Hispanic Black females from 1990 to 2022, was forecasted to have one of the smallest changes for this group from 2022 to 2035 (1.8% [95% UI, -1.6% to 4.2%]).

Within-State Disparities

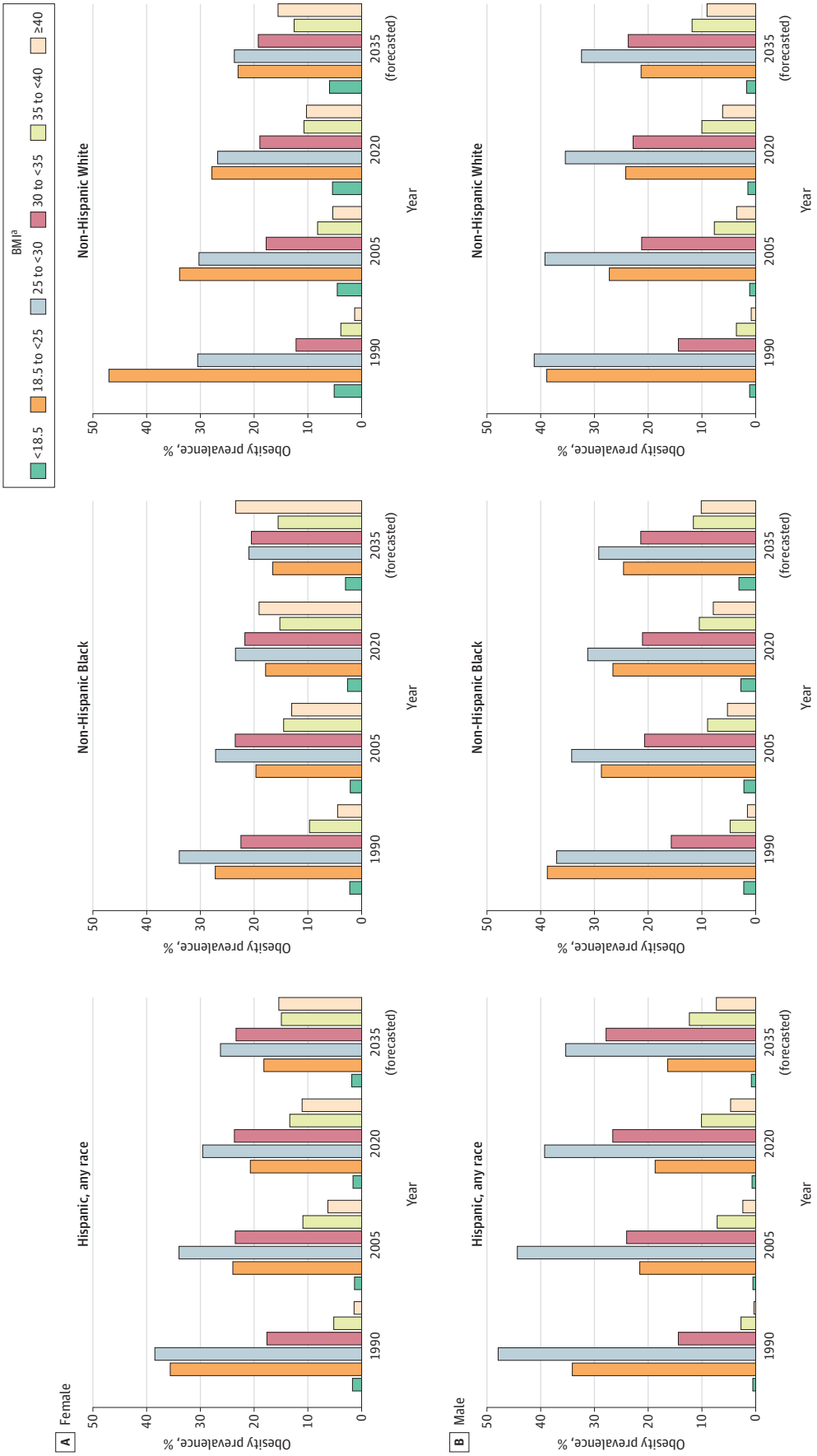
Figure 4 illustrates the within-state disparities for prevalence of obesity by sex and state in 1990, 2022, and 2035, represented by the difference in estimated prevalence for the race and ethnicity groups with the highest and lowest values. In 1990 and 2022, the within-state disparities were wider for females (mean of 18.3% and range of 11.7%-26.7% in 1990; mean of 14.8% and range of 9.0%-28.9% in 2022) compared with males (mean of 5.7% and range of 1.6%-12.1% in 1990; mean of 4.2% and range of 0.5%-12.1% in 2022). In 2035, these values remained higher for females (mean of 11.6% and range of 6.1%-25.8%) than for males (mean of 5.9% and range of 2.1%-13.9%).

For females, generally the non-Hispanic White group had the lowest estimated prevalence of obesity, although prevalence was lowest for Hispanic females in 3 states (New Hampshire, Vermont, Virginia) in 1990. Non-Hispanic Black females had the highest prevalence of obesity in both 1990 and 2022 in all states, but by 2035 Hispanic females had the highest value in South Dakota. Among males, the Hispanic population had the lowest prevalence of obesity in 1990 in all but 5 states (California, Colorado, Michigan, New Mexico, Texas) but the highest rate of obesity in 2035 in 41 states, reflecting the trends for increasing prevalence of obesity among this population.

Discussion

This analysis highlights the trajectory of obesity in the US by state, age, sex, and race and ethnicity group. In addition to

Figure 1. Modeled Estimates of Age-Standardized Prevalence of Body Mass Index Categories in the US Over Time



Body mass index (BMI) categories for 1990, 2005, and 2020 were estimated using spatiotemporal gaussian process regression. BMI categories for 2035 were forecasted using an ensemble model of 6 annualized rate of change models and six 2-stage MR-BRT (meta-regression—bayesian, regularized, trimmed) spline models.

See eTable 2 in Supplement 1 for numbers and characteristics of the surveys used as input data for modeling.

[a]Calculated as weight in kilograms divided by square of height in meters.

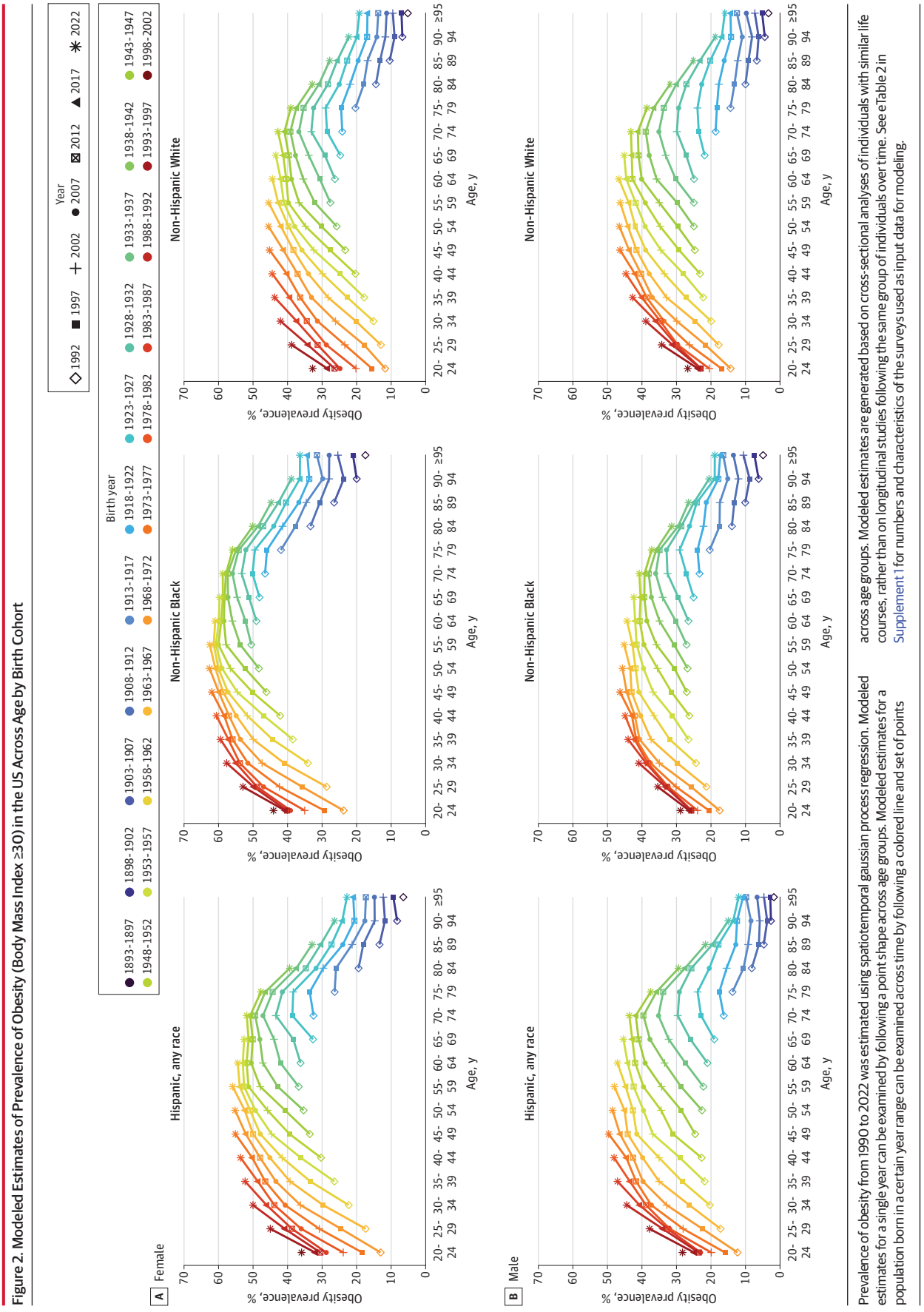
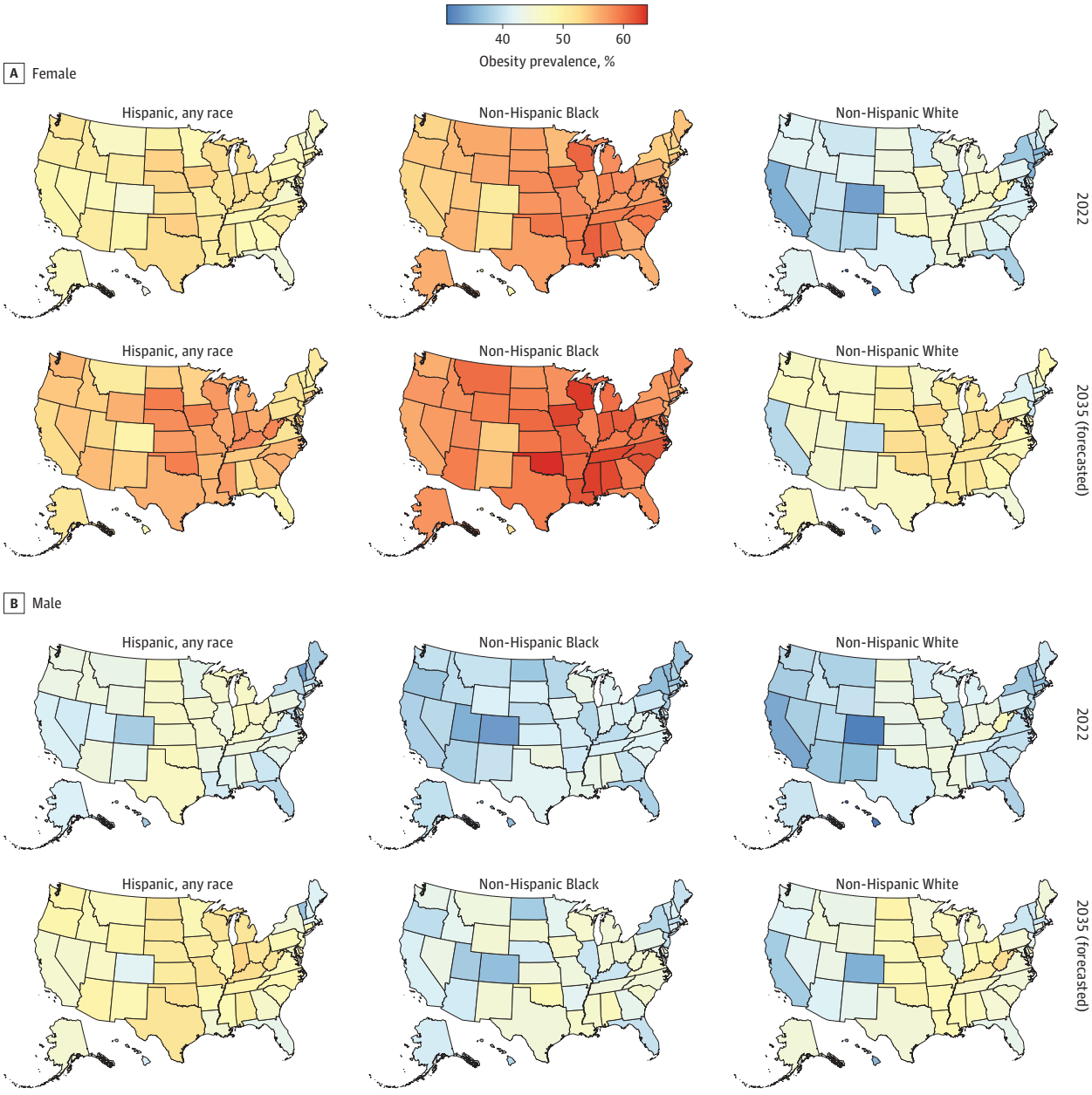


Figure 2. Modeled Estimates of Prevalence of Obesity (Body Mass Index ≥30) in the US Across Age by Birth Cohort

Prevalence of obesity from 1990 to 2022 was estimated using spatiotemporal gaussian process regression. Modeled estimates for a single year can be examined by following a point shape across age groups. Modeled estimates for a population born in a certain year range can be examined across time by following a colored line and set of points across age groups. Modeled estimates are generated based on cross-sectional analyses of individuals with similar life courses, rather than on longitudinal studies following the same group of individuals over time. See eTable 2 in Supplement 1 for numbers and characteristics of the surveys used as input data for modeling.

Figure 3. US Maps of Age-Standardized Prevalence of Obesity (Body Mass Index ≥30) Modeled Estimates in 2022 and 2035

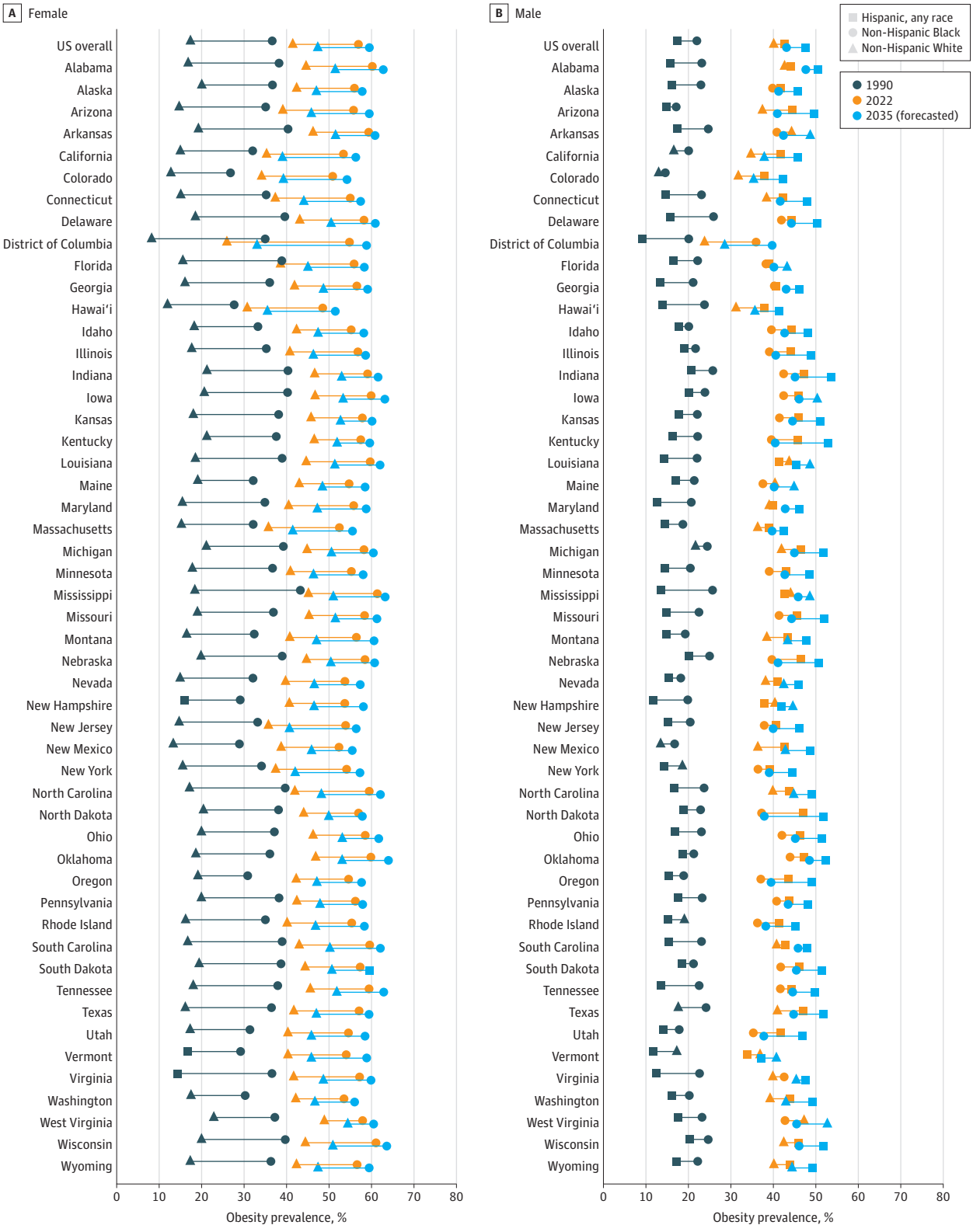


Prevalence of obesity for 2022 was estimated using spatiotemporal gaussian process regression. Prevalence of obesity for 2035 was forecasted using an ensemble model of 6 annualized rate of change models and six 2-stage MR-BRT (meta-regression—bayesian, regularized, trimmed) spline models. See eTable 2 in Supplement 1 for numbers and characteristics of the surveys used as input data for modeling.

geographical differences, there were large disparities in the estimated prevalence of obesity by race and ethnicity group, especially for females. The results indicate substantial increases in the prevalence of obesity among younger ages over the past several decades, representing earlier onset of obesity. They also show lower prevalence of obesity at the oldest ages, likely representing premature mortality for those living with obesity or the effects of multimorbidity in older persons. By 2035, the prevalence of obesity is projected to increase to 46.9% (95% UI, 43.9%-49.9%) of the US adult population, with prevalence by demographic group ranging from 43.1% (95% UI, 39.8%-46.6%) to 59.5% (95% UI, 56.0%-62.9%).

These forecasts indicate that geographic patterns are changing. Predictions in states with historically high levels of obesity, such as Mississippi, suggest that the prevalence of obesity may be plateauing in some locations. In contrast, marked increases are predicted for other locations, such as Oklahoma. The results, with data collected over 3 decades, provide insight into future levels of persons living with

Figure 4. Range of Within-State Modeled Estimates of Age-Standardized Prevalence of Obesity (Body Mass Index ≥30) Over Time



Horizontal lines represent the range of modeled estimates within a certain state. The race and ethnicity groups with the lowest and highest prevalence within a state are represented by points on either side of the line. Prevalence of obesity for 1990 and 2022 was estimated using spatiotemporal gaussian process regression.

Prevalence of obesity for 2035 was forecasted using an ensemble model of 6 annualized rate of change models and six 2-stage MR-BRT (meta-regression—bayesian, regularized, trimmed) spline models. See eTable 2 in Supplement 1 for numbers and characteristics of the surveys used as input data for modeling.

obesity, if past trends continue. Effective policies may be identified by examining populations with consistently lower rates of obesity.

These results incorporate the most recent data from large-scale, state-level survey systems, including data collected during the COVID-19 pandemic. An earlier analysis by Ward et al[31] using data through 2016 estimated that the prevalence of obesity was forecasted to reach nearly 50% nationwide by 2030, with large disparities by state and race and ethnicity group. An analysis of data from BRFSS 2020 by the same investigators found that severe obesity varied by US state and socioeconomic characteristics but did not provide comprehensive estimates by race and ethnicity group.[32] US state-level analyses and forecasts conducted as part of the GBD study have also shown that states in the South generally have the highest prevalences of persons living with obesity; the analysis reported in this article extends prior work to report estimates by race and ethnicity group for each state.[33,34]

Obesity in the current analysis was defined using BMI, which does not directly measure body fat or account for body composition and may incorrectly estimate the amount and location of adipose tissue vs lean muscle mass, with some evidence that these errors may differ by demographic group.[35] While direct measurement of body fat or assessment of anthropometric criteria in addition to an individual's risk profile should be used for health evaluation or treatment recommendations, BMI-based measures are an important proxy that can be used to assess population-level risk.[36] BMI and other surrogate measures of body fat, such as waist circumference or waist-to-hip ratio, have been shown to be consistently associated with adverse health outcomes, including all-cause mortality, cardiovascular disease, diabetes, and cancer-related mortality, and lower health-related quality of life scores.[5,9,37] BMI can be easily assessed in large-scale studies, is widely available for many populations, and has been collected over many years, allowing for assessment of long-term time trends.

The patterns of obesity shown in the current analysis demonstrate significant health disparities that are likely to continue. Studies suggest that these disparities are the result of a complex and multifactorial set of causes, including discrimination based on race and ethnicity group,[38] food insecurity and differential access to healthy food,[39] socioeconomic deprivation,[40] and inequities in physical activity access due to neighborhood segregation and aspects of the built environment.[41,42]

Geographic differences in obesity prevalence help to suggest how drivers may vary between locations. For example, Colorado, which had a low estimated prevalence of obesity, also had the lowest reported prevalence of physical inactivity.[43] States with consistently high prevalence of obesity, such as Oklahoma, had among the lowest percentage of people meeting dietary intake recommendations.[44] Physical inactivity and poor diet do not exist in isolation, often reflecting deep socioeconomic disparities and representing only some of the many causes of obesity that policy interventions can target to blunt its concerning trajectory.

Highlighting disparities is essential for identifying where resources should be focused. A wide range of interventions exist to reduce body weight, including pharmacotherapies. Weight loss medications are generally highly effective.[45] However, access to and use of medications varies by race and ethnicity group and income level; these barriers must be addressed for pharmacotherapies to reduce disparities.[46] Within-state disparities can be reduced with evidence-based health policies and state-level legislation.[47,48]

Limitations

First, forecasts must always be interpreted with care, because the past may not predict the future. Despite this note of caution, forecasting is an important area of evidence generation for use in public health policy and planning.

Second, some locations had sparse data, most often states with small populations. Spatiotemporal gaussian process regression models leverage geographic patterns and relationships with covariates to produce estimates for all locations and demographic groups for the entire time series.

Third, the analysis used self-reported height and weight data. Bias in self-report of these measures is a known concern; to address this, these data were adjusted by matching to measured NHANES BMI data. Using these matched data, self-report bias was estimated accounting for potential differences by survey series, sex, age, race and ethnicity group, and self-reported BMI quantile. However, because NHANES is a national survey, potential differences between states could not be accounted for.

Fourth, prevalence was not estimated separately for smaller groups such as American Indian and Alaska Native, Asian and Asian subgroups, and Native Hawaiian and Other Pacific Islander due to the challenges associated with changes regarding the collection of information on race and ethnicity from 1990 to 2022.[49,50]

Conclusions

Using nationally representative surveys and robust modeling approaches, this study estimated that the percent of US adults living with obesity increased from 19.3% (95% UI, 17.3%-21.3%) in 1990 to 42.5% (95% UI, 40.2%-45.0%) in 2022 and that this will rise to 46.9% (95% UI, 43.9%-49.9%) by 2035, with substantial variation by location and race and ethnicity group. Given the association between obesity and adverse health outcomes, and the resulting rapidly rising health care costs, these findings underscore the importance of addressing the burden of obesity in the US.

ARTICLE INFORMATION

Accepted for Publication: December 22, 2025.

Published Online: January 28, 2026. doi:10.1001/jama.2025.26817

Author Contributions: Drs Johnson and Roth had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Drs Johnson and Roth contributed equally.

Concept and design: Yuan, Mokdad, Murray, Johnson, Roth.
Acquisition, analysis, or interpretation of data: DeCleene, Kahn, Gakidou, Mokdad, Johnson.
Drafting of the manuscript: DeCleene, Johnson, Roth.
Critical review of the manuscript for important intellectual content: Kahn, Yuan, Gakidou, Mokdad, Murray.
Statistical analysis: DeCleene, Kahn, Gakidou, Mokdad, Johnson.
Obtained funding: Mokdad, Roth.
Administrative, technical, or material support: Yuan, Gakidou, Mokdad, Johnson.
Supervision: Mokdad, Murray, Johnson, Roth.

Conflict of Interest Disclosures: Mr Kahn reported receiving funding from the Intramural Research Program, National Institute on Minority Health and Health Disparities, US National Institutes of Health (NIH) (contract 75N94023C00004) and from the Intramural Research Program, National Cancer Institute; National Institute on Aging; National Institute of Arthritis and Musculoskeletal and Skin Diseases; Office of Disease Prevention; and Office of Behavioral and Social Sciences Research, NIH (contract 75N94019C00016) during the conduct of the study. No other disclosures were reported.

Funding/Support: This research was funded by the National Heart, Lung, and Blood Institute (NHLBI) grant 5R01HL136868.

Role of the Funder/Sponsor: The NHLBI had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Data Sharing Statement: See Supplement 3.

REFERENCES

1. Hales CM, Carroll MD, Fryar CD, Ogden CL. Prevalence of Obesity and Severe Obesity among Adults: United States, 2017-2018. NCHS Data Brief No. 360. National Center for Health Statistics. Published 2020. Accessed December 23, 2025. https://stacks.cdc.gov/view/cdc/85451/cdc_85451_DS1.pdf

2. Di Angelantonio E, Bhupathiraju ShN, Wormser D, et al; Global BMI Mortality Collaboration. Body-mass index and all-cause mortality: individual-participant-data meta-analysis of 239 prospective studies in four continents. *Lancet*. 2016;388(10046):776-786. doi:10.1016/S0140-6736(16)30175-1

3. Lauby-Secretan B, Scoccianti C, Loomis D, Grosse Y, Bianchini F, Straif K; International Agency for Research on Cancer Handbook Working Group. Body fatness and cancer—viewpoint of the IARC Working Group. *N Engl J Med*. 2016;375(8):794-798. doi:10.1056/NEJMsr1606602

4. Singh GM, Danaei G, Farzadfar F, et al; Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group; Asia-Pacific Cohort Studies Collaboration (APCSC); Diabetes Epidemiology: Collaborative analysis of Diagnostic criteria in Europe (DECODE); Emerging Risk Factor Collaboration (ERFC); Prospective Studies Collaboration (PSC). The age-specific quantitative effects of metabolic risk factors on cardiovascular diseases and diabetes: a pooled analysis. *PLoS One*. 2013;8(7):e65174. doi:10.1371/journal.pone.0065174

5. Khan SS, Ning H, Wilkins JT, et al. Association of body mass index with lifetime risk of cardiovascular disease and compression of morbidity. *JAMA Cardiol*. 2018;3(4):280-287. doi:10.1001/jamacardio.2018.0022

6. Anandacoomarasamy A, Caterson I, Sambrook P, Fransen M, March L. The impact of obesity on the musculoskeletal system. *Int J Obes (Lond)*. 2008;32(2):211-222. doi:10.1038/sj.ijo.0803715

7. Alford S, Patel D, Perakakis N, Mantzoros CS. Obesity as a risk factor for Alzheimer's disease: weighing the evidence. *Obes Rev*. 2018;19(2):269-280. doi:10.1111/obr.12629

8. Dieleman JL, Cao J, Chapin A, et al. US health care spending by payer and health condition, 1996-2016. *JAMA*. 2020;323(9):863-884. doi:10.1001/jama.2020.0734

9. Ward ZJ, Bleich SN, Long MW, Gortmaker SL. Association of body mass index with health care expenditures in the United States by age and sex. *PLoS One*. 2021;16(3):e0247307. doi:10.1371/journal.pone.0247307

10. Hales CM, Fryar CD, Carroll MD, Freedman DS, Ogden CL. Trends in obesity and severe obesity prevalence in US youth and adults by sex and age, 2007-2008 to 2015-2016. *JAMA*. 2018;319(16):1723-1725. doi:10.1001/jama.2018.3060

11. Liu B, Du Y, Wu Y, Snetselaar LG, Wallace RB, Bao W. Trends in obesity and adiposity measures by race or ethnicity among adults in the United States 2011-18: population based study. *BMJ*. 2021;372(365):n365. doi:10.1136/bmj.n365

12. Petersen R, Pan L, Blanck HM. Racial and ethnic disparities in adult obesity in the United States: CDC's tracking to inform state and local action. *Prev Chronic Dis*. 2019;16:E46. doi:10.5888/pcd16.180579

13. Revisions to OMB's Statistical Policy Directive No. 15: Standards for Maintaining, Collecting, and Presenting Federal Data on Race and Ethnicity. *Federal Register*. Published March 29, 2024. Accessed February 7, 2025. https://www.federalregister.gov/documents/2024/03/29/2024-06469/revisions-to-ombs-statistical-policy-directive-no-15-standards-for-maintaining-collecting-and

14. Stevens GA, Alkema L, Black RE, et al; GATHER Working Group. Guidelines for accurate and transparent health estimates reporting: the GATHER statement. *Lancet*. 2016;388(10062):e19-e23. doi:10.1016/S0140-6736(16)30388-9

15. Behavioral Risk Factor Surveillance System (BRFSS). Centers for Disease Control and Prevention. Published January 9, 2024. Accessed February 20, 2024. https://www.cdc.gov/brfss/index.html

16. How did the Gallup US Daily Tracking Poll work? Gallup. Published January 1, 2018. Accessed February 20, 2024. https://www.gallup.com/224855/gallup-poll-work.aspx

17. Gallup daily tracking methodology. Gallup. Published April 2014. Accessed April 26, 2024. https://news.gallup.com/poll/165401/gallup-daily-tracking-methodology.aspx

18. Centers for Disease Control and Prevention. National Health and Nutrition Examination Survey (NHANES). Accessed March 21, 2023. https://www.cdc.gov/nchs/nhanes/index.html

19. Ward ZJ, Long MW, Resch SC, et al. Redrawing the US obesity landscape: bias-corrected estimates of state-specific adult obesity prevalence. *PLoS One*. 2016;11(3):e0150735. doi:10.1371/journal.pone.0150735

20. Connor Gorber S, Tremblay M, Moher D, Gorber B. A comparison of direct vs self-report measures for assessing height, weight and body mass index: a systematic review. *Obes Rev*. 2007;8(4):307-326. doi:10.1111/j.1467-789X.2007.00347.x

21. Rue H, Martino S, Chopin N. Approximate bayesian inference for latent gaussian models by using integrated nested Laplace approximations. *J R Stat Soc Series B Stat Methodol*. 2009;71(2):319-392. doi:10.1111/j.1467-9868.2008.00700.x

22. Brauer M, Roth GA, Aravkin AY, et al; GBD 2021 Risk Factors Collaborators. Global burden and strength of evidence for 88 risk factors in 204 countries and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet*. 2024;403(10440):2162-2203. doi:10.1016/S0140-6736(24)00933-4

23. Vollset SE, Ababneh HS, Abate YH, et al; GBD 2021 Forecasting Collaborators. Burden of disease scenarios for 204 countries and territories, 2022-2050: a forecasting analysis for the Global Burden of Disease Study 2021. *Lancet*. 2024;403(10440):2204-2256. doi:10.1016/S0140-6736(24)00685-8

24. Johnson CO, DeCleene NK, Blacker BF, et al. State-level cardiovascular mortality rates among Hispanic, Non-Hispanic Black, and Non-Hispanic White populations, 1990 to 2019. *JAMA Cardiol*. 2023;8(5):429-442. doi:10.1001/jamacardio.2023.0112

25. Ferrari AJ, Santomauro DF, Aali A, et al. Global incidence, prevalence, years lived with disability (YLDs), disability-adjusted life-years (DALYs), and healthy life expectancy (HALE) for 371 diseases and injuries in 204 countries and territories and 811 subnational locations, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet*. 2024;403(10440):2133-2161. doi:10.1016/S0140-6736(24)00757-8

26. US census populations with bridged race categories. Centers for Disease Control and Prevention. October 28, 2022. Accessed April 29, 2024. https://www.cdc.gov/nchs/nvss/bridged_race.htm

27. County population by characteristics: 2020-2022. US Census Bureau. Accessed April 29, 2024. https://www.census.gov/data/datasets/time-series/demo/popest/2020s-counties-detail.html

28. Hauer ME. Population projections for US counties by age, sex, and race controlled to shared socioeconomic pathway. *Sci Data*. 2019;6(1):190005. doi:10.1038/sdata.2019.5

29. GBD 2021 Demographics Collaborators. Global age-sex-specific mortality, life expectancy, and population estimates in 204 countries and territories and 811 subnational locations, 1950-2021, and the impact of the COVID-19 pandemic: a comprehensive demographic analysis for the Global Burden of Disease Study 2021. *Lancet*. 2024;403(10440):1989-2056. doi:10.1016/S0140-6736(24)00476-8

30. R: The R Project for Statistical Computing. Accessed February 20, 2024. https://www.r-project.org/

31. Ward ZJ, Bleich SN, Cradock AL, et al. Projected US state-level prevalence of adult obesity and

severe obesity. *N Engl J Med*. 2019;381(25):2440-2450. doi:10.1056/NEJMsa1909301

32. Zhao L, Park S, Ward ZJ, Cradock AL, Gortmaker SL, Blanck HM. State-specific prevalence of severe obesity among adults in the US using bias correction of self-reported body mass index. *Prev Chronic Dis*. 2023;20:E61. doi:10.5888/pcd20.230005

33. Ng M, Dai X, Cogen RM, et al; GBD 2021 US Obesity Forecasting Collaborators. National-level and state-level prevalence of overweight and obesity among children, adolescents, and adults in the USA, 1990-2021, and forecasts up to 2050. *Lancet*. 2024;404(10469):2278-2298. doi:10.1016/S0140-6736(24)01548-4

34. Ng M, Gakidou E, Lo J, et al; GBD 2021 Adult BMI Collaborators. Global, regional, and national prevalence of adult overweight and obesity, 1990-2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021. *Lancet*. 2025;405(10481):813-838. doi:10.1016/S0140-6736(25)00355-1

35. Jeong SM, Lee DH, Rezende LFM, Giovannucci EL. Different correlation of body mass index with body fatness and obesity-related biomarker according to age, sex and race-ethnicity. *Sci Rep*. 2023;13(1):3472. doi:10.1038/s41598-023-30527-w

36. Rubino F, Cummings DE, Eckel RH, et al. Definition and diagnostic criteria of clinical obesity. *Lancet Diabetes Endocrinol*. 2025;13(3):221-262. doi:10.1016/S2213-8587(24)00316-4

37. Elmaleh-Sachs A, Schwartz JL, Bramante CT, Nicklas JM, Gudzune KA, Jay M. Obesity management in adults: a review. *JAMA*. 2023;330(20):2000-2015. doi:10.1001/jama.2023.19897

38. Bailey ZD, Krieger N, Agénor M, Graves J, Linos N, Bassett MT. Structural racism and health inequities in the USA: evidence and interventions. *Lancet*. 2017;389(10077):1453-1463. doi:10.1016/S0140-6736(17)30569-X

39. Bower KM, Thorpe RJ Jr, Rohde C, Gaskin DJ. The intersection of neighborhood racial segregation, poverty, and urbanicity and its impact on food store availability in the United States. *Prev Med*. 2014;58:33-39. doi:10.1016/j.ypmed.2013.10.010

40. Benusic M, Cheskin LJ. Obesity prevalence in large US cities: association with socioeconomic indicators, race/ethnicity and physical activity. *J Public Health (Oxf)*. 2021;43(1):148-154. doi:10.1093/pubmed/fdz077

41. Whitfield GP, Carlson SA, Ussery EN, et al. Racial and ethnic differences in perceived safety barriers to walking, United States National Health Interview Survey—2015. *Prev Med*. 2018;114:57-63. doi:10.1016/j.ypmed.2018.06.003

42. Mujahid MS, Diez Roux AV, Shen M, et al. Relation between neighborhood environments and obesity in the Multi-Ethnic Study of Atherosclerosis. *Am J Epidemiol*. 2008;167(11):1349-1357. doi:10.1093/aje/kwn047

43. Gamble S, Mawokomatanda T, Xu F, et al. Surveillance for certain health behaviors and conditions among states and selected local areas—Behavioral Risk Factor Surveillance System, United States, 2013 and 2014. *MMWR Surveill Summ*. 2017;66(16):1-144. doi:10.15585/mmwr.ss6616a1

44. Lee SH, Moore LV, Park S, Harris DM, Blanck HM. Adults meeting fruit and vegetable intake recommendations—United States, 2019. *MMWR Morb Mortal Wkly Rep*. 2022;71(1):1-9. doi:10.15585/mmwr.mm7101a1

45. Brown E, Heerspink HJL, Cuthbertson DJ, Wilding JPH. SGLT2 inhibitors and GLP-1 receptor agonists: established and emerging indications. *Lancet*. 2021;398(10296):262-276. doi:10.1016/S0140-6736(21)00536-5

46. Mahajan S, Caraballo C, Lu Y, et al. Trends in differences in health status and health care access and affordability by race and ethnicity in the United States, 1999-2018. *JAMA*. 2021;326(7):637-648. doi:10.1001/jama.2021.9907

47. SPAN Program, 2023-2028. Centers for Disease Control and Prevention. Published October 25, 2023. https://www.cdc.gov/span/php/about/index.html

48. Novak NL, Brownell KD. Role of policy and government in the obesity epidemic. *Circulation*. 2012;126(19):2345-2352. doi:10.1161/CIRCULATIONAHA.111.037929

49. Bacong AM, Gibbs SL, Rosales AG, et al. Obesity disparities among adult single-race and multiracial Asian and Pacific Islander populations. *JAMA Netw Open*. 2024;7(3):e240734. doi:10.1001/jamanetworkopen.2024.0734

50. Zhao G, Hsia J, Vigo-Valentín A, Garvin WS, Town M. Health-related behavioral risk factors and obesity among American Indians and Alaska Natives of the United States: assessing variations by Indian Health Service region. *Prev Chronic Dis*. 2022;19:E05. doi:10.5888/pcd19.210298