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Racial/Ethnic Disparities in Hypertension Prevalence, Awareness, Treatment, and Control in the United States, 2013–2018

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Abstract

We evaluated the prevalence, awareness, treatment, and control of hypertension (defined as a systolic blood pressure [BP]) ≥140 mm Hg, diastolic BP ≥90 mm Hg, or a self-reported use of an antihypertensive agent) among US adults, stratified by race/ethnicity. This analysis included 16,531 non-pregnant US adults (≥18 years) in the three National Health and Nutrition Examination Survey (NHANES) cycles between 2013 and 2018. Race/ethnicity was defined by self-report as White, Black, Hispanic, Asian, or other Americans. Among 76,910,050 (74,449,985–79,370,115) US adults with hypertension, 48.6% (47.3%−49.8%, unadjusted) have controlled BP. When compared with BP control rates for White adults (49.0% [46.8%−51.2%], age-adjusted), BP control rates are lower in Black (39.2%, adjusted Odds Ratio [aOR]: 0.71 [95% CI: 0.59–0.85], P<0.001), Hispanic (40.0%, aOR: 0.71 [95% CI: 0.58–0.88], P=0.003), and Asian (37.8%, aOR: 0.68 [95% CI: 0.55–0.84 P=0.001) Americans. Black adults have higher hypertension prevalence (45.3% vs 31.4%, aOR: 2.24 [95% CI: 1.97–2.56], P<0.001) but similar awareness and treatment rates as White adults. Hispanic adults have similar hypertension prevalence, but lower awareness (71.1% vs 79.1%, aOR: 0.72 [0.58–0.89], P=0.005) and treatment rates (60.5% vs 67.3%, aOR: 0.78 [95% CI: 0.66–0.94], P=0.010) than White adults. Asian adults have similar hypertension prevalence, lower awareness (72.5% vs 79.1%, aOR: 0.75 [0.58–0.97], P=0.038), but similar treatment rates. Black, Hispanic, and Asian Americans have

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different vulnerabilities in the hypertension control cascade of prevalence, awareness, treatment, and control. These differences can inform targeted public health efforts to promote health equity and reduce the burden of hypertension in the US.

Keywords

Hypertension; Blood Pressure Control; Blood Pressure Cascade; Racial/ethnic Disparities; Health Equity

INTRODUCTION

One in three US adults has hypertension, and half of these individuals having uncontrolled blood pressure (BP).[1,2] Hypertension is the leading cause of morbidity and mortality in the US, and generates more than 51.2 billion dollars in healthcare costs annually.[3,4] Despite improvement in hypertension control in the 1990s and early 2000s, BP control rates have recently worsened.[5] Recognizing the large public health burden of this shift in trajectory, the US Surgeon General recently issued a call to action to reduce the national burden of hypertension.[6] This call to action advocates for targeted efforts to improve BP control in racial and ethnic minority groups, as individuals in these groups have disproportionately poor rates of hypertension control.[6]

Muntner and colleagues previously reported significant differences in hypertension control rates among Black adults and suggested poorer rates of control among Asian and Hispanic adults, when compared to White adults.[5] Our study builds upon this work by evaluating disparities in hypertension control by evaluating disparities at each step of the hypertension control cascade: prevalence, awareness, treatment, and control. Understanding where BP control fails for each race/ethnic group allows targeted strategies to improve hypertension treatment, but prior studies were unable to examine all of these outcomes for multiple racial/ethnic groups.[5] Our study addresses this key gap in hypertension surveillance by providing contemporary national estimates of the prevalence, awareness, treatment, and control of hypertension among major US race/ethnicity groups.

METHODS

Data Source:

All data are publicly available from the National Center for Health Statistics.[7] All analyses were conducted with R statistical software version 3.5.2.[8] We used the “survey” package to account for the survey design when computing mean values, proportions, and 95% confidence intervals.[9] All analytical scripts are available on request.

The National Health and Nutrition Examination Survey (NHANES) is a cross-sectional population-based survey conducted by the US Centers for Disease Control and Prevention, with in-person physical examinations conducted in 2-year cycles.[7] The survey is conducted with a multistage, probability sampling design that is designed to generate nationally representative rates of disease burden, treatment, and control. All participants provided

written informed consent. NHANES was approved by the National Center for Health Statistics Research Ethics Review Board.

Inclusion Criteria:

We pooled data from 28,061 individuals included in NHANES 2013–2018. We excluded individuals who were younger than 18 years of age (n=10,869), were pregnant (n=190), or did not have a BP measurement recorded (n=471). The final study cohort consisted of 16,531 US adults.

Measures and Outcomes:

Age, sex, and race/ethnicity were determined by self-report. Race/ethnicity were categorized as White American (non-Hispanic White American), Black American (non-Hispanic Black American), Hispanic American, Asian American, and other race/ethnicity.

In NHANES, BP was measured using manual sphygmomanometry by trained physicians. Upper arm circumference was measured to determine correct cuff size. Each individual was instructed to rest in a seated position for five minutes, after which three BP measurements were taken. The mean of the three systolic measurements and the mean of the three diastolic measurements was recorded as the BP for that individual.[7] If an individual had fewer than three measurements systolic or diastolic measurements, the mean of available measurements was used.

Prevalence, awareness, treatment, and control was defined similarly to past reports.[10–13] Hypertension was defined as having at least one of three criteria: systolic BP greater than or equal to 140 mm Hg, diastolic BP of greater than or equal to 90 mm Hg, or currently taking any prescription medication to lower BP. To be consistent with prior reports from the US Centers for Disease Control and Prevention, this definition was chosen as the primary outcome in place of the newer definition using lower thresholds for hypertension.[13,14] The prevalence of hypertension was calculated as the proportion of US adults meeting criteria for hypertension.

Awareness of hypertension was determined by an individual's response to the question, "Have you ever been told by a doctor or other health professional that you had hypertension, also called high blood pressure?" We calculated the proportion of study participants who met the primary definition of hypertension who were aware of their diagnosis. Of note, awareness differs from diagnosis, as it is feasible that adults diagnosed with the disease may be unaware of the disease.

Treatment of hypertension was defined as an affirmative response to all of the following questions: 1) "Have you ever been told by a doctor or other health professional that you had hypertension, also called high blood pressure?", 2)"Because of your high blood pressure/ hypertension, have you ever been told by a doctor or other health professional to take prescribed medication?", and 3) "Are you now taking prescribed medication." We calculated the proportion of study participants who met the primary definition of hypertension who were receiving treatment.

Hypertension control was determined as the proportion of patients with hypertension who had an average systolic and diastolic BP at goal (a systolic BP of less than 140 mm Hg and a diastolic BP of less than 90 mm Hg). We calculated the proportion of study participants who met the primary definition of hypertension whose BP was controlled (regardless of treatment status). In a sensitivity analysis, we also estimated hypertension control among adults on hypertension treatment.

In the analyses, the primary outcomes were prevalence, awareness, treatment, and control. Differences in the outcomes were determined, after age-sex adjustment, by race/ethnicity, with White Americans as the reference group.

Statistical Analyses:

We followed the NHANES Analytic and Reporting Guidelines.[7] Our analysis adheres to evaluation methods proposed by the Centers for Disease Control and Prevention in order to present results that are comparable to prior surveillance studies.[10–13] We compared differences by race/ethnic group for the outcomes using logistic regression, adjusting the analyses for age and sex. To examine whether each outcome varied by sex within each race/ethnicity, we introduced an interaction term between sex and race/ethnicity in the logistic regression model as follows:

$$outcome \sim age + sex + race/ethnicity + race/ethnicity * sex$$

Patients with missing BP information were excluded. No correction for missing data was applied as no study participants had missing age, sex, or race/ethnicity data, and fewer than 5% of study participants had missing BP measurements. To provide contemporary estimates, all age-adjusted estimates were adjusted to the 2018 US census population estimate,[15] contrary to prior estimates which standardized to the 2000 US census population.[5,10,11] A P threshold of <0.05 was used for significance.

RESULTS

US Population:

In 2013–2018, 76,910,050 (95% CI: 72,088,412–81,731,689, unadjusted) US adults had hypertension, representing 33.0% (95% CI: 31.5%−34.5%, unadjusted) of the US adult population. Among individuals with hypertension, 81.6% (95% CI: 80.0%−83.2%, unadjusted) were aware of their diagnosis, 73.1% (95% CI: 71.3%−75.0%, unadjusted) were on treatment, and 48.6% (95% CI: 46.1%−51.0%, unadjusted) had controlled BP. Baseline characteristics of individuals with hypertension are presented by race/ethnicity in Table 1 while unadjusted prevalence, awareness, treatment, and awareness rates by race/ethnicity are presented in Table 2.

White Americans

Among White Americans, 31.4% (95% CI: 29.7%−33.2%, age-adjusted) had hypertension, and of these individuals, 79.1% (95% CI: 75.9%−82.4%, age-adjusted) were aware of their diagnosis, 67.3% (95% CI: 63.3%−71.4%, age-adjusted) were on treatment, and 49.1%

(95% CI: 44.6%−53.6%, age-adjusted) had controlled BP (Table 3). Rates are presented by sex in Figure 1.

Black Americans

Compared with White Americans, Black Americans had higher hypertension prevalence (45.3%, adjusted odds ratio [aOR]: 2.24 [95% CI: 1.97–2.56], P<0.001), similar rates of awareness (79.7%, aOR: 1.18 [0.94–1.48], P=0.164) and treatment (67.1%, aOR: 1.14 [95% CI: 0.93–1.39], P=0.23), but lower control rates (39.2%, aOR: 0.71 [95% CI: 0.59–0.85], P<0.001). Black women had increased hypertension prevalence than Black men (P for Interaction = 0.005), but there were no other statistical differences by sex in hypertension awareness, treatment, or control (Supplemental Table S1).

Hispanic Americans:

Compared with White Americans, Hispanic Americans had similar hypertension prevalence (31.6%, adjusted odds ratio [aOR]: 0.98 [95% CI: 0.85–1.13], P=0.77), but lower rates of awareness (71.1%, aOR: 0.72 [0.58–0.89], P=0.005), treatment, (60.5%, aOR: 0.78 [95% CI: 0.66–0.94], P=0.010), and control (40.0%, aOR: 0.71 [95% CI: 0.58–0.88], P=0.003). There was no statistically significant difference between men and women in any stage of the BP cascade in this subgroup (Supplemental Table S1).

Asian Americans:

Asian Americans, when compared to White Americans, had similar hypertension prevalence (31.8%, adjusted odds ratio [aOR]: 1,00 [95% CI: 0.87–1.16], P=0.96), lower awareness (72.5%, aOR: 0.75 [0.58–0.97], P=0.038), similar treatment rates, (58.8%, aOR: 0.81 [95% CI: 0.65–1.00], P=0.06), and lower control rates (37.8%, aOR: 0.68 [95% CI: 0.55–0.84], P=0.001). There was no statistically significant difference between men and women in any stage of the BP cascade in this subgroup (Supplemental Table S1).

Results for other Americans are presented in Table 3 and Supplemental Table S1. Rates of hypertension control among adults on treatment are presented in Supplemental Table S2.

DISCUSSION

In the US, more than 35 million adults have uncontrolled BP, representing one-half of the adult population with hypertension. We find that in the US population, rates of hypertension awareness and treatment are high (81.6% and 73.1%, respectively), though hypertension control rates are low (48.6%). Our study provides key insights into differences in the causes of uncontrolled hypertension among racial/ethnic groups in the US. Black Americans, Hispanic Americans, and Asian Americans have substantially lower rates of BP control than White Americans. Though prior reports have suggested this to be the case,[5,16] we identify substantial differences in the BP control cascade by race/ethnicity, which may inform the development of targeted interventions. Among White Americans, there are substantial drop-offs at each step of the hypertension cascade: awareness (79.1%) to treatment (67.3%) to control (49.1%). Black Americans have the highest prevalence of any race/ethnicity group, and although rates of awareness and treatment are similar to White Americans, rates of

BP control are significantly lower. Hispanic adults have similar prevalence compared with White adults, but lower rates of awareness, treatment, and control. Asian Americans have lower awareness and control rates compared to White Americans, despite having similar treatment rates. Based on these findings, targeted strategies can be designed for achieving BP prevention and control by addressing specific barriers encountered by each racial/ethnic group.

Our study supports prior research demonstrating that Black adults have higher hypertension prevalence than White adults. Additionally, Black women have the highest prevalence of hypertension, when compared to White Americans.[17] While differences in diet and lifestyle may contribute to this, socioeconomic factors to accessing healthy food, exercise, and quality healthcare likely increase the burden of hypertension among Black Americans.[18,19]

The downstream consequences of inadequate hypertension control among Black Americans are substantial: Black Americans experience five times the mortality risk from hypertension compared with White Americans,[20] making it critical to understand the sources of differential control and develop targeted strategies to address them. The finding that Black Americans have lower rates of control is unlikely related to awareness and treatment rates in Black Americans based on our findings. These findings are likely secondary to health system-, physician-, and patient-related factors. Prior work has raised concern that physicians treat Black patients differently than White patients;[21] whether this discrimination results in increased therapeutic inertia – a key barrier to effective BP control – should be examined in future studies.[18,22] Prior reports disagree about whether therapeutic inertia varies by race/ethnicity. Further work on this topic may clarify whether this contributes to racial/ethnic differences in BP control.[22,23] These disparities may also be the result of socioeconomic inequality, as low- income patients face greater barriers to access health care and may be less able to afford the copay on hypertension medications. Due to a history of systemic racism and structural inequalities, Black communities have lower trust in the healthcare system, which necessitate a different approach to care, such as models of care that shift hypertension management for Black adults into the community. An example is the Los Angeles Barbershop BP Study—Black men who received pharmacist-led hypertension treatment in Black-owned barbershops were able to achieve a 20.8 mm Hg greater BP reduction at 12 months compared with the control arm.[24,25] Scaling up this model nationally has the potential to avert one in three major adverse cardiovascular events among enrolled Black men and is likely cost effective.[26–28]

Hispanic Americans have lower awareness, treatment, and control rates compared with White adults, which was not identified in recent surveillance reports.[5,16] Certain systemic barriers affect Hispanic Americans disproportionately, which may translate into these failures in the hypertension control cascade. For example, Hispanic Americans have lower rates of health insurance than White Americans,[29] precluding access to high-quality primary care for diagnosing, treating, and monitoring hypertension. Expanding insurance access to affordable clinic visits, increasing reimbursement for telemedicine visits, and reducing copayments for BP medications may improve population-level BP control.[30,31] Limited English proficiency is another healthcare barrier faced by Hispanic Americans, with 29.8% of Hispanic Americans reporting poor fluency in English, which is associated with higher

rates of undiagnosed or uncontrolled hypertension.[32] Spanish-speaking patients who receive care from physicians with Spanish fluency are more likely to be counseled on diet and exercise, highlighting the importance of language concordance in promoting lifestyle modifications.[32] Further, culturally cognizant lifestyle interventions may be effective in increasing the rates of hypertension control. For instance, a small pilot study of 17 Hispanic Americans found that weekly motivational interviews conducted in Spanish with culturally tailored educational materials resulted in lower blood pressure at 6 weeks (systolic BP −10.3 mmHg, SD 10.6 mmHg).[33] Community health workers in Hispanic communities, commonly known as *Promotores de salud*, could be effective allies in identifying Hispanic American health needs and delivering effective outcome interventions.[34] Ongoing investigation of culturally adapted interventions for hypertension control among Hispanic Americans is needed and scaling up of effective programs should be prioritized.

We find that Asian Americans have lower awareness of their hypertension and lower control rates than White Americans, despite having similar treatment rates. Asian Americans have the highest health insurance rates of any racial or ethnic group in the US,[35] which may contribute to similar rates of hypertension treatment between White adults and Asian adults despite lower rates of hypertension unawareness. Further, treatment rates likely do not explain differences in hypertension control for Asian Americans. Similar to the Hispanic population, limited English proficiency is a major challenge for Asian Americans, with 32.6 percent of Asian Americans lacking fluency in English.[36] Small pilot studies have shown the feasibility and effectiveness of community-based interventions and public health messaging to reduce language and cultural barriers to treat hypertension among Asian Americans.[37,38] As some Asian American communities have high-salt diets and exercise less regularly than other racial/ethnic groups,[39] lifestyle interventions to may be particularly important in improving BP control. Further studies among subgroups of Asian Americans is needed to better understand these differences. As Asian Americans have high rates of cardiovascular disease,[40] efforts to target hypertension could result in substantial downstream health improvements.

Overall, the universally lower hypertension control rates among all racial/ethnic groups underscore the clinically significant health inequity in the US. “Further, our prevalence estimate – 77 million US adults with hypertension –uses the more conservative definition of hypertension (BP ≥ 140/90 mmHg). The estimated prevalence would be substantially higher with a more stringent definition of hypertension (BP ≥ 130/80 mmHg).” Structural factors, including racial discrimination, socioeconomic inequity, and differences in access to healthcare, are likely impeding health progress in minority groups.[41] Even though adults in certain racial/ethnic groups have similar treatment rates to White adults, they still experience lower rates of hypertension control—revealing that prior strategies focusing primarily on improving rates of awareness or treatment rates are inadequate. Further, addressing differences in trust for the health system and incorporating cultural understanding into care may improve BP control in the long-run, but will require substantial investments in reversing the systemic inequities and discrimination that continues to hamper care of minority individuals.

Our study has a few limitations. First, our findings are based on survey data and thus we cannot exclude response bias. The objective parameters used for BP determination, however, make this less of a concern. Second, the cross-sectional design of NHANES precludes the evaluation of downstream clinical outcomes related to uncontrolled BP. However, the influence of poor hypertension control on health outcomes has been well established in prior epidemiologic studies and clinical trials[42–46] Third, we were unable to evaluate differences in the hypertension cascade among Asian American or Hispanic subgroups, such as Filipino or Indian Americans. Racial subgroups may have substantial differences based on genetics, diet, and acculturation, and may face unique challenges in receiving adequate hypertension treatment. Fourth, available data precluded the evaluation of individuals of multiple race/ethnic groups. Fifth, we were unable to assess the effects of adherence on hypertension control.

Perspectives:

In summary, in the United States, Black, Hispanic, and Asian adults have substantially lower BP control rates than White adults, with significant racial/ethnic differences in each step of the hypertension control cascade of hypertension prevalence, awareness, treatment, and control. Black adults have higher hypertension prevalence but similar awareness and treatment rates as White adults. Hispanic adults compared to White adults have lower awareness and treatment rates, despite similar hypertension prevalence. Asian Americans have lower awareness rates than White Americans despite similar prevalence and treatment rates. As rates of uncontrolled hypertension in the US are rising, with racial/ethnic minority individuals being disproportionately impacted by hypertension, targeted public health efforts that by race/ethnicity may reduce health disparities and decrease the overall population burden of hypertension.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Novelty and Significance:

1. What is new? Black Americans have the highest prevalence of hypertension, while rates of awareness and treatment are similar to White Americans. Hispanic adults have similar prevalence compared with White adults, but lower rates of awareness and treatment. Asian Americans have lower awareness rates compared to White Americans, despite having similar prevalence and treatment rates.
2. What is relevant? In the United States, hypertension control rates in Black, Hispanic, and Asian adults are substantially lower than in White adults.
3. Summary: Differences in the hypertension control cascade of prevalence, awareness, and treatment by race/ethnicity can be targeted to improve hypertension control in the United States.

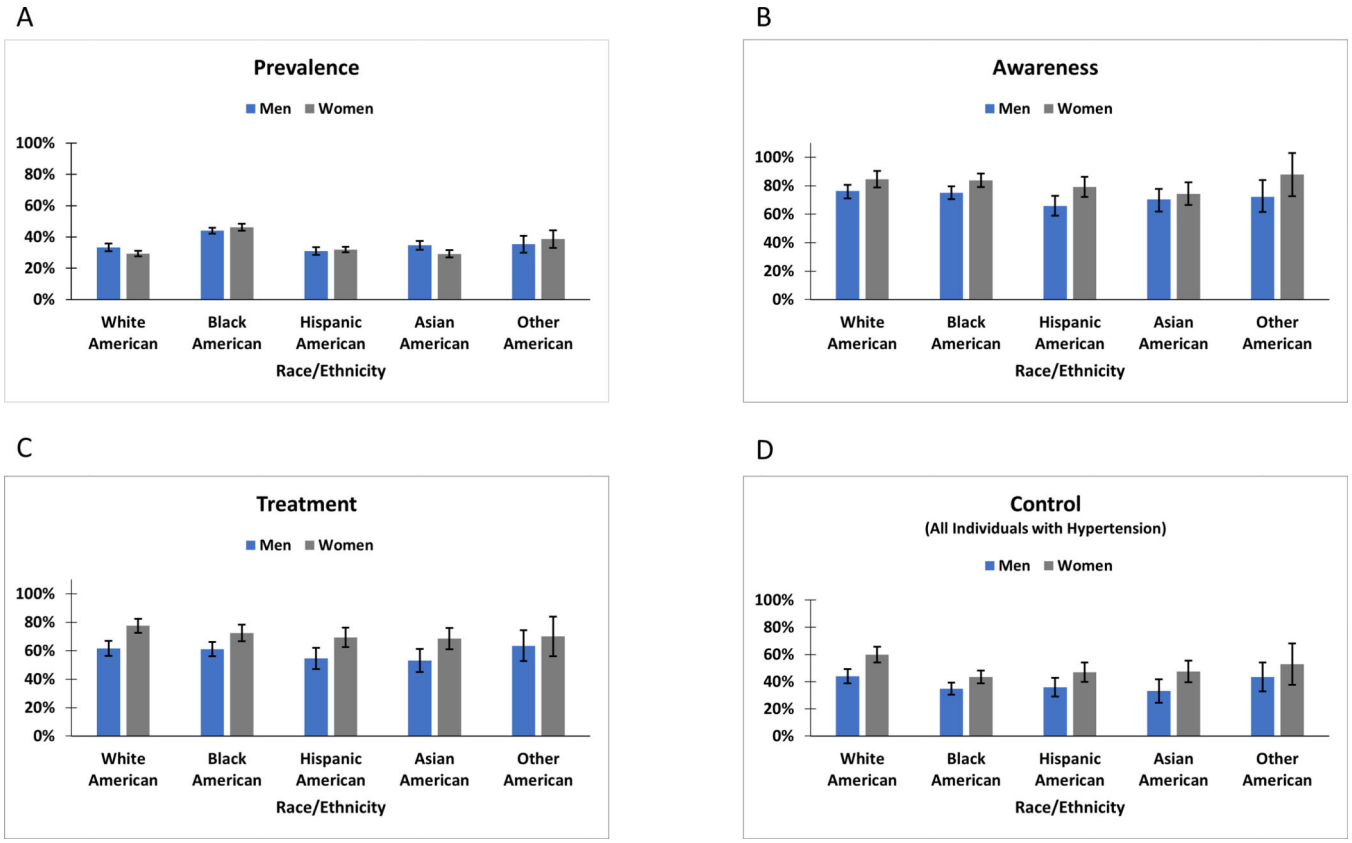

Figure 1. Blood Pressure Control Cascade in the United States by Race & Sex

In the primary analyses, hypertension prevalence was defined as a systolic blood pressure (BP) of 140 mm Hg or greater, a diastolic BP of 90 mm Hg or greater, or an individual taking an antihypertensive. Hypertension awareness and treatment were based on self-report. Hypertension control was defined as having a systolic and diastolic BP below the diagnostic threshold. All estimates were for non-pregnant US adults age 18 years or older in the National Health and Nutrition Examination Survey (2013–2018). Estimates were age-adjusted to the 2018 US census. Race/ethnicity and sex were determined by self-report.

A) Hypertension Prevalence

B) Hypertension Awareness

C) Hypertension Treatment

D) Hypertension Control

Table 1:

Demographic Characteristics of US Adults with Hypertension

Demographic characteristics are presented for US adults with hypertension. Hypertension was defined as a blood pressure ≥140 mm Hg systolic and/or ≥90 mm Hg diastolic, or an individual taking an antihypertensive. Any individual that did not self-identify with the race categories presented was defined as other race.

Characteristics	Race/Ethnicity	White American	Hispanic American	Black American	Asian American	Other
n *		51,083,185 (48,209,678, 53,956,692)	8,373,642 (7,496,088, 9,251,196)	11,061,686 (10,129,312, 11,994,060)	3,575,534 (3,212,562, 3,938,506)	2,816,005 (2,466,920, 3,165,090)
	(%)	66.4% (64.4%, 68.5%)	10.9% (9.7%, 12.1%)	14.4% (13.0%, 15.8%)	4.6% (4.1%, 5.2%)	3.7% (3.2%, 4.1%)
Age (mean)		61.9 (61.6, 62.3)	55.9 (55.3, 56.6)	56.6 (56.1, 57.1)	59.5 (58.7, 60.4)	57.1 (55.9, 58.3)
Women (%)		50.2% (49.0%, 51.4%)	51.5% (49.6%, 53.3%)	56.9% (55.9%, 57.8%)	49.7% (48.0%, 51.4%)	46.2% (41.0%, 51.4%)
Systolic Blood Pressure (mmHg)						
	Mean	135.9 (135.4, 136.5)	139.6 (138.8, 140.5)	141.0 (140.5, 141.6)	140.3 (139.5, 141.0)	134.7 (132.9, 136.6)
	<120	20.9% (19.7%, 22.1%)	14.6% (13.1%, 16.0%)	13.8% (12.7%, 15.0%)	10.4% (9.0%, 11.7%)	24.4% (20.2%, 28.6%)
	120–129	17.8% (16.5%, 19%)	16.7% (15.7%, 17.7%)	15.6% (14.7%, 16.5%)	17.9% (16.1%, 19.7%)	23.4% (19.4%, 27.4%)
	130–139	17.9% (16.7%, 19.2%)	17.9% (16.5%, 19.3%)	19.1% (18.1%, 20.1%)	20.4% (18.0%, 22.7%)	11.5% (8.6%, 14.4%)
	140–159	33.7% (32.2%, 35.1%)	38.5% (36.8%, 40.2%)	36.3% (34.9%, 37.8%)	38.8% (36.5%, 41.1%)	29.2% (24.7%, 33.8%)
	≥160	9.7% (9.0%, 10.4%)	12.4% (11.0%, 13.8%)	15.1% (14.2%, 16.0%)	12.5% (11.3%, 13.8%)	11.5% (8.9%, 14.1%)
Diastolic Blood Pressure (mmHg)						
	Mean	72.8 (72.3, 73.3)	76.1 (75.3, 76.9)	76.6 (76.0, 77.2)	76.3 (75.6, 77.1)	75.8 (75.0, 76.7)
	<80	68.5% (66.7%, 70.2%)	59.6% (56.9%, 62.3%)	57.5% (55.8%, 59.1%)	57.1% (54.6%, 59.7%)	67.6% (63.9%, 71.3%)
	80–89	18.3% (17.3%, 19.3%)	18.9% (17.4%, 20.4%)	21.5% (20.2%, 22.7%)	24.7% (22.7%, 26.6%)	14.5% (11.4%, 17.7%)
	90–119	12.8% (11.5%, 14%)	20.8% (18.7%, 23%)	20.1% (18.5%, 21.8%)	17.4% (15.4%, 19.4%)	16.4% (13.3%, 19.5%)
	≥120	0.4% (0.2%, 0.7%)	0.7% (0.4%, 0.9%)	1.0% (0.8%, 1.2%)	0.9% (0.4%, 1.3%)	1.4% (0.5%, 2.3%)
Body Mass Index (mean)		31.4 (31.2, 31.6)	32.1 (31.9, 32.4)	32.8 (32.6, 33)	26.6 (26.5, 26.8)	32.4 (31.8, 33.1)
Diabetes (%)		21.6% (20.8%, 22.4%)	26.9% (25.1%, 28.6%)	24.3% (23.1%, 25.5%)	26.2% (24.1%, 28.2%)	27.4% (23.6%, 31.1%)
Uninsured (%)		6.3% (5.5%, 7.2%)	19.4% (17.7%, 21.1%)	13.2% (12%, 14.5%)	8.1% (7.0%, 9.2%)	8.3% (6.1%, 10.5%)

* Projected US population with hypertension in each race/ethnic group.

Table 2:

Blood Pressure Control Cascade by Race/Ethnicity (Crude Rates)

Unadjusted prevalence, awareness, treatment, and control rates are presented by race/ethnicity. Hypertension was defined as a blood pressure ≥140 mm Hg systolic and/or ≥90 mm Hg diastolic, or an individual taking an antihypertensive. Control was defined as a blood pressure <140 mm Hg systolic and <90 mm Hg diastolic in individuals with hypertension. Awareness and treatment were based on self-report. Any individual that did not self-identify with the race categories presented was defined as other race.

Race/Ethnicity	Prevalence	Awareness	Treatment	Control
Overall	33.0% (31.5%, 34.5%)	81.6% (80%, 83.2%)	73.1% (71.3%, 75.0%)	48.6% (46.1%, 51.0%)
White American	34.2% (32.2%, 36.3%)	82.4% (80.2%, 84.6%)	74.3% (71.5%, 77.0%)	51.1% (47.7%, 54.5%)
Black American	41.8% (39.7%, 43.9%)	83.6% (81.7%, 85.6%)	74.3% (72.1%, 76.6%)	42.7% (39.7%, 45.7%)
Hispanic American	23.5% (21.4%, 25.6%)	75.3% (72.3%, 78.3%)	66.2% (63.3%, 69.0%)	42.4% (38.9%, 45.9%)
Asian American	27.8% (25.2%, 30.4%)	77.1% (73.0%, 81.3%)	68.7% (64.5%, 73.0%)	41.4% (37.7%, 45.1%)
Other American	32.0% (26.3%, 37.7%)	83.8% (78.2%, 89.3%)	74.4% (69%, 79.7%)	52.0% (44.2%, 59.8%)

Table 3:

Blood Pressure Control Cascade by Race/Ethnicity (Rates Adjusted to the 2018 US Population)

Prevalence, awareness, treatment, and control are presented by race/ethnicity. Hypertension was defined as a blood pressure ≥140 mm Hg systolic and/or ≥90 mm Hg diastolic, or an individual taking an antihypertensive. Control was defined as a blood pressure <140 mm Hg systolic and <90 mm Hg diastolic in individuals with hypertension. Awareness and treatment were based on self-report. Any individual that did not self-identify with the race categories presented was defined as other race. Odds ratios were adjusted for sex and age. White Americans were the reference group for comparisons. All rate estimates are age-adjusted to the 2018 census population.

	Prevalence		Awareness		Treatment		Control	
Race/Ethnicity		**Adjusted Odds Ratio***		**Adjusted Odds Ratio***		**Adjusted Odds Ratio***		**Adjusted Odds Ratio***
White American	31.4% (29.7%, 33.2%)	Reference	79.1% (75.9%, 82.4%)	Reference	67.3% (63.3%, 71.4%)	Reference	49.1% (44.6%, 53.6%)	Reference
Black American	45.3% (43.6%, 46.9%)	2.24 (1.97, 2.56)	79.7% (76.4%, 83.1%)	1.18 (0.94, 1.48)	67.2% (63.9%, 70.5%)	1.14 (0.93, 1.39)	39.2% (35.5%, 42.9%)	0.71 (0.59, 0.85)
Hispanic American	31.6% (30.0%, 33.2%)	0.98 (0.85, 1.13)	71.1% (66.8%, 75.4%)	0.72 (0.58, 0.89)	60.5% (56.2%, 64.7%)	0.78 (0.66, 0.94)	40.0% (35.5%, 44.4%)	0.71 (0.58, 0.88)
Asian American	31.8% (29.9%, 33.6%)	1.00 (0.87, 1.16)	72.5% (67.2%, 77.8%)	0.75 (0.58, 0.97)	58.8% (53.8%, 63.8%)	0.81 (0.65, 1)	37.8% (33%, 42.6%)	0.68 (0.55, 0.84)
Other American	36.6% (32.5%, 40.8%)	1.33 (1, 1.76)	78.5% (71.4%, 85.6%)	1.21 (0.79, 1.85)	66.0% (58.6%, 73.3%)	1.15 (0.83, 1.59)	47.2% (39.2%, 55.1%)	1.05 (0.75, 1.48)

*Age-sex adjusted