

HYPERTENSION IN BLACKS: A LITERATURE REVIEW

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Hypertension is a major risk factor for heart disease and stroke, the first and third-leading causes of death in the United States. This review discusses the magnitude of the problem, its epidemiology, and the evaluation and management of hypertension as recommended by the reports of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. Activities related to the control of this disorder are also highlighted.

Data from the Third National Health and Nutrition Examination Survey, 1998–1994, (NHANESIII) suggest approximately three-quarters (75%) of Black hypertensives are aware of their diagnosis, but only 57% are treated and just 25% have their blood pressure under control (<140 mm Hg systolic and <90 mm Hg diastolic). Although substantial evidence indicates a significant increase in awareness of hypertension over the past three decades, control rates are remarkably low, particularly among Blacks.

This review serves to emphasize and reiterate the burden of hypertension among Blacks and acts as a reminder of the need for additional research to determine if culturally competent interventions are appropriate to prevent, treat, and control this disease within this population. (*Ethn Dis.* 2003;13:456–462)

Key Words: Hypertension, Blacks, Epidemiology

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DISEASE BURDEN

Hypertension is a major controllable risk factor for heart disease and stroke, the first- and third-leading causes of death among adults in the United States. Coronary heart disease, stroke, congestive heart failure, various renal diseases, and peripheral vascular disease all become progressively likely as blood pressure rises, making the prevention and treatment of hypertension essential.¹ Systolic, diastolic, and pulse pressure are important predictors of cardiovascular risk.^{2,3} Blood pressure, especially systolic blood pressure rises with age. However, among older hypertensives, cardiovascular risk is more strongly related to systolic than diastolic pressure.^{4,5} In fact, more recent reports suggest an inverse association of the risk and diastolic blood pressure for any given level of systolic blood pressure.⁶

Approximately 50 million adult Americans, almost one-quarter of the population, have hypertension.⁷ Of this group, one in 3 Blacks is estimated to have hypertension.⁸ On the whole, African Americans make up about 13% of the United States population.⁹ Through its effects on the renal, cardiovascular, and central nervous systems, hypertension exacts a heavy price with annual associated deaths of about 45,000¹⁰—a toll similar to breast cancer. Significantly, Blacks are disproportionately affected. Further, hypertension is one of the most common reasons for seeking medical care, with over 35 million office visits in a recent year.¹¹ Not surprising, the total bill is staggering. In 2003, the estimated economic cost (direct and indirect) is \$50.3 billion, or approximately 15% of the total expenditure for cardiovascular disease.⁸

The high prevalence of hypertension and modifiable risk factors in the Black population constitutes a major public

health challenge. On the national front, a major goal set forth in the *Healthy People 2010*, a publication of the US Department of Health and Human Services, is to eliminate health disparities, including differences by gender, ethnicity, and other demographic variables.¹² Thus, initiatives in both the prevention and treatment of hypertension are particularly relevant in achieving this goal.

One of the earliest studies to examine ethnic differences in blood pressure was conducted in Muscogee County, Georgia by Comstock, who noted that Blacks had higher blood pressures than Whites.¹³ Subsequent studies have confirmed this finding. More recently, data from the National Health and Nutrition Examination Surveys (NHANES) have provided comprehensive information on the prevalence and risk factors for cardiovascular disease across various ethnic groups, allowing for comparison and observation of trends in a nationally representative sample. The NHANES represents the best existing national data set to study the extent of awareness, treatment, and control for hypertension.

A decline and, more recently, an increase have been observed in the overall prevalence of hypertension. Blacks still have a higher prevalence rate than the other 2 major ethnic groups (Figure 1). The most recent data from the NHANES (1999–2000) indicates an age-adjusted prevalence of 38.1% and 41.0% for Black males and females, respectively.¹⁴ As many as 30% of deaths in Black men affected by hypertension were attributable to the disease, while 20% of deaths among Black women affected by hypertension were attributable to the disease.^{8,15} Compared with Whites, Blacks have a 4.2 times risk of end-stage renal disease, a 1.8 times risk of fatal stroke, a 1.5 times risk of fatal heart disease, and a 1.3 times risk of nonfatal

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stroke.^{15,16} In addition, Blacks experience a more rapid progression to end-stage organ damage from hypertension, which has been termed “the silent-killer.” For example, the gender- and age-adjusted incidence for end stage renal disease due to hypertension is 2771 per 10 million, 8 times the rate among Whites and 3 times the rate among Native Americans and Asian Americans.¹⁷ Furthermore, hypertension, at any level, exacts a greater degree of cardiovascular and renal damage on Blacks than Whites.¹⁸ The onset of clinically significant target organ complications occurs 10–20 years earlier in life for Blacks, especially in the southeastern United States.^{19,20}

The extraordinarily high rate of morbidity and mortality associated with hypertension among Blacks has been attributed to the earlier onset of disease and a greater severity of disease-related complications, such as stroke, acute myocardial infarction, and end stage renal disease.^{15,16} In addition, the likelihood of complications is increased by a higher prevalence of certain risk factors such as obesity, stress, alcohol consumption and physical inactivity.²¹

Apart from the issue of excess morbidity and mortality, why do Blacks have an excess burden of hypertension? One answer that has been suggested is that lower socioeconomic status and a lower standard of health are to blame.²² We know that an inverse relationship has been found between socioeconomic

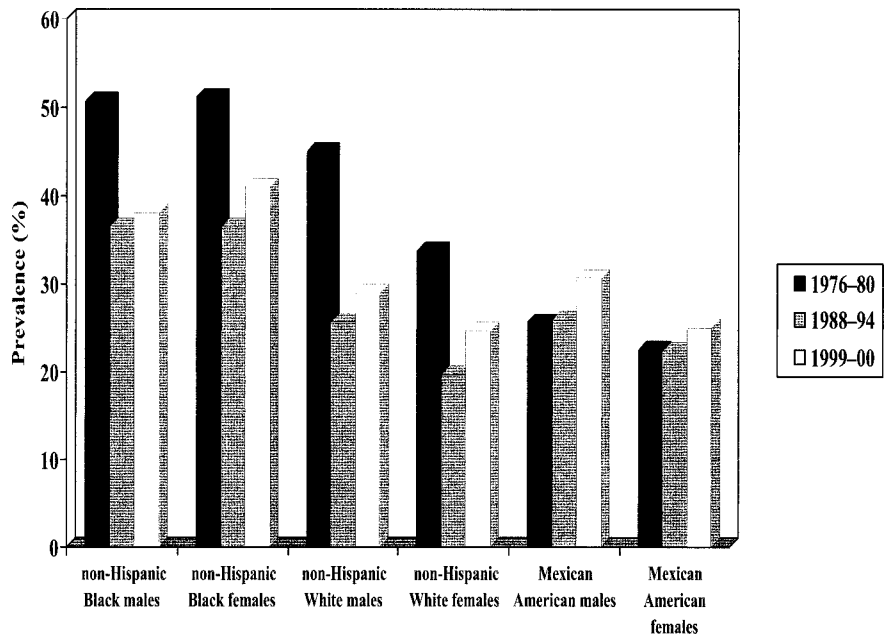


Fig 1. Trends in the age adjusted prevalence* of hypertension by gender and ethnicity in adults, United States. NHANES II (1976–1980), NHANES III (1988–1994), and NHANES (1999–2000)

* Adjusted to the 2000 standard US civilian, non-institutionalized population.
Source: Health United States, 2001. Centers for Disease Control and Prevention, the National Center for Health Statistics.

status and the risk of hypertension among Blacks,²³ and it is widely known that in the United States, a correlation exists between socioeconomic status and the adequacy of health services received. Underlying social and biological variables such as the environment, family history, and diet have important bearing on outcomes.²⁴ Other factors must also be considered in explaining the excess burden of hypertension among Blacks. For example, regarding the factor of treatment and control, population-based studies have demonstrated that Blacks are less likely to have health insurance, access to health care, less likely to receive a timely diagnosis for hypertension, and less likely to adhere to prescribed medical treatment.²⁵ According to the recent Institute of Medicine’s report,²⁶ access to care is the most important predictor of the quality of health-care across ethnic groups. Therefore, it would be most appropriate to invest time and resources to improve access to

care to reduce and eliminate the disparities in outcomes for this population.

AWARENESS, TREATMENT, AND CONTROL

The levels of awareness, treatment, and control of hypertension are defined as follows: the level of awareness is the proportion who have been told they have hypertension by a healthcare professional; the treatment level is defined as the percentage of hypertensive persons who are currently receiving anti-hypertensive therapy; and the level of control is the proportion of hypertensive persons who have a systolic blood pressure of less than 140 mm Hg and a diastolic blood pressure less than 90 mm Hg while taking hypertensive medication.²⁷ Trends over the past 3 decades in the United States show an initial increase in the rates of awareness, treatment, and control of hypertension how-

Table 1. Percentage distribution of hypertension awareness, treatment, and control in adults, United States

Ethnic Group	Hypertensives		
	Aware, %	Treated, %	Controlled, %
Non-Hispanic Black	74.0	57.0	25.0
Non-Hispanic White	70.0	54.0	24.0
Mexican American	54.0	35.0	14.0

Source: Centers for Disease Control and Prevention, the National Center for Health Statistics. Data from NHANES III, 1988-1994.

ever, this increase has leveled-off during the 1990s.²⁷ According to NHANES III, about three-quarters (74%) of Black patients with hypertension are aware of their diagnosis, but only 57% of patients are treated and, a smaller number still, only 25%, have their blood pressure levels under control (Table 1). Black hypertensive women tend to be more aware of their condition, are more likely to seek treatment and have relatively higher control rates than their male counterparts (Figure 2). As shown in the Figure, Blacks have higher awareness rates than Whites or Mexican Americans, but their treatment rates are about the same as Whites and much higher than those of Mexican Americans. Absolute control rates among Blacks, however, are similar to Whites, even though they are higher than rates in Mexican Americans. One conclusion to draw is that Blacks have a more severe form of disease.

SCREENING, MEASUREMENT, AND FOLLOW-UP

In the most recent report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure (JNC VII), hypertension is classified based on severity²⁸ (Table 2). As stated in the report, blood pressure values used to determine follow-up and treatment should be based on the mean of 2 or more blood pressure measurements properly

recorded at each of 2 or more visits after an initial screening.

Accurate measurements of blood pressure are essential for detecting and managing hypertension; the following guidelines are recommended^{15,28}:

- Patients should be seated in a chair with their backs supported and their arms bared and supported at heart level.
- Patients should refrain from smoking or ingesting caffeine during the 30 minutes preceding the measurement.
- Measurement should begin after at least 5 minutes of rest.

• An appropriate cuff size must be used to ensure accurate measurement. The bladder within the cuff should encircle at least 80% of the arm.

• A mercury sphygmomanometer is preferred, but a recently calibrated aneroid manometer or a validated electronic device can be used.

• Systolic and diastolic blood pressure should be documented. Systolic blood pressure is detected by the first appearance of sound (phase 1) and diastolic by the disappearance of sound (phase 5).

• The average of 2 or more readings 2 minutes apart should be recorded. Additional measurements are required if the first 2 readings differ by more than 5 mm Hg.

• Clinicians should explain to patients the meaning of their blood pressure readings and the need for regular follow-up.

According to JNC VI, how often patients should be screened depends on their initial blood pressure, and whether

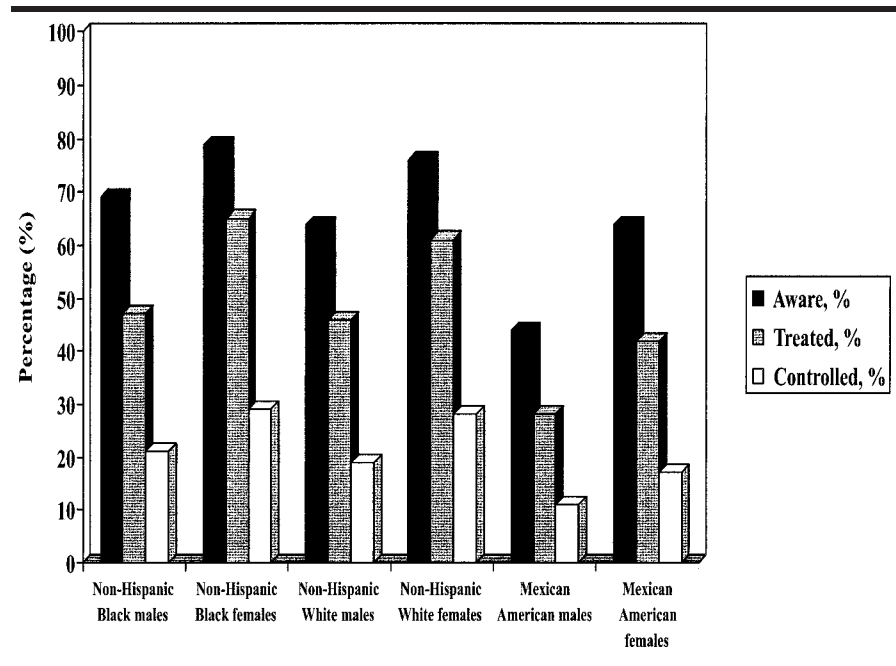


Fig 2. Hypertension awareness, treatment, and control rates by gender and ethnicity in adults, United States. (NHANES III).

Source: Centers for Disease Control and Prevention, the National Center for Health Statistics.

Table 2. Classification of hypertension for adults aged 18 years and older

Category	Systolic Blood Pressure (mm Hg)*		Diastolic Blood Pressure (mm Hg)*
Normal	<120	and	<80
Prehypertension	120–139	or	80–89
Hypertension			
Stage 1	140–159	or	90–99
Stage 2	≥160	or	≥100

Source: JNC VII (2003).

* When systolic and diastolic blood pressures fall into different categories, the higher category should be selected to classify the individual blood pressure status.

an increased level persists on follow-up (Table 3). All adults should have their blood pressure measured at least once every 2 years with follow-up, based on the level of the blood pressure reading. When the categories for systolic and diastolic blood pressure vary, the shorter follow-up period is recommended.¹⁵ For example, a patient with a blood pressure of 170/88 mm Hg should be evaluated or referred to a healthcare provider in a month since that is the shorter recommendation for these readings (recommendation for the diastolic reading is to evaluate in 1 year).

TREATMENT

Reducing blood pressure through the use of antihypertensive medications

has been shown to reduce the incidence of complications. For example, the Systolic Hypertension in the Elderly Program (SHEP) achieved reductions of 36% in the rates of both fatal and non-fatal stroke, 27% in coronary heart disease, 32% in all cardiovascular disease, and overall mortality dropped by 13%.²⁹ Treatment options can be divided into non-pharmacological and pharmacological. Non-pharmacological treatment involves lifestyle modification, which has been shown to reduce high blood pressure and greatly enhance the control of hypertension. The Dietary Approaches to Stop Hypertension (DASH) trial found that the original DASH diet especially the diet rich in fruits and vegetables, and low fat dairy products, was very effective at lowering blood pressure in minorities, mostly African Ameri-

cans, despite sodium content similar to that of the control diet.³⁰ Unquestionably, the low-sodium DASH was even more effective.^{30–32} In practice, the DASH diet will be lower in sodium than the regular diet for most individuals. Whether the DASH diet is more difficult to follow than a low-sodium diet is unclear.

The components of the DASH diet are as follows¹⁵:

- 7–8 servings of whole grains and grain products daily
- 4–5 servings of vegetables daily
- 4–5 servings of fruits daily
- 2–3 servings of low-fat or nonfat dairy foods daily
- ≤2 servings of meats, poultry, fish daily
- 4–5 servings of nuts, seeds, legumes weekly
- Limited intake of fats, sweets, and beverages containing sugar

Additional lifestyle modifications recommended for the management of hypertension include^{15,28}:

- Control or lose weight through an individualized, monitored program involving calorie restriction and increased physical activity. Maintain a healthy weight (BMI 18.5–24.9).
- Restrict sodium intake to no more than 100 mmol per day (2.4 g of sodium or 6 g of sodium chloride).
- Engage in at least 30–45 minutes of moderate aerobic physical activity on most days.
- Limit alcohol intake to no more than 1–2 drinks per day (1 oz. [30 mL] of ethanol, 24 oz. [20 mL] of beer, 10 oz [300 mL] of wine or 2 oz. [60 mL] of 100 proof whiskey per day). Women and lighter weight people should reduce these recommendations by 50%.
- Quit smoking.
- Maintain adequate potassium intake about (90 mmol per day).
- Maintain adequate intake of calcium and magnesium.
- Reduce intake of saturated fat and

Table 3. Recommendations for follow-up based on initial blood pressure measurements for adults

Initial Blood Pressure Measurement*		Follow-up Recommended†
Systolic (mm Hg)	Diastolic (mm Hg)	
<130	<85	Recheck in 2 years‡
130–139	85–89	Recheck in 1 year‡
140–159	90–99	Confirm in 2 months‡
160–179	100–109	Evaluate or refer to source of care within 1 month
≥180	≥110	Evaluate or refer to source of care immediately or within 1 week depending on clinical situation

Source: JNC VI, 1997.

* If systolic and diastolic categories are different, follow recommendations for shorter follow-up periods.

† Modify the scheduling of follow-up according to reliable information about past blood pressure measurements, other cardiovascular risk factors, or other target organ diseases.

‡ Provide advice about lifestyle modifications.

cholesterol for overall cardiovascular health.

Pharmacological Therapy

Antihypertensive medications reduce the risk of developing complications from the disease process and reduce the risk of associated morbidity and mortality. Blacks usually require multi-drug therapy because of the higher prevalence of severe forms of hypertension (Stage 3),¹⁵ but treatment should always be combined with lifestyle modifications for maximum effect. Diuretics are the drugs of choice for first-line therapy. The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) has documented the effectiveness of traditional diuretics in reducing blood pressure.³³ A recent consensus statement by the International Society on Hypertension in Blacks (ISHIB) established treatment recommendations for African-American patients.³⁴ These include: a lower blood pressure control goal of 130/80 mm Hg for patients with diabetes, or non diabetic nephropathy; the importance of the DASH diet and lifestyle changes; and using 2 or more drugs as first line therapy for most patients with blood pressures 15/10 mm Hg above the goal blood pressure to reduce the risk of end stage organ complications. Recommended combination therapy for African-American patients include beta-blocker/diuretic, Angiotensin Converting Enzyme (ACE) inhibitor/diuretic, ACE inhibitor/Calcium Channel Blocker (CCB) or Angiotensin Receptor Blocker (ARB)/diuretic.³⁴

The low rates of hypertension control among Blacks can be attributed to several factors, including poor physician-patient communication, lack of access to health care, the high cost of medication, unavailability of social support, and the patient's lack of trust in the medical system. Socioeconomic factors, as well as lifestyle factors such as heavy alcohol intake, use of illicit drugs, unemployment and lack of health in-

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urance, also contribute to low rates of hypertension control among Blacks.³⁵⁻³⁷ Studies have shown, however, that when Blacks receive sufficient treatment, they can achieve reductions in blood pressure similar to Whites and an even lower incidence of cardiovascular disease.³⁸ Unfortunately, many Blacks are unable to continue in care and to adhere to treatment until hypertension has been present for a considerable period and complications have already occurred.¹⁵ Thus, additional efforts are needed to ensure the continuity of care and adherence to therapy early on in the course of the disease.

The following strategies are recommended for the healthcare provider to improve adherence to therapy and the control of high blood pressure^{15,28}:

- Provide empathic counsel to patient in the healthcare setting.
- Encourage patient motivation.
- Be aware of signs of noncompliance.
 - Establish goal of therapy.
 - Encourage positive attitude about achieving goals.
 - Encourage lifestyle modification.
 - Educate patients and family about disease and therapy. Involve them in measurement and treatment.
- Encourage self-monitoring of blood pressure.
 - Keep care inexpensive and simple.
 - Integrate therapy into daily routine.

- Maintain contact with patients.
- Prescribe long-acting drugs.
- Adjust therapy to minimize side effects.
- Continue to add drugs systematically to meet goals.
- Consider using nurse case management.
- Utilize other health professionals.
- Try a new approach if current regime is inadequate.

INITIATIVES TO PREVENT AND CONTROL HYPERTENSION

The National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health established the National High Blood Pressure Education Program (NHBPEP) in 1972. In conjunction with healthcare providers, voluntary health agencies, state health departments and community groups, NHBPEP has been working to raise the rates of detection, awareness, treatment, and control of hypertension in the general population, as well as among high risk subpopulations such as Blacks. The program's goal is to "reduce death and disability related to high blood pressure through programs of professional, patient, and public education."³⁹ Through health education programs for the public, patients, and healthcare professionals, the program has been able to improve dramatically public knowledge about high blood pressure and its complications.⁴⁰ The program places strong emphasis on outreach to minority populations including Blacks, using culturally sensitive, innovative approaches, such as faith-based interventions, to reach a large segment of the community.⁴¹

Recognizing the immense burden of cardiovascular disease, the US Congress made funding available to the Centers for Disease Control and Prevention (CDC) in fiscal year 1998 to initiate a national, state-based cardiovascular dis-

ease prevention program. Starting with eight states, CDC now funds 30 state-based cardiovascular health (CVH) programs, which are charged with increasing the leadership of state health departments in CVH promotion, and in preventing and controlling cardiovascular disease. It does this by changing both environmental and policy systems to improve cardiovascular health and to increase relevant education, training, assessment, and communication. State initiatives are listed below⁴²:

- The Arkansas CVH program is providing technical assistance on interventions addressing hypertension among Black men in the state.

- The Maine CVH program has conducted trainings on the American Heart Association's *Get with the Guidelines* to improve primary and secondary prevention of cardiovascular disease, including hypertension.

- The Virginia CVH program is partnering with federally qualified health centers, which serve primarily low-income residents, to provide professional education about hypertension.

- The Oregon CVH Program analyzed Medicaid claims to determine the prevalence of cardiovascular disease risk factors, including hypertension.

In addition to these federal initiatives, several professional medical organizations have activities in place designed to reduce the burden of hypertension among Blacks. The International Society on Hypertension in Blacks (ISHIB) has used community education programs, worship site programs, and media campaigns to increase the public's awareness about hypertension among Blacks.⁴³ ISHIB works with other health organizations to reduce the disparities in disease among ethnic minority populations. As part of its advocacy efforts, ISHIB publishes the present journal, an international peer-reviewed source of comprehensive information on ethnic health disparities, as well as patterns of disease among ethnic populations. Other

activities undertaken by ISHIB include provision of health information to patients and healthcare professionals on cardiovascular disease and related risk factors and organizing accredited educational programs for health professionals who care for ethnic patients with hypertension and other co-morbid cardiovascular diseases. In clinical research, ISHIB has most recently sponsored clinical trials to illustrate the efficacy of antihypertensive medications among Blacks.⁴³

CONCLUSION

The high prevalence of hypertension and modifiable cardiovascular risk factors among Blacks underscores the timeliness of interventions to prevent and reduce complications in this population. Although hypertension awareness, treatment, and control rates are similar in Whites and Blacks, hypertension outcomes are worse for Blacks. In a recent report, NHBPEP coordinating committee recommends lifestyle modification in the general population and especially for high-risk individuals. Additionally, education is designed for healthcare providers and the public to encourage policy changes aimed at reducing the burden of hypertension.⁴⁴ Primary and secondary prevention, specifically through lifestyle interventions that promote heart-healthy behaviors, is therefore essential. Additional research is needed to determine if culturally competent interventions are appropriate to prevent, treat, and control this disease within this population. Working together we can greatly reduce the burden of disease among the Black population.

ACKNOWLEDGMENT

Funding/Support: This project was supported under cooperative agreement T-15/15-CCD01-002 from the Centers for Disease Control and Prevention through the Association of Teachers of Preventive Medicine.

REFERENCES

1. Working Group on Primary Prevention of Hypertension. National High Blood Pressure Education Program Working Group Report on Primary Prevention of Hypertension. *Arch Intern Med.* 1993;153:186-208.
2. Benetos A, Thomas F, Bean K, Gautier S, Smulyan H, Guize L. Prognostic value of systolic and diastolic blood pressure in treated hypertensive men. *Arch Intern Med.* March 11, 2002;162(5):577-578.
3. Sesso HD, Stampfer MJ, Rosner B, et al. Systolic and diastolic blood pressure, pulse pressure, and mean arterial pressure as predictors of cardiovascular disease risk in men. *Hypertension.* November 2000;36(5):801-807.
4. He J, Whelton PK. Elevated systolic blood pressure as a risk factor for cardiovascular and renal disease. *J Hypertens.* 1999; suppl 2:s7-s13.
5. Kannel WB. Risk stratification in hypertension: new insights from the Framingham study. *Am J Hypertens.* 2000;13:3s-10s.
6. Izzo JL Jr, Levy D, Black HR. Clinical Advisory Statement. Importance of systolic blood pressure in older Americans. *Hypertension.* May 2000;35(5):1019-1020.
7. Wolz M, Cutler J, Roccella EJ, et al. Statement from the National High Blood Pressure Education Program: prevalence of hypertension. *Am J Hypertens.* 2000;13(1, pt 1):103-104.
8. American Heart Association. *2003 Heart and Stroke Statistical Update.* Dallas, Tex: American Heart Association.
9. US Census Bureau. *Profile of the General Demographic Characteristics for the United States: 2000.* Washington, DC: US Dept of Commerce, Statistics Administration; 2001.
10. Hoyert DL, Arias E, Smith BL, Murphy SL, Kochanek KD. Deaths: final data for 1999. *Natl Vital Stat Rep.* 2001;49:1-113.
11. Cherry DK, Woodwell DA. National Ambulatory Medical Care Survey: 2000 summary. *Adv Data.* 2002;328:1-32.
12. Department of Health and Human Services. *Healthy People 2010.* Vol 1. Atlanta, Ga: US Dept of Health and Human Services, Centers for Disease Control and Prevention; 2000.
13. Comstock GW. An epidemiologic study of blood pressure in a biracial community in southern United States. *Am J Hyg.* 1957;65:271-315.
14. Pastor P, Makuc DM, Reuben C, Xia H. Chartbook on trends in the health of Americans. *Health, United States, 2002.* Hyattsville, Md: National Center for Health Statistics; 2002.
15. Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. The sixth report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Arch Intern Med.* 1997;157:2413-2446.

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16. Joint National Committee. The fifth report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC V). *Arch Intern Med.* 1993;153:154-183.
17. National Kidney and Urologic Diseases Information Clearinghouse. Kidney and urologic disease statistics for the United States. Available at: <http://www.usrds.org/2kpdf/A1incidence.pdf>. Accessed September 10, 2001.
18. Clark LT. Primary prevention of cardiovascular disease in high-risk patients: physiologic and demographic risk factor differences between African-American and White American populations. *Am J Med.* 1999;107(2A):225-245.
19. Hall WD, Ferrario CM, Moore MA, et al. Hypertension-related morbidity and mortality in the southeastern United States. *Am J Med Sci.* April 1997;313(4):195-209.
20. Lackland DT, Egan BM. The dominant role of systolic hypertension as a vascular risk factor: evidence from the southeastern United States. *Am J Med Sci.* December 1999;318(6):365-368.
21. Francis CK, Grant AO, Cooper RS, and the Working Group Members. *Report of the Working Group on Research in Coronary Heart Disease in Blacks.* Bethesda, Md: National Heart, Lung, and Blood Institute; March 1994.
22. He J, Klag MJ, Appel LJ, Charleston J, Whelton PK. Seven-year incidence of hypertension in a cohort of middle-aged African Americans and Whites. *Hypertension.* 1998;31:1130-1135.
23. James SA. Psychosocial and environmental factors in Black hypertension. In: Hall WD, Shulman NB, Saunders E, eds. *Hypertension in Blacks: Epidemiology, Pathophysiology, and Treatment.* Chicago, Ill: Year Book Medical Publishers, Inc; 1985:132-143.
24. Sowers JR, Ferdinand KC, Bakris GL, Douglas JG. Hypertension-related disease in African Americans. Factors underlying disparities in illness and its outcome. *Postgrad Med.* October 2002;112(4):24-26, 29-30, 33-34.
25. Hill MN, Bone LR, Kim MT, Miller DJ, et al. Barriers to hypertension care and control in young urban Black men. *Am J Hypertens.* October 1999;12(10, pt 1):951-958.
26. Smedley BD, Stith AY, Nelson AR, eds. Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care.* Institute of Medicine of the National Academies; 2002.
27. Burt VL, Cutler JA, Higgins M, et al. Trends in the prevalence, awareness, treatment, and control of hypertension in the adult US population data from the health examination surveys, 1960 to 1991. *Hypertension.* 1995;26:60-69.
28. Chobanian AV, Bakris GL, Black HR, et al. The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: The JNC 7 Report. *JAMA.* 2003;289:2560-2571.
29. Perry HM Jr, Davis BR, Price TR, et al. Effect of treating isolated systolic hypertension on the risk of developing various types and subtypes of stroke: the Systolic Hypertension in the Elderly Program (SHEP). *JAMA.* 2000;284:465-471.
30. Appel LJ, Moore TJ, Obarzanek E, et al. A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group. *N Engl J Med.* 1997;336:1117-1124.
31. Sacks FM, Svetkey LP, Vollmer WM, et al. Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. DASH-Sodium Collaborative Research Group. *N Engl J Med.* 2001;344(1):3-10.
32. Svetkey LP, Simons-Morton D, Vollmer VM, et al. Effects of dietary patterns on blood pressure: subgroup analysis of the Dietary Approaches to Stop Hypertension (DASH) randomized clinical trial. *Arch Intern Med.* 1999;159:285-293.
33. The ALLHAT Officers and Coordinators for the ALLHAT Collaborative Research Group. The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial. Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic: The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *JAMA.* December 18, 2002;288(23):2981-2997.
34. Douglas JG, Bakris GL, Epstein M, et al. Management of high blood pressure in African Americans: consensus statement of the Hypertension in African Americans Working Group of the International Society on Hypertension in Blacks. *Arch Intern Med.* March 10, 2003;163(5):525-541.
35. Moser M, Herbert PR. Prevention of disease progression, left ventricular hypertrophy, and congestive heart failure in hypertension treatment trials. *J Am Coll Cardiol.* 1996;27:1214-1218.
36. Ward HJ, Morisky DE, Lees NB, Fong R. A clinic and community-based approach to hypertension control for an underserved minority population: design and methods. *Am J Hypertens.* 2000;13:2:177-183.
37. Hill MN, Bone LR, Kim MT, Miller DJ, Dennison CR, Levine DM. Barriers to hypertension care and control in young urban Black men. *Am J Hypertens.* 1999;12(4, pt 1):951-958.
38. Management of patient compliance in the treatment of hypertension [abstract]. Report of the NHLBI Working Group. *Hypertension.* 1982;4:415-423.
39. Hypertension Detection and Follow up Program Cooperative Group. Five-year findings of the Hypertension Detection and Follow up Program; mortality by race, sex, and blood pressure level: a further analysis. *Community Health.* 1984;9:314-327.
40. The National Heart, Lung, and Blood Institute—The National High Blood Pressure Education Program. Available at: <http://www.nhlbi.nih.gov/about/nhbpep/nhbp.pd.htm>. Accessed September 10, 2001.
41. National Institutes of Health, The National Heart, Lung, and Blood Institute (NHLBI). Available at: <http://www.nhlbi.nih.gov/resources/docs/plandisp.htm>. Accessed September 10, 2001.
42. US Department of Health and Human Services. *Annual Progress Reports of the CDC-funded Cardiovascular Health State Programs.* Atlanta, Ga: US Dept of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 2001.
43. The International Society on Hypertension in Blacks. Available at: http://ishib.org/main/program_main.htm. Accessed September 12, 2001.
44. Whelton PK, He J, Appel LJ, et al, for the National High Blood Pressure Education Program Coordinating Committee. Primary prevention of hypertension. Clinical and public health advisory from the National High Blood Pressure Education Program. *JAMA.* 2002;288:1882-1888.

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Data analysis and interpretation: Giles, Ashaye

Manuscript draft: Ashaye, Giles

Statistical expertise: Ashaye, Giles

Acquisition of funding: Ashaye

Administrative, technical, or material assistance: Ashaye

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