

Coronary Heart Disease Risk Factors and Attributable Risks in African-American Women and Men: NHANES I Epidemiologic Follow-Up Study

ABSTRACT

Objectives. This study assessed associations of risk factors with coronary heart disease incidence in African Americans.

Methods. The participants in the NHANES I Epidemiologic Follow-Up Study included in this analysis were 1641 Black and 9660 White persons who were aged 25 to 74 years when examined and who did not have a history of coronary heart disease. Average follow-up for survivors was 19 years.

Results. Significant, independent risk factors for coronary heart disease were age, systolic blood pressure, and smoking in Black women and age, systolic blood pressure, serum cholesterol, low education, and low family income in Black men. In this cohort, 19% of incident coronary heart disease in Black women and 34% in Black men might be prevented if systolic blood pressure were below 140 mm Hg. In Black men, attributable risk for low education (46%) was even higher than that for elevated blood pressure.

Conclusions. Elevated systolic blood pressure and smoking were predictive of coronary heart disease incidence in African Americans. Estimates of population attributable risk were highest for elevated systolic blood pressure in women and education less than high school in men. Further studies of serum lipids, education, and coronary heart disease in Black women are needed. (*Am J Public Health*. 1998;88:913-917)

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Introduction

Despite recent increased interest in and funding for health research in women and minorities, few reports on the incidence of coronary heart disease from prospective, longitudinal studies of population-based cohorts are available for Black women.¹⁻⁹ Still controversial is whether standard coronary risk factors and socioeconomic status are predictive of coronary heart disease in Black women. Therefore, data from a national cohort that has now been followed up for as long as 22 years were analyzed to test the hypothesis that standard coronary risk factors (systolic blood pressure, serum cholesterol concentration, and cigarette smoking) and socioeconomic status are significant predictors of coronary heart disease incidence in Black women and men. Population attributable risks are presented to assist in planning and prioritizing strategies for reducing coronary incidence and mortality in Blacks.

Methods

The first National Health and Nutrition Examination Survey (NHANES I) collected data on a nationwide multistage probability sample of the civilian noninstitutionalized population aged 1 to 74 years of the United States, excluding Alaska, Hawaii, and reservation lands of American Indians.^{10,11} Details of the plan, complex sample design, response, and operation were published previously, as were procedures used to obtain informed consent and to maintain confidentiality of obtained information.^{10,11} Older persons, women of childbearing age, and persons residing in poverty areas were oversampled.

The NHANES I Epidemiologic Follow-Up Study (NHEFS) is a longitudinal

study of participants in NHANES I who were 25 to 74 years of age at the time of the survey (1971-1975).¹²⁻¹⁴ The personal interviews and physical and laboratory examinations of NHANES I provided the baseline data for the NHEFS. This analysis was based on 4 waves of follow-up data collection from 1982 through 1984 and during 1986, 1987, and 1992. Data collected consisted of 4 interview surveys, health care facility medical records for the period between baseline and last follow-up, and death certificates for all decedents. Information about place and date of hospitalizations was obtained from follow-up interviews, death certificates, or both; hence, without one of these data sources, hospital records were usually unavailable. Hospital records may also be missing because of subject or proxy refusal, hospital refusal, or inability to locate specific hospitals or hospital records. The completeness of data collection has been reported elsewhere.¹⁵⁻¹⁷ A study using both Medicare and NHEFS data found that 80% of hospital stays for coronary heart disease that were detected by either of these sources were detected by the NHEFS.¹⁷ Persons who became institutionalized after the baseline examination were included in the NHEFS. Age-, race-, and sex-specific mortality in the NHEFS cohort has been quite similar to that expected for the US population.¹⁵

This analysis included Black and White persons aged 25 to 74 years at baseline in NHANES I. Of the 2199 Black and 12 036

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White persons in this age group at baseline, 172 Blacks (7.8%) and 614 Whites (5.1%) were lost to follow-up (there was no subject or proxy interview at any follow-up wave and no death certificate). Excluded from all analyses were 217 Black and 864 White persons for whom history of heart disease, systolic blood pressure, serum cholesterol, smoking status, family income, or educational attainment were unknown at baseline or who were pregnant at baseline examination. Also excluded from coronary heart disease analyses were 169 Black and 898 White persons who had a positive history of heart disease at baseline, defined as persons who had ever been told by a physician that they had had a heart attack or heart failure; who had used any medication for a weak heart during the 6 months prior to the baseline interview; or who had a baseline electrocardiogram consistent with prior transmural myocardial infarction (electrocardiograms were available only for persons in the detailed examination subsample). After all exclusions, 1641 Black and 9660 White persons remained for coronary heart disease analyses. The length of follow-up in the NHEFS for coronary heart disease-free survivors ranged from 8.0 to 22.1 years (median 19.2 years).

CHD Criteria

Incident coronary heart disease cases met 1 or both of the following criteria: (1) had a death certificate with underlying or nonunderlying cause of death coded 410 to 414 according to the *International Classification of Diseases, Ninth Revision (ICD-9)* or (2) had one or more hospital stays during the follow-up period with any discharge diagnosis coded 410 to 414 according to the Clinical Modification of ICD-9 (ICD-9 CM). The date of incidence was considered the date of first hospital admission with a coronary heart disease diagnosis or, for coronary heart disease deaths without any hospital records of coronary heart disease, the date of death.

Baseline Variables

At baseline, blood samples were obtained and frozen serum was sent to the Centers for Disease Control (CDC) for determination of serum total cholesterol.^{10,18} The baseline medical history questionnaire included questions about selected conditions and about medications used for selected conditions during the preceding 6 months.¹⁰ At the beginning of the baseline physical examination, the physician measured blood pressure once with the examinee seated.¹⁰

With a few exceptions, a standard mercury sphygmomanometer was used. A 13-cm or 9.5-cm cuff was chosen that was at least 20% wider than the diameter of the arm. American Heart Association guidelines were followed.

Examining physicians were White males. A standardized protocol was used for all participants. Smoking status was obtained at baseline for the subsample that received the detailed examination. For the remaining persons, smoking status at baseline was either derived from questions on the follow-up interview on lifetime smoking history or imputed.^{19,20} The validity of this approach has been documented.^{19,20} Other baseline variables were measured as described elsewhere.¹⁰

Statistical Methods

Estimates of the risk of coronary heart disease for persons with a risk factor relative to those without the risk factor were derived from Cox proportional hazards regression models.²¹⁻²⁴ Separate analyses were carried out for groups based on race and sex. All models included age at baseline in single years as a covariate. Other variables previously shown to have important associations with CHD risk in this cohort⁶ were entered as indicator variables: systolic blood pressure of 140 mm Hg or

higher, serum cholesterol concentration of 240 mg/dL or higher, history of current smoking, fewer than 12 years of education completed, and family income of less than \$5000.

Persons who died of other causes in coronary heart disease analyses were censored at the date of death. Survivors were censored at the date last known alive. To assess the effect of the complex survey design on the results, Cox regression analyses were repeated, using Software for Survey Design Analysis (SUDAAN).^{25,26} Results of weighted analyses were generally consistent with the conclusions derived from the unweighted estimates, which have smaller variances. Therefore, only the data from the unweighted Cox regression models are presented.²⁶

Population attributable risk (PAR) was computed by standard methods as follows:

$$PAR = P_e(RR_e - 1) / [P_e(RR_e - 1) + 1] \times 100,$$

where P_e is the age-adjusted proportion of the population exposed at baseline and RR_e is the age-adjusted relative risk of exposed persons compared with nonexposed persons from proportional hazards analysis.²⁷ PAR varies with definitions used for prevalence; clinically significant blood pressure and cholesterol cutpoints and socially meaningful education cutpoints were selected. Age-

TABLE 1—Number of Incident Cases of Coronary Heart Disease and Age-Adjusted Levels of Risk Factors, by Sex and Race, among Persons Aged 25 to 74 Years at Baseline: NHANES I Epidemiologic Follow-Up Study, 1971–1992

	Women		Men	
	Cases	Noncases	Cases	Noncases
Blacks	(n = 177)	(n = 864)	(n = 137)	(n = 463)
Age, y	56.5	44.5*	60.5	50.4**
Systolic blood pressure, mm Hg	142.4	139.2	153.3	141.4**
Serum cholesterol, mg/dL	223.8	217.2	231.9	216.2**
Current smoking, %	43.0	37.3	45.4	52.6
History of hypertension, %	51.1	34.2**	33.6	23.5*
Taking blood pressure medication, %	31.5	18.8**	17.1	13.1
Education < 12 y, %	69.2	63.9	79.1	69.7*
Family income < \$5000, %	57.3	50.9	53.3	44.5
Whites	(n = 970)	(n = 4774)	(n = 1085)	(n = 2831)
Age, y	61.4	44.2**	59.0	46.6**
Systolic blood pressure, mm Hg	136.5	129.8**	138.7	133.3**
Serum cholesterol, mg/dL	227.1	219.5**	225.9	217.0**
Current smoking, %	37.1	30.1**	48.5	41.3**
History of hypertension, %	34.3	20.2**	24.3	16.4**
Taking blood pressure medication, %	20.3	10.6**	12.8	7.9**
Education < 12 y, %	48.5	36.3**	48.1	41.8**
Family income < \$5000, %	32.3	22.3**	21.6	18.8

* $P < .05$, cases vs noncases.

** $P < .01$, cases vs noncases.

adjusted risk factor levels for cases and non-cases were computed by the direct method with the entire cohort as standard.

Results

Table 1 shows the number of incident cases of coronary heart disease, by sex and race, among persons aged 25 to 74 years. Also shown are the age-adjusted levels of selected risk factors by coronary heart disease status at follow-up.

Proportional hazards analyses for women aged 25 to 74 revealed that age, systolic blood pressure, and smoking in Blacks, and age, systolic blood pressure, smoking, low educational attainment, and low family income in Whites were significant ($P < .05$), independent risk factors for coronary heart disease (Table 2). In men aged 25 to 74, significant, independent risk factors for coronary heart disease were age, systolic blood pressure, serum cholesterol, low educational attainment, and low family income in Blacks, and age, systolic blood pressure, serum cholesterol, smoking, and low educational attainment in Whites. There were no significant interactions of any risk factors with age in Blacks. Effect modification by age in White women will be the subject of another report; the results for White women of all ages presented here must be interpreted with caution.

When current use of blood pressure medication was added to the model for women, it was a significant predictor of coronary heart disease after controls were applied for age (Blacks, relative risk [RR] = 1.76, 95% confidence interval [CI] = 1.28, 2.41; Whites, RR = 1.64, 95% CI = 1.42, 1.90) or for all risk factors (Blacks, RR = 1.62, 95% CI = 1.18, 2.24; Whites, RR = 1.54, 95% CI = 1.33, 1.78). However, the relative risks for variables other than systolic blood pressure were essentially unchanged from those shown in Table 2 in risk-adjusted analyses. The same was true for White men. In Black men, use of blood pressure medication was not a significant predictor of coronary heart disease incidence (age-adjusted RR = 1.42, 95% CI = 0.93, 2.18; risk-adjusted RR = 1.21, 95% CI = 0.78, 1.87), with relative risks of other variables, including systolic blood pressure, unaffected by its inclusion. The results of weighted analyses were consistent with those shown in Table 2, with the exception of some results for Black men. For Black men, weighted analyses showed even higher risks for low educational attainment and income, but somewhat smaller, non-significant risks for elevated systolic blood pressure and serum cholesterol.

TABLE 2—Relative Risks for Coronary Heart Disease Associated with Risk Factors at Baseline, by Sex and Race, among Persons Aged 25–74 Years at Baseline: NHANES I Epidemiologic Follow-Up Study, 1971–1992

Risk Factor	Age-Adjusted RR (95% CI)	Risk-Adjusted ^a RR (95% CI)
Women		
Systolic blood pressure		
Blacks	1.50 (1.04, 2.15)*	1.47 (1.02, 2.12)*
Whites	1.55 (1.35, 1.79)**	1.54 (1.34, 1.78)**
Serum cholesterol		
Blacks	1.12 (0.82, 1.53)	1.15 (0.84, 1.57)
Whites	1.11 (0.97, 1.27)	1.09 (0.95, 1.24)
Smoking		
Blacks	1.47 (1.04, 2.06)*	1.51 (1.07, 2.13)*
Whites	1.54 (1.33, 1.78)**	1.59 (1.37, 1.84)**
Education <12 y		
Blacks	1.41 (0.96, 2.05)	1.29 (0.88, 1.90)
Whites	1.56 (1.37, 1.79)**	1.45 (1.26, 1.67)**
Family income <\$5000		
Blacks	1.33 (0.96, 1.84)	1.25 (0.89, 1.74)
Whites	1.34 (1.17, 1.53)**	1.20 (1.04, 1.38)*
Men		
Systolic blood pressure		
Blacks	2.09 (1.41, 3.09)**	2.15 (1.45, 3.19)**
Whites	1.45 (1.28, 1.64)**	1.41 (1.24, 1.59)**
Serum cholesterol		
Blacks	1.47 (1.05, 2.07)*	1.45 (1.03, 2.05)*
Whites	1.40 (1.24, 1.59)**	1.42 (1.26, 1.60)**
Smoking		
Blacks	0.89 (0.62, 1.26)	0.92 (0.64, 1.31)
Whites	1.49 (1.32, 1.69)**	1.47 (1.30, 1.66)**
Education <12 y		
Blacks	2.25 (1.31, 3.85)**	2.00 (1.15, 3.47)*
Whites	1.34 (1.17, 1.52)**	1.24 (1.09, 1.42)**
Family income <\$5000		
Blacks	1.61 (1.10, 2.36)*	1.54 (1.05, 2.27)*
Whites	1.21 (1.05, 1.39)**	1.09 (0.94, 1.25)

Note. Relative risk (RR) was derived from Cox proportional hazard regression models and based on systolic blood pressure ≥ 140 mm Hg and serum cholesterol ≥ 240 mg/dL. CI = confidence interval.

^aAdjusted for baseline age and for cardiovascular disease risk factors listed.

* $P < .05$; ** $P < .01$.

Computations were performed of population attributable risk of coronary heart disease due to elevated systolic blood pressure, current cigarette smoking, elevated total serum cholesterol, and fewer than 12 years of education completed (Table 3). In this cohort, 19% of coronary heart disease cases in Black women and 16% in White women might be prevented if systolic blood pressure were below 140 mm Hg in everyone. Attributable coronary heart disease risks for fewer than 12 years of education completed were similar to those for elevated blood pressure in Black and White women. In Black men, attributable risk for low educational attainment (46%) was even higher than that for elevated blood pressure (34%); both were higher in Black than in White men. Attributable risk for elevated serum cholesterol was similar to that for

elevated systolic blood pressure in White men but lower in Black men.

Discussion

Results of the few cohort studies of coronary heart disease among Blacks reported prior to 1980 have been reviewed previously.^{1,2} More recent reports often focused on extended follow-up of small southern cohorts^{4,28} or follow-up for mortality rather than incidence in men.^{7,29,30} These cohort studies have consistently found elevated systolic blood pressure to be an independent risk factor for coronary heart disease in Black women and Black men.^{1-9,28-31} However, serum cholesterol has not consistently been found to predict coronary heart disease risk in either Black women or Black men.^{1-9,28-31}

TABLE 3—Population Attributable Risk (PAR) of Coronary Heart Disease, By Race and Sex, among Persons Aged 25 to 74 Years at Baseline: NHANES I Epidemiologic Follow-Up Study (NHEFS), 1971–1992

	PAR, %			
	Systolic Blood Pressure >140 mm Hg	Current Smoking	Serum Cholesterol > 240 mg/dL	Education <12 y
Black women	19	15	4	21
Black men	34	... ^a	12	46
White women	16	14	... ^a	18
White men	14	18	10	12

Note. PAR = $Pe(RR_e - 1) / [Pe(RR_e - 1) + 1] \times 100$. Pe is taken from the NHEFS baseline unweighted; RR is the age-adjusted relative risk.

^aNonsignificant association.

A report based on the initial wave of follow-up of the NHEFS in 1982 through 1984 indicated similar predictive power of systolic blood pressure, serum cholesterol, and income for both Blacks and Whites aged 25 to 74.⁶ Another recent study found that in a small cohort of Blacks systolic blood pressure in women and systolic blood pressure and smoking in men predicted coronary heart disease mortality after controls were applied for age or other factors; serum cholesterol was significant in Black women after adjustment for age but no longer significant after adjustment for multiple risk factors.⁴ An early cohort study failed to find an association of serum cholesterol and coronary heart disease risk in Black women.⁵

Smoking was predictive of coronary heart disease risk in some cohorts of Black women³ and men,⁷ but not in other Black female^{4,6} or male⁶ cohorts. However, none of the studies that reported no association between serum cholesterol or smoking and coronary heart disease risk in Black women have had sufficient statistical power to exclude an important association with confidence. The present data cannot exclude modest effects of elevated total serum cholesterol in Black women, although strong effects ($RR > 1.6$) are not compatible with these data. An inverse association between risk of coronary heart disease death and income after control for age or other risk factors was reported in one large cohort of Black men,³¹ but not in smaller cohorts of Black men or women.⁴ Population attributable risk was not reported for coronary heart disease incidence in other studies.¹⁻⁹

Putative mechanisms by which the variables studied increase coronary risk have been discussed at length elsewhere.¹⁻⁹ The effect of low education was not explained by other risk factors in this analysis and may be mediated by health behaviors not considered, less access to care, and

other psychosocial factors discussed elsewhere.³¹

Limitations of the present study include possible bias arising from loss to follow-up and missing hospital data at follow-up. A further source of possible bias was misclassification due to inaccuracy of diagnoses coded on death certificates and hospital records. Analyses in which deaths or hospitalizations with a diagnosis code of ICD-9 429.2 (arteriosclerotic cardiovascular disease) or an interview history of heart attack or coronary bypass surgery without supporting hospital records were included in the definition of coronary heart disease (260 additional cases) produced results essentially similar to those shown. The anomalous finding for smoking in Black men may be due to bias related to the use of data from follow-up interviews and imputed data for about half the subjects. Relative risk estimates may be biased toward the null by regression dilution bias, effects of treatment, and smoking cessation.

In conclusion, data from the NHANES I Epidemiologic Follow-Up Study revealed that elevated systolic blood pressure and smoking in Black women and elevated systolic blood pressure and elevated serum cholesterol in Black men were predictive of coronary heart disease incidence in a national cohort. Estimates of population attributable risk for standard risk factors were highest for elevated systolic blood pressure and fewer than 12 years of education completed, especially in Black men. Further cohort studies of larger numbers of Blacks are needed to replicate and extend these findings for smoking and education. Further studies of serum lipids, education, and coronary heart disease in Black women are needed. Pooling of results from multiple studies³⁰ and meta-analysis may be productive approaches. □

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References

- Gillum RF. Coronary heart disease in black populations, I: mortality and morbidity. *Am Heart J*. 1982;104:839–851.
- Gillum RF, Grant CT. Coronary heart disease in black populations, II: risk factors. *Am Heart J*. 1982;104:852–864.
- Garfinkel L. Cigarette smoking and coronary heart disease in blacks: comparison to whites in a prospective study. *Am Heart J*. 1984;108:802–807.
- Keil JE, Sutherland SE, Knapp RG, Lackland DT, Gazes PC, Tyroler HA. Mortality rates and risk factors for coronary disease in black as compared to white men and women. *N Engl J Med*. 1993;329:73–78.
- Tyroler HA, Heyden S, Bartel A, et al. Blood pressure and cholesterol as coronary heart disease risk factors. *Arch Intern Med*. 1971;128:907–914.
- Cooper RS, Ford E. Comparability of risk factors for coronary heart disease among blacks and whites in the NHANES-I Epidemiologic Follow-Up Study. *Ann Epidemiol*. 1992;2:637–645.
- Neaton JD, Kuller LH, Wentworth D, Borhani NO. Total and cardiovascular mortality in relation to cigarette smoking, serum cholesterol concentration, and diastolic blood pressure among black and white males followed up for five years. *Am Heart J*. 1984;108:759–769.
- Gillum RF. Cardiovascular disease in the United States: an epidemiologic overview. In: Saunders E, ed. *Cardiovascular Diseases in Blacks*. Philadelphia, Pa: F.A. Davis Co; 1991:3–16.
- Report of the Working Group on Research in Coronary Heart Disease in Blacks. Bethesda, Md: National Heart, Lung, and Blood Institute; 1994:1–94.
- Miller HW. Plan and operation of the Health and Nutrition Examination Survey, United States, 1971–1973. *Vital Health Stat 1*. 1978; No. 10a.
- Engel A, Murphy RS, Maurer K, Collins E. Plan and operation of the HANES I Augmentation Survey of Adults 25–74 years, United States, 1974–1975. *Vital Health Stat 1*. 1978; No. 14.
- Cohen BB, Barbano HE, Cox CS, et al. Plan and operation of the NHANES I Epidemiologic

- Follow-Up Study, 1982–84. *Vital Health Stat 1*. 1987; No. 22.
13. Finucane FF, Freid VM, Madans JH, et al. Plan and operation of the NHANES I Epidemiologic Follow-up Study, 1986. *Vital Health Stat 1*. 1990; No. 25.
 14. Cox CS, Rothwell ST, Madans JH, et al. Plan and operation of the NHANES I Epidemiologic Follow-Up Study, 1987. *Vital Health Stat 1*. 1992; No. 27.
 15. Madans JH, Kleinman JC, Cox CS, et al. Ten years after NHANES I: report of initial follow-up, 1982–84. *Public Health Rep*. 1986; 101:465–473.
 16. Madans JH, Cox CS, Kleinman JC, et al. Ten years after NHANES I: mortality experience at initial follow-up, 1982–84. *Public Health Rep*. 1986; 101:474–481.
 17. Madans JH, Reuben CA, Rothwell ST, Eberhardt MS. Differences in morbidity measures and risk factor identification using multiple data sources: the case of coronary heart disease. *Stat Med*. 1995; 14:643–653.
 18. *HANES I Hematology and Clinical Chemistry Procedures Developed or Utilized by the Center for Disease Control, Bureau of Laboratories, 1971–1975*. Washington, DC: National Center for Health Statistics; August 1979.
 19. McLaughlin JK, Dietz MS, Mehl ES, Blot WJ. Reliability of surrogate information on cigarette smoking by type of informant. *Am J Epidemiol*. 1987; 126:144–146.
 20. Machlin SR, Kleinman JC, Madans JH. Validity of mortality analysis based on retrospective smoking information. *Stat Med*. 1989; 8:997–1009.
 21. Kaplan EL, Meier P. Nonparametric estimation from incomplete observations. *J Am Stat Assoc*. 1958; 53:457–481.
 22. *SAS User's Guide: Statistics, Version 5 Edition*. Cary, NC: SAS Institute Inc; 1985:529–558.
 23. *SAS/STAT Software: Changes and Enhancements*. Cary, NC: SAS Institute Inc; 1992: 433–480. SAS technical report P-229.
 24. *SAS/STAT Software: the PHREG Procedure*. Cary, NC: SAS Institute Inc; 1991:1–59. SAS technical report P-217.
 25. *Software for Survey Design Analysis (SUDAAN)* [computer software] Version 5.30. Research Triangle Park, NC: Research Triangle Institute; 1992.
 26. Ingram DD, Makuc DM. Statistical issues in analyzing the NHANES I Epidemiologic Follow-Up Study. *Vital Health Stat 2*. 1994; No. 121.
 27. Kahn HA, Sempos CT. *Statistical Methods in Epidemiology*. New York, NY: Oxford University Press; 1989:73–83.
 28. Keil JE, Tyroler HA, Gazes PC. Predictors of coronary heart disease in blacks. In: Saunders E, ed. *Cardiovascular Diseases in Blacks*. Philadelphia, PA: F.A. Davis Co; 1991: 227–239.
 29. Tyroler HA, Knowles MG, Wing SB, et al. Ischemic heart disease risk factors and twenty-year mortality in middle-age Evans County black males. *Am Heart J*. 1984; 108:738–746.
 30. Keil JE, Sutherland SE, Hames CG, et al. Coronary disease mortality and risk factors in black and white men: results from the combined Charleston, SC, and Evans County, Georgia, Heart Studies. *Arch Intern Med*. 1995; 155:1521–1527.
 31. Smith GD, Wentworth D, Neaton JD, Stamler R, Stamler J. Socioeconomic differentials in mortality risk among men screened for the Multiple Risk Factor Intervention Trials, II: black men. *Am J Public Health*. 1996; 86:497–504.

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