Journal of the American College of Cardiology
© 2011 by the American College of Cardiology Foundation
Published by Elsevier Inc.
Vol. 57, No. 16, 2011
ISSN 0735-1097/$36.00
doi:10.1016/j.jacc.2010.11.041

Epidemiology

Community Prevalence of Ideal Cardiovascular Health, by the American Heart Association Definition, and Relationship With Cardiovascular Disease Incidence

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Objectives The purpose of this study is to estimate the prevalence of ideal cardiovascular health and its relationship with incident cardiovascular disease (CVD).

Background An American Heart Association committee recently set a goal to improve the cardiovascular health of Americans by 20% by 2020. The committee developed definitions of "ideal," "intermediate," and "poor" cardiovascular health for adults and children based on 7 CVD risk factors or health behaviors.

Methods We used data from the Atherosclerosis Risk in Communities Study cohort, age 45 to 64 years, to estimate the prevalence of ideal cardiovascular health in 1987 to 1989 and the corresponding incidence rates of CVD. Incident CVD comprised stroke, heart failure, myocardial infarction, and fatal coronary disease.

Results Among 12,744 participants initially free of CVD, only 0.1% had ideal cardiovascular health, 17.4% had intermediate cardiovascular health, and 82.5% had poor cardiovascular health. CVD incidence rates through 2007 showed a graded relationship with the ideal, intermediate, and poor categories and with the number of ideal health metrics present: rates were one-tenth as high in those with 6 ideal health metrics (3.9 per 1,000 person-years) compared with zero ideal health metrics (37.1 per 1,000 person-years).

Conclusions In this community-based sample, few adults in 1987 to 1989 had ideal cardiovascular health by the new American Heart Association definition. Those who had the best levels of cardiovascular health nevertheless experienced relatively few events. Clearly, to achieve the American Heart Association goal of improving cardiovascular health by 20% by 2020, we will need to redouble nationwide primordial prevention efforts at the population and individual levels.
(J Am Coll Cardiol 2011;57:1690–6) © 2011 by the American College of Cardiology Foundation

Considerable epidemiologic evidence indicates that populations and individuals with optimal cardiovascular disease (CVD) risk factors and health behaviors experience very low rates of CVD events (1–8). This observation provides a foundation for population-wide approaches to encourage avoidance of CVD risk factor development in the first place (i.e., maintenance of low risk or primordial prevention). Avoidance of risk factors by youths and adults would eliminate much, probably ≥70%, of the epidemic of CVD in the United States (1–9). However, in U.S. population–based cohorts, disappointingly, only approximately 5% of middle-aged and older adults have ideal risk factor levels (9).

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Recently, the American Heart Association (AHA) Strategic Planning Task Force and Statistics Committee set the following goal: "By 2020, to improve the cardiovascular health of all Americans by 20% while reducing deaths from cardiovascular diseases and stroke by 20%" (9). The committee developed definitions of "ideal," "intermediate," and

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Manuscript received September 10, 2010; revised manuscript received October 20, 2010, accepted November 23, 2010.

"poor" cardiovascular health for adults and children based on 7 CVD risk factors or health behaviors. To serve as a baseline, the committee reported the estimated current prevalence of each targeted risk factor or health behavior in the U.S. population. The percentages of adults meeting ideal cardiovascular health metrics were cited as smoking (73%), body mass index (33%), physical activity (45%), healthy diet (<0.5%), total cholesterol (45%), blood pressure (42%), and fasting plasma glucose (58%). However, the AHA committee could not report what percentage of U.S. adults had actually achieved their definition of ideal cardiovascular health (i.e., ideal levels of all 7 factors). The committee also did not provide data on the actual CVD incidence rates of adults meeting their ideal, intermediate, or poor cardiovascular health definitions.

We report here the prevalence of ideal cardiovascular health by the AHA definition in the ARIC (Atherosclerosis Risk in Communities) study cohort in 1987 to 1989 and the corresponding 20-year incidence rates of CVD.

Methods

Study design and subjects. The ARIC study is a prospective cohort study of atherosclerotic diseases in 4 U.S. communities: Forsyth County, North Carolina; Jackson, Mississippi; Washington County, Maryland; and the northwest suburbs of Minneapolis, Minnesota (10). The cohort comprised, at baseline in 1987 to 1989, 15,792 men and women age 45 to 64 years who were selected by list or area probability sampling. Only African Americans were recruited in the Jackson study center. The baseline home interview and clinic examination measured various risk factors, health behaviors, and cardiovascular conditions. The ARIC study protocol was approved by the institutional review board of each participating university.

Baseline examination. The ARIC study protocols were described previously (7,8,10). Diet was assessed by a slightly modified, 66-item Harvard food frequency questionnaire (11). We first excluded persons with extreme energy intake of <600 or >4,200 kcal/day for men or <500 or >3,600 kcal/day for women (approximate lower and upper 1 percentiles). We then categorized achievement of the 5 AHA ideal cardiovascular health items: ≥4.5 cups/day of fruits and vegetables (approximated as ≥4.5 servings/day in the ARIC study); ≥3.5 oz servings/week of fish (approximated as ≥2 3- to 5-oz servings/week); ≥3 1-oz servings/day of whole grains (approximated as ≥3 servings/day); sodium (<1,500 mg/day); and ≤36 oz/week of sugar-sweetened beverages (approximated as ≤4 glasses/week). The Baecke questionnaire (12) asked participants to report the frequency of participation in as many as 4 sports and in walking in the previous year; this was converted to minutes per week of moderate or vigorous exercise (13). Smoking status (current, former, or never smokers) was derived from interviews. Use of antihypertensive, cholesterol-lowering, and glucose-lowering medications within the past 2 weeks of baseline interview were self-reported or taken from prescription bottles. Fasting plasma total cholesterol was measured by enzymatic methods. Serum glucose was measured by a hexokinase/glucose-6-phosphate dehydrogenase method. Sitting blood pressure was measured 3 times using a random-zero sphygmomanometer after a 5-min rest. The mean of the last 2 measurements was used for analysis. Body mass index (kg/m^2) was computed from weight in a scrub suit and standing height. Using the AHA definitions of cardiovascular health (9), we classified each cardiovascular health metric at baseline into ideal, intermediate, or poor categories, as shown in Table 1.

Abbreviations and Acronyms

AHA = American Heart Association

CHD = coronary heart disease

CVD = cardiovascular disease

ICD = International Classification of Diseases, 9th Revision

MI = myocardial infarction

Pre-existing heart failure at baseline was defined as the following: 1) an affirmative response to "Were any of the medications you took during the last 2 weeks for heart failure?" and 2) stage 3 or "manifest heart failure" by Gothenburg criteria (14,15). Pre-existing coronary heart disease (CHD) at baseline was defined by self-reported previous physician diagnosis of myocardial infarction (MI) or coronary revascularization, or by prevalent MI by 12-lead electrocardiography. Pre-existing stroke was defined by any self-reported previous physician diagnosis of stroke.

Incident CVD events. Incident CVD events comprised heart failure, definite or probable MI, definite fatal CHD, and definite or probable stroke. We followed all participants from the baseline examination in 1987 to 1989 to the date of the CVD event, death, loss to follow-up, or otherwise through December 31, 2007. CVD events in the ARIC study were ascertained by contacting participants annually, identifying hospitalizations and deaths during the previous year, and surveying discharge lists from local hospitals and death certificates from state vital statistics offices for potential CVD events (15–17). Incident heart failure in the ARIC study was defined as the first occurrence of either a hospitalization that included an International Classification of Diseases-9th Revision (ICD-9) discharge code of 428 (428.0 to 428.9) among the primary or secondary diagnoses or else a death certificate with an ICD-9 code of 428 or an ICD-10 code of I50 among the listed or underlying causes of death (15). The ARIC study did not further validate ICD-9 code 428 for heart failure; validation studies using physician review of the ARIC study hospital records beginning in 2005 indicated the positive predictive value of ICD-9 428 to be 93% for acute decompensated heart failure and 97% for chronic heart failure.

For patients hospitalized with a potential MI, trained abstractors recorded the presenting symptoms and related clinical information, including cardiac biomarkers, and photocopied up to 3 12-lead electrocardiograms for Minnesota coding (18). Out-of-hospital deaths were investigated by

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Table 1 Distribution of Individual Baseline Cardiovascular Health Metrics in the ARIC Study Participants Free of Cardiovascular Disease, 1987 to 1989

Health Metric		Definition*	Total Sample, % (n = 12,744)	African Americans, % (n = 3,107)	Whites, % (n = 9,637)
Smoking	Ideal	Never or quit >12 months	72.2	68.5	73.4
	Intermediate	Former ≤12 months	2.7	2.4	2.8
	Poor	Current	25.1	29.1	23.9
Body mass index	Ideal	<25 kg/m^2	34.5	22.7	38.3
	Intermediate	25–29.99 kg/m^2	39.7	38.2	40.2
	Poor	≥30 kg/m^2	25.7	39.1	21.5
Physical activity	Ideal	≥150 min/week moderate or ≥75 min/week vigorous or ≥150 min/week moderate + vigorous	37.7	22.0	42.8
	Intermediate	1–149 min/week moderate or 1–74 min/week vigorous or 1–149 min/week moderate + vigorous	25.8	21.5	27.2
	Poor	None	36.5	56.6	30.1
Healthy diet score	Ideal	4–5 components	5.3	4.4	5.6
	Intermediate	2–3 components	63.5	59.2	64.8
	Poor	0–1 components	31.3	36.5	29.6
Total cholesterol	Ideal	<200 mg/dl, without medication	37.5	40.5	36.6
	Intermediate	200-239 mg/dl or treated to <200 mg/dl	37.2	33.0	38.6
	Poor	≥240 mg/dl	25.2	26.6	24.8
Blood pressure	Ideal	<120/<80 mm Hg, without medication	43.8	23.8	50.2
	Intermediate	SBP 120–139 or DBP 80–89 mm Hg or treated to <120/<80 mm Hg	30.7	32.2	30.2
	Poor	SBP ≥140 or DBP ≥90 mm Hg	25.5	44.0	19.6
Fasting serum glucose	Ideal	<100 mg/dl, without medication	53.2	48.5	54.8
	Intermediate	100–125 mg/dl or treated to <100 mg/dl	38.7	38.3	38.8
	Poor	≥126 mg/dl	8.1	13.2	6.4

*Per Lloyd-Jones et al. (9).
DBP = diastolic blood pressure; SBP = systolic blood pressure.

means of death certificates and, in most cases, by an interview with ≥1 next of kin and a questionnaire completed by the patient's physician. Coroner reports or autopsy reports, when available, were abstracted for use in validation. A CHD event was defined as a validated definite or probable MI requiring hospitalization or a definite CHD death. The criteria for definite or probable MI were based on combinations of chest pain symptoms, electrocardiographic changes, and cardiac enzyme levels (16). The criteria for definite fatal CHD were based on chest pain symptoms, history of CHD, underlying cause of death from the death certificate, and any other associated hospital information or medical history, including that from an ARIC study clinic visit (16).

The diagnostic classification of stroke was described previously (17). In brief, for patients hospitalized for potential strokes, the abstractors recorded signs and symptoms and photocopied neuroimaging (computed tomography or magnetic resonance imaging) and other diagnostic reports. Using criteria adopted from the National Survey of Stroke (19), definite or probable strokes were classified by computer algorithm and separate review by a physician, with disagreements resolved by a second physician.

Statistical analyses. Of 15,792 ARIC study participants at baseline, we excluded, due to small numbers, participants who were neither white nor African-American subjects (n = 48). We further excluded 1,969 who at baseline had a history of heart failure, CHD, or stroke or could not be classified based on history; 417 who were not fasting ≥8 h; 271 had extreme energy intake; and 299 who did not have complete information on risk factors or health behaviors, leaving 12,744 participants.

Prevalences of each cardiovascular health metric at baseline, or combinations of them, were computed. The cumulative incidence of CVD was calculated via a life-table approach. Age-, sex-, and/or race-adjusted incidence rates of CVD were calculated according to cardiovascular health groups using Poisson regression. The hazard ratios of incident CVD in relation to cardiovascular health groups were estimated from Cox proportional hazard models adjusted for age, sex, and sometimes race. The proportional hazards assumption was confirmed by examining whether the ln(-ln) survival curves for the cardiovascular health groups were parallel.

Results

Prevalence of ideal cardiovascular health. The ARIC study cohort free of CVD in 1987 to 1989 had a mean age of 54 years. As shown in Table 1, the proportions of participants in the total ARIC study sample who had ideal levels of individual cardiovascular health metrics were as

Table 2 Distribution (Prevalence, %) of Ideal Cardiovascular Health Metrics in Various Subgroups of the ARIC Study Participants Free of Cardiovascular Disease, 1987 to 1989

		Age Group (yrs)		Men		Women	
No. of Ideal Health Metrics Present	Total Sample, % (n = 12,744)	45–54, % (n = 6,899)	55–64, % (n = 5,845)	African American, % (n = 1,191)	White, % (n = 4,398)	African American, % (n = 1,916)	White, % (n = 5,239)
7	0.1	0.1	0.1	0	0.1	0.1	0.2
6	2.8	3.6	1.9	1.1	2.3	0.5	4.5
5	9.3	11.5	6.8	2.5	8.1	3.6	14.0
4	18.6	20.7	16.2	12.4	17.8	11.3	23.4
3	26.7	26.0	27.6	25.9	28.9	24.7	25.8
2	25.3	22.8	28.4	33.2	26.7	31.9	20.0
1	14.5	13.1	16.2	21.1	13.6	23.4	10.6
0	2.5	2.3	2.8	3.8	2.4	4.5	1.6
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0

follows: smoking, 72.2%; body mass index, 34.5%; physical activity, 37.7%; healthy diet, 5.3%; total cholesterol, 37.5%; blood pressure, 43.8%; and fasting plasma glucose, 53.2%. Except for total cholesterol, more whites than African Americans met ideal levels of each metric. The healthy diet components were poorly met, but were met more often for sugar-sweetened beverages (69%) and sodium (58%) than for fruits and vegetables (30%), fish (28%), and whole grains (9%).

As shown in Table 2, only 0.1% of ARIC study participants (n = 17) had all 7 cardiovascular health metrics in the ideal range, and, thus, almost no one had "ideal cardiovascular health." Approximately 12.2% of participants had 5 to 7 ideal health metrics, and this percentage varied by age, race, and sex: 15.2% for ages 45 to 54 years and 8.8% for ages 55 to 64 years, 3.6% for African-American men, 4.2% for African-American women, 10.5% for white men, and 18.7% for white women.

The prevalence of having "intermediate" cardiovascular health (at least 1 intermediate metric and no poor metrics) was also low: 17.4% (Table 3). In contrast, 82.5% of participants had "poor" cardiovascular health (at least 1 poor health metric). In fact, 27.9% had ≥3 poor health metrics.

Incidence rates of CVD. The median duration of follow-up was 18.7 years (maximum, 21.1 years), during which 3,063 incident CVD events occurred. The first CVD event was CHD in 49%, heart failure in 30%, stroke in 16%, and multiple outcomes simultaneously in 5%. The 17 participants with all 7 factors rated as ideal had no CVD events. In contrast, the CVD incidence rate was 7.5 per 1,000 person-years (95% confidence interval: 6.4 to 8.4) for those with intermediate cardiovascular health, and it was 14.6 (95% confidence interval: 14.0 to 15.2) for those with poor cardiovascular health.

There was a strong gradient of cumulative CVD incidence during follow-up according to the number of ideal health metrics met (Fig. 1). The 2.8% of the ARIC study cohort with 6 ideal factors had a relatively low cumulative CVD incidence of approximately 6%. In contrast, the 2.5% of the ARIC study cohort with no ideal health factors had approximately a 50% cumulative incidence.

After adjustment for age, race, and sex (Table 4), the overall CVD incidence rate in the ARIC study was 13.3 per 1,000 person-years. The rate was relatively low for those with 5 to 7 ideal health metrics (<7 per 1,000 person-years) and less than one fifth that of those with no ideal health metrics (32.1 per 1,000 person-years). Table 4 also shows an overall higher incidence rate of CVD in African Americans (16.5 per 1,000 person-years) than whites (12.2 per 1,000 person-years). However, within each stratum of ideal cardiovascular health counts, CVD rates

Table 3 Prevalence of Baseline Cardiovascular Health Categories in the ARIC Study Participants Free of Cardiovascular Disease, 1987 to 1989

				Prevalence		
Cardiovascular Health Category	No. of Poor Health Metrics	No. of Intermediate Health Metrics	No. of Ideal Health Metrics	Total, % (n = 12,744)	African Americans,% (n = 3,107)	Whites, % (n = 9,637)
Ideal health*	0	0	7	0.1	0.0	0.2
Intermediate health†	0	1–7	0–6	17.4	6.5	20.9
Poor health‡	1–7	Any	Any	82.5	93.5	78.9
	(1)			(28.3)	(17.7)	(31.7)
	(2)			(26.3)	(27.6)	(25.8)
	(3)			(17.9)	(27.3)	(14.9)
	(4–7)			(10.0)	(20.9)	(6.5)

*Ideal health is all 7 health metrics at ideal levels. †Intermediate health is at least 1 of 7 health metrics at intermediate levels, but no poor health metrics. ‡Poor health is at least 1 of 7 health metrics at a poor level. Subgroups of poor health are shown in parentheses.

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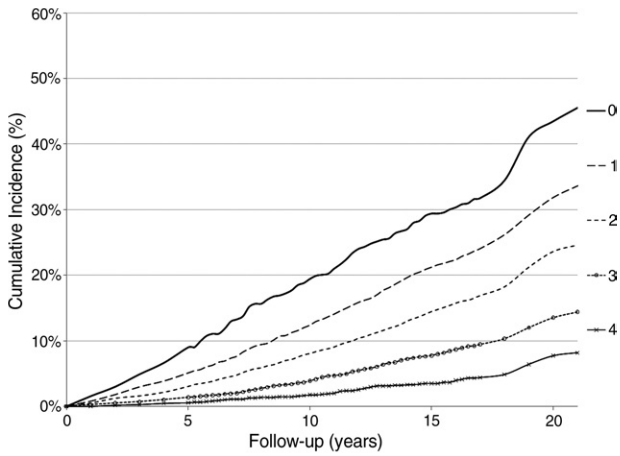

Figure 1 **Cumulative Incidence of Cardiovascular Disease According to the Number of Ideal Cardiovascular Health Metrics**

Cumulative incidence of cardiovascular disease according to the number of ideal cardiovascular health metrics, ARIC Study, 1987 to 2007.

were relatively similar between African Americans and white participants.

As shown in Figure 2, both ideal health behaviors (nonsmoking, body mass index, physical activity, healthy diet score) and ideal health factors (total cholesterol, blood pressure, glucose) contributed to lower CVD risk.

Discussion

The 2 main findings of applying the AHA 2020 cardiovascular health goal metrics to this long-term prospective study of cardiovascular health in middle-aged adults were that: 1) the AHA metrics indeed reflect well the subsequent risk of CVD, as reflected by a graded CVD incidence rate in relation to the number of ideal health metrics; and 2) virtually no one had ideal cardiovascular health in this community-based study in 1987 to 1989. Previous studies documenting that CVD incidence rates are low in those with optimal cardiovascular health metrics (1–8) studied fewer metrics and usually used narrower CVD incidence definitions, such as CHD alone. In the ARIC study, for example, we estimated previously that 70% of CHD and stroke events and 77% of heart failure might be eliminated through avoidance of just 4 factors: high blood pressure, high cholesterol, diabetes, and smoking (7,8). We extended previous findings to the new AHA definition of cardiovascular health in relation to a combined CVD endpoint that included CHD, heart failure, and stroke. The data further demonstrate that much of CVD might be eliminated by primordial prevention whereby people avoid CVD risk factors and risk behaviors in the first place.

The AHA goal to improve cardiovascular health by 20% by 2020 (9) is bold and forward-thinking, but achievement of the 2020 goal will be challenging. What is clear from our data and previous studies is that most U.S. middle-aged adults have poor cardiovascular health, and few have ideal cardiovascular health. In fact, by the new AHA definition, only 0.1% of ARIC study participants in 1987 to 1989 had

Table 4 **Incidence Rate and Hazard Ratios of Cardiovascular Disease According to the Number of Ideal Cardiovascular Health Metrics, ARIC Study, 1987 to 2007**

	Total Sample					African Americans			Whites		
No. of Ideal Metrics	No. of CVD Cases	Incidence Rate*†	95% CI	Hazard Ratio†	95% CI	No. of CVD Cases	Incidence Rate*†	95% CI	No. of CVD Cases	Incidence Rate*†	95% CI
7	0	0	—	—	—	0	0	NA	0	0	NA
6	23	3.9	2.6–5.9	0.11	0.07–0.17	1			22	4.3	2.8–6.5
5	127	6.4	5.4–7.6	0.18	0.14–0.23	5	3.3‡	1.5–7.4	122	7.1	5.9–8.4
4	354	8.6	7.8–9.6	0.24	0.20–0.29	49	8.7	6.6–11.5	305	9.3	8.3–10.4
3	755	12.0	11.2–12.9	0.34	0.28–0.40	173	14.2	12.2–16.5	582	12.4	11.4–13.5
2	946	16.0	15.0–17.1	0.46	0.39–0.54	270	16.9	15.0–19.1	676	17.2	15.9–18.6
1	699	21.9	20.3–23.6	0.65	0.55–0.77	265	25.3	22.4–28.6	434	22.4	20.4–24.7
0	159	32.1	37.5–3.5	1.00	(Reference)	72	40.4	32.0–51.1	87	30.4	24.7–37.6
Overall	3,063	13.3	12.8–13.8			835	16.5	15.4–17.7	2,228	12.2	11.7–12.8

*Incidence rate per 1,000 person-years. †Adjusted for age, sex, and race (except where race stratified). ‡Incidence rate and 95% confidence interval was calculated by collapsing 5 and 6 ideal metrics categories.
CI = confidence interval; CVD = cardiovascular disease; NA = not available.

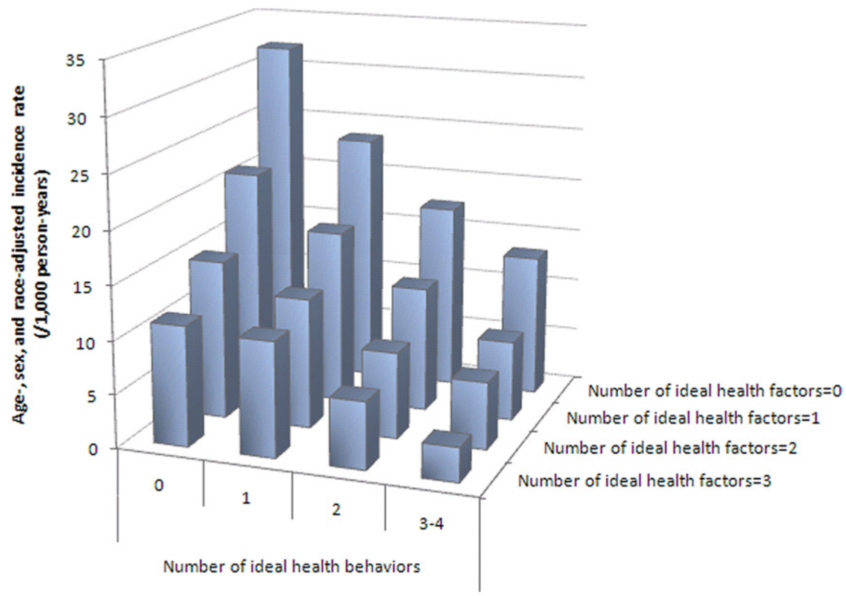

Figure 2 **Incidence Rate of Cardiovascular Disease According to the Number of Ideal Health Behaviors and Health Factors**

Age-, sex-, and race-adjusted incidence rate of cardiovascular disease according to the number of ideal cardiovascular health behaviors (nonsmoking, body mass index, physical activity, healthy diet score) and health factors (total cholesterol, blood pressure, glucose), ARIC (Atherosclerosis Risk in Communities), 1987 to 2007.

ideal cardiovascular health. There clearly also is some incongruency that almost no one in middle age has ideal cardiovascular health, yet the lifetime probabilities of staying free of CHD were nearly 50% for men in the Framingham study and nearly 70% for women in the Framingham study (20), 79% and 80%, respectively, for heart failure (21), and 83% and 80%, respectively, for stroke (22). Yet, certainly, metrics such as AHA's are needed to monitor the cardiovascular health of the population, even if the U.S. population is currently a long way from ideal. Indeed, formulating a definition of cardiovascular health and establishing specific goal levels, even if challenging to achieve, provides an expanded view of CVD prevention.

A point that ARIC study investigators made previously (7,8) is worth re-emphasizing. Although African Americans have higher rates of CVD than white Americans, this is mainly due to their lower frequency of ideal cardiovascular health metrics (Table 2). At similar levels of health metrics, African Americans and whites actually had similar CVD incidence rates in the ARIC study (Table 4). Yet, none of the 3,107 African Americans studied here had ideal cardiovascular health. Other factors, such as socioeconomic disadvantages, stress, and genetics, may contribute additionally to high CVD rates in African Americans, but clearly their low prevalence of "traditional" ideal cardiovascular health metrics is alarming.

We chose to focus on ARIC study participants free of CVD at baseline because we wanted to calculate subsequent CVD incidence rates. Although we excluded participants with self-reported physician-diagnosed stroke, MI, or coronary revascularization, as well as MI by electrocardiography or symptoms or treatment for heart failure, we did not have valid measures to exclude some other prevalent cardiovascular diseases (e.g., medically treated angina), and we did not try to exclude subclinical CVD. Nevertheless, in middle-aged adults, our baseline exclusion criteria likely eliminated most clinically important CVD from the cohort. Had we not excluded people with prevalent CVD, the prevalence percentage of ideal cardiovascular health in the ARIC study sample would be even lower than the observed 0.1% because CVD patients can only achieve intermediate cardiovascular health, not ideal (9).

Study limitations. Drawbacks of our study warrant consideration. First, the ARIC study sample is community based but not nationally representative. Most of the African Americans were from 1 center, so their lower prevalence of ideal cardiovascular health than that of ARIC study whites, although consistent with national patterns (23), might be due to geographic or socioeconomic differences and should not be attributed to race per se. Furthermore, the ARIC study has no cardiovascular health information on other minority groups. Such information needs to be documented in minority cohort studies and national surveys. Second, although measurement of major risk factors is well standardized and therefore quite generalizable from study to study, measurement of diet and physical activity is not. The instruments that we used were validated (11,12) but brief. For example, "fish" included deep-fried and other types of fish that probably have widely varying health effects. In addition, sodium intake was likely quite underestimated by this brief food frequency questionnaire. Of course, if the ARIC study had asked about additional food items or activities, the prevalences of adults meeting ideal diet metrics might have been different. Nevertheless, our estimates for healthy diet and physical activity were close to national estimates (9). Third, we used a single measure of cardiovascular health. Changes in risk factor levels undoubtedly occurred over 2 decades of follow-up and would have typically led to underestimation of the true biological associations between cardiovascular health metrics and CVD incidence. This underestimation tends to be greater for behavioral factors than for biological risk factors. Fourth, we studied risk factors in the period from 1987 to 1989. Yet, the 1987 to 1989 prevalence estimates for ARIC are not greatly different from those for the U.S. population currently (9). Using a more recent value, for example, ARIC study visit 4 in 1996 to 1998 may have given different estimates of the prevalence of ideal health. Because the cohort would have been 9 years older then, likely the prevalence of ideal cardiovascular health would have been even lower. Finally, using the later ARIC study examination data also would have shortened the follow-up time for CVD events, resulting in poorer precision of incidence rates.

Conclusions

In this community-based sample, few adults had ideal cardiovascular health by the new AHA definition. Those who had the best levels of cardiovascular health nevertheless experienced relatively few events. Clearly, to achieve the AHA goal of improving cardiovascular health by 20% by 2020, we will need to redouble our primordial prevention efforts at the population and individual levels. Such efforts must be targeted at youths and young adults because, by middle age, most Americans already have poor cardiovascular health.

Acknowledgments
The authors thank the staff and participants of the ARIC study for their important contributions over many years.

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Key Words: cardiovascular disease ■ coronary disease ■ epidemiology ■ risk factors ■ stroke.