

SUPPLEMENTAL MATERIAL

Table S1. The prevalence of missing data for each component of the CVHS at each ARIC visit.

	BMI	Smoking status	Physical Activity	Cholesterol	Blood Pressure	Glucose
Visit 1	0.1%	0.1%	0.3%	1.3%	0.1%	0.8%
Visit 2	2.3%	2.4%	-	2.6%	2.2%	2.4%
Visit 3	5.2%	5.4%	5.4%	5.5%	5.3%	5.5%
Visit 4	6.8%	7.3%	-	7.3%	6.8%	7.3%
Visit 5	4.1%	12.5%	4.3%	1.7%	0.6%	6.5%

ARIC = Atherosclerosis Risk in Communities Study; BMI = body mass index; CVHS = Cardiovascular health score

Table S2. Prevalence of aortic stenosis, defined using the peak aortic valve velocity, based on category of percent cumulative CVHS attained from visit 1 through 5 including confidence intervals. P for trend across categories is adjusted for age, sex, race and field center.

Aortic stenosis	Cumulative percent CVHS attained (Visits 1-5)					p for trend
	<50%	50% – <60%	60% – <70%	70% – <80%	>80%	
None (%)	70 (66.8–72.7)	75.4 (73.1–77.7)	80.2 (78.4–82)	85.3 (83.1–88)	86.5 (84.2–88.8)	<0.001
Sclerotic (%)	22 (19.4–24.7)	18.3 (16.2–20.3)	14.9 (13.3–16.5)	12.6 (10.5–14.7)	11 (8.9–13.1)	<0.001
Mild (%)	7.2 (5.5–8.9)	5.1 (3.9–6.2)	4.4 (3.5–5.3)	1.9 (1.1–2.7)	2.3 (1.3–3.3)	<0.001
Moderate and severe (%)	1.2 % (0.4–1.9)	1.2 (0.7–1.8)	0.5 (0.1–0.9)	0.3 (0–0.6)	0.2 (0.0–0.5)	0.001

CVHS = Cardiovascular health score

Table S3. Prevalence and Odds of AV sclerosis, defined using the AV peak velocity, associated with each component metric of the CVHS. Prevalence is adjusted for age, sex, and race. The p for trend is calculated from a logistic regression model with CVHS category as the primary exposure variable and adjusted for age, sex, race and percent attainment of each of the other health metrics. Logistic regression models employed to calculate the OR associated with each CVHS category adjusted for age, sex, race, and percent attainment of each of the other health metrics.

Metric	<50%		≥50% to <60%		≥60% to <70%		≥70% to <80%		≥80%		P for trend
	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	
Smoking status	15.1 (12.6 – 17.6)	Ref	16.7 (8.5 – 25)	1.03 (0.55 – 1.94)	14.9 (9.6 – 20.3)	0.87 (0.54 – 1.40)	14.5 (9.1 – 20)	0.85 (0.52 – 1.37)	16.1 (15.1 – 17.1)	0.98 (0.79 – 1.22)	0.94
BMI	19.8 (18.2 – 21.4)	Ref	14.7 (12.5 – 16.9)	0.72 (0.58 – 0.89)	14.3 (11.3 – 17.3)	0.70 (0.54 – 0.92)	14.6 (10.9 – 18.3)	0.73 (0.53 – 1.01)	11.8 (10.2 – 13.3)	0.58 (0.48 – 0.71)	<0.001
Physical activity	16.4 (14.8 – 18)	Ref	16.5 (14.1 – 19)	1.05 (0.85 – 1.31)	16.2 (13.3 – 19.1)	1.07 (0.83 – 1.37)	15.5 (12.9 – 18.2)	1.02 (0.80 – 1.30)	15 (13.2 – 16.7)	1.06 (0.88 – 1.29)	0.73
Total cholesterol	17.4 (15.6 – 19.2)	Ref	14.3 (11.9 – 16.7)	0.78 (0.62 – 0.99)	14.8 (12.1 – 17.4)	0.83 (0.65 – 1.06)	15.6 (12.8 – 18.4)	0.89 (0.69 – 1.14)	15.7 (14.2 – 17.3)	0.92 (0.77 – 1.10)	0.61

Blood pressure	19.4 (17.5 – 21.2)	Ref	17.3 (14.9 – 19.7)	0.85 (0.69 – 1.04)	18.7 (15.7 – 21.7)	0.99 (0.78 – 1.26)	15.3 (12.7 – 18)	0.79 (0.62 – 1)	11.2 (9.8 – 12.6)	0.57 (0.47 – 0.69)	<0.001
Fasting glucose	18.3 (15.9 – 20.9)	Ref	17.4 (14.7 – 20)	0.99 (0.77 – 1.27)	15.5 (13-18)	0.90 (0.69 – 1.16)	16.9 (14.4-19.5)	1.05 (0.82 – 1.34)	14.4 (13 – 15.7)	0.97 (0.79 – 1.20)	0.96

AV = Aortic Valve; CVHS = Cardiovascular health score; CI = Confidence interval; BMI = body mass index; OR = Odds ratio

Table S4. Prevalence and Odds of mild stenosis, defined using the AV peak velocity, associated with each component metric of the CVHS.

Prevalence is adjusted for age, sex, and race. The p for trend is calculated from a logistic regression model with CVHS category as the primary exposure variable and adjusted for age, sex, race and percent attainment of each of the other health metrics. Logistic regression models employed to calculate the OR associated with each CVHS category adjusted for age, sex, race, and percent attainment of each of the other health metrics.

Metric	<50%		≥50% to <60%		≥60% to <70%		≥70% to <80%		≥80%		P for trend
	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	
Smoking status	5.1 (3.4 – 6.7)	Ref	5.3 (0.3 – 10.3)	1.04 (0.35 – 3.06)	4.4 (1.3 – 7.6)	0.76 (0.32 – 1.77)	6.5 (2.6 – 10.3)	1.18 (0.56 – 2.48)	4.1 (3.5 – 4.6)	0.72 (0.49 – 1.06)	0.09
BMI	5.2 (4.3 – 6.2)	Ref	5.6 (4.2 – 7)	1.20 (0.85 – 1.67)	3.5 (1.9 – 5.1)	0.70 (0.42 – 1.16)	2.6 (0.9 – 4.3)	0.54 (0.27 – 1.09)	2.7 (2 – 3.4)	0.61 (0.42 – 0.88)	0.002
Physical activity	5.2 (4.2 – 6.2)	Ref	5 (3.5 – 6.4)	0.99 (0.68 – 1.43)	3.1 (1.8 – 4.5)	0.63 (0.38 – 1.04)	3.3 (2.1 – 4.6)	0.67 (0.42 – 1.05)	3.6 (2.8 – 4.5)	0.81 (0.57 – 1.14)	0.13
Total cholesterol	5.8 (4.7 – 6.9)	Ref	3.5 (2.3 – 4.8)	0.60 (0.39 – 0.92)	5.5 (4.3 – 7.2)	1.00 (0.68 – 1.48)	3.8 (2.2 – 5.2)	0.66 (0.42 – 1.05)	3 (2.3 – 3.7)	0.53 (0.38 – 0.74)	<0.001

Blood pressure	5.6 (4.5 – 6.6)	Ref	5.1 (3.8 – 6.5)	0.88 (0.62 – 1.26)	4.3 (2.7 – 5.8)	0.80 (0.51 – 1.24)	2.6 (1.4 – 3.7)	0.47 (0.28 – 0.79)	3.1 (2.3 – 3.9)	0.63 (0.44 – 0.90)	0.004
Fasting glucose	5.9 (4.4 – 7.3)	Ref	5 (3.5 – 6.5)	0.89 (0.59 – 1.37)	5.1 (3.6 – 6.6)	1.00 (0.66 – 1.53)	3.8 (2.4 – 5)	0.73 (0.46 – 1.15)	3.4 (2.7 – 4.1)	0.78 (0.53 – 1.13)	0.13

AV = Aortic Valve; CVHS = Cardiovascular health score; CI = Confidence interval; BMI = body mass index; OR = Odds ratio

Table S5. Prevalence and Odds of moderate and severe stenosis, defined using the AV peak velocity, associated with each component metric of the CVHS. Prevalence is adjusted for age, sex, and race. The p for trend is calculated from a logistic regression model with CVHS category as the primary exposure variable and adjusted for age, sex, race and percent attainment of each of the other health metrics. Logistic regression models employed to calculate the OR associated with each CVHS category adjusted for age, sex, race, and percent attainment of each of the other health metrics.

Metric	<50%		≥50% to <60%		≥60% to <70%		≥70% to <80%		≥80%		P for trend
	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	Prevalence	OR (95% CI)	
Smoking status	1.3 (0.5 – 2.2)	Ref	0	N/A	1.9 (0 – 4.1)	1.14 (0.29 – 4.44)	0	N/A	0.6 (0.4 – 0.8)	0.37 (0.18 – 0.80)	0.016
BMI	0.9 (0.5 – 1.3)	Ref	0.8 (0.3 – 1.4)	1.00 (0.44 – 2.27)	1.1 (0.2 – 2)	1.30 (0.51 – 3.34)	0.3 (0 – 0.9)	0.37 (0.48 – 2.84)	0.3 (0 – 0.6)	0.43 (0.16 – 1.16)	0.11
Physical activity	0.7 (0.4 – 1.1)	Ref	0.5 (0 – 0.9)	0.66 (0.21 – 2.02)	0.5 (0 – 1.1)	0.73 (0.21 – 2.61)	1.1 (0.3 – 1.8)	1.78 (0.72 – 4.37)	0.7 (0.3 – 1)	1.20 (0.52 – 2.77)	0.32
Total cholesterol	0.6 (0.3 – 1)	Ref	1 (0.3 – 1.6)	1.71 (0.67 – 4.33)	.9 (0.2 – 1.6)	1.46 (0.52 – 4.03)	0.5 (0 – 1)	0.82 (0.23 – 3)	0.7 (0.3 – 1)	1.17 (0.51 – 2.64)	0.98

Blood pressure	1.2 (0.7 – 1.7)	Ref	0.7 (0.2 – 1.3)	0.57 (0.24 – 1.37)	0.2 (0 – 0.5)	0.14 (0.02 – 1.09)	0.4 (0 – 0.9)	0.36 (0.10 – 1.24)	0.5 (0.2 – 0.8)	0.48 (0.21 – 1.11)	0.045
Fasting glucose	1.1 (0.5 – 1.8)	Ref	1.1 (0.4 – 1.8)	1.03 (0.42 – 2.56)	0.7 (0.2 – 1.3)	0.68 (0.25 – 1.89)	0.5 (0 – 0.9)	0.50 (0.16 – 1.60)	0.5 (0.2 – 0.7)	0.59 (0.24 – 1.44)	0.14

AV = Aortic Valve; CVHS = Cardiovascular health score; CI = Confidence interval; BMI = body mass index; OR = Odds ratio

Table S6. Prevalence of aortic stenosis based on category of percent cumulative CVHS attained from visit 1 through 5 for sex. Values and P for trend across categories are adjusted for age, race and field center.

Cumulative percent CVHS attained (Visits 1-5)

Aortic stenosis Category	Sex	<50%	50% – <60%	60% – <70%	70% – <80%	>80%	P for trend	P for Interaction
	Male (2,527) Female (3,507)							
None	Male (%)	69 (64-74)	74 (71-78)	80 (77-82)	84 (80-87)	82 (78-85)	<0.001	
	Female (%)	71 (67-75)	76 (73-79)	80 (78-83)	86 (83-89)	89 (87-92)	<0.001	
Sclerotic	Male (%)	23 (19-28)	19 (16-22)	14 (12-16)	13 (10-17)	14 (10-18)	<0.001	0.13
	Female (%)	21 (18-24)	18 (15-20)	16 (14-18)	12 (9-15)	9 (7-12)	<0.001	
Mild	Male (%)	7 (4-10)	5 (4-7)	6 (4-7)	2 (0.3-5)	3 (0.1-5)	0.003	0.07
	Female (%)	7 (5-9)	5 (3-6)	4 (2-5)	2 (1-3)	2 (1-3)	<0.001	
Moderate and Severe	Male (%)	1 (0-2)	1 (0.4-2)	1 (0.3-2)	0.5 (0-1)	0.6 (0-1)	0.21	0.1
	Female (%)	1.2 (0.2-2)	1.2 (0.4-2)	0.2 (0-5)	0.2 (0-5)	0	0.001	

CVHS = Cardiovascular health score

Table S7. Prevalence of aortic stenosis based on category of percent cumulative CVHS attained from visit 1 through 5 for race. Values and p for trend across categories is adjusted for age, sex and field center.

Cumulative percent CVHS attained (Visits 1-5)

Aortic stenosis Category	Race						P for trend	P for Interaction
	White (4,713) Black (1,321)	<50%	50% – <60%	60% – <70%	70% – <80%	>80%		
None	White (%)	67 (64-71)	74 (71-78)	79 (77-81)	84 (81-86)	85 (83-88)	<0.001	
	Black (%)	78 (74-82)	81 (80-87)	85 (81-87)	90 (85-96)	96 (89-100)	<0.001	
Sclerotic	White (%)	23 (20-27)	19 (17-21)	16 (14-17)	14 (11-16)	12 (10-14)	<0.001	0.9
	Black (%)	18 (14-21)	16 (12-20)	13 (9-16)	9 (4-14)	4 (0-10)	0.001	
Mild	White (%)	8 (5-10)	6 (5-7)	5 (4-6)	2 (1-3)	3 (2-4)	<0.001	0.2
	Black (%)	4 (3-6)	2 (1-3)	3 (1-4)	0	0	0.007	
Moderate and Severe	White (%)	1.5 (0-3)	1.3 (1-2)	0.6 (0.2-1)	0.2 (0-1)	0.3 (0-1)	0.001	0.21
	Black (%)	0.5 (0-1)	1 (0.002-2)	0	1 (0-4)	0	0.79	

CVHS = Cardiovascular health score

Table S8. Prevalence of aortic stenosis, defined using the calculated AVA, based on category of percent cumulative CVHS attained from visit 1 through 5 for sex. Values and p for trend across categories are adjusted for age, race and field center.

		Cumulative percent CVHS attained (Visits 1-5)						
Aortic stenosis Category	Sex						P for trend	P for Interaction
	Male (2.527) Female (3.507)	<50%	50% – <60%	60% – <70%	70% – <80%	>80%		
None	Male (%)	65 (60-70)	68 (65-72)	75 (72-78)	78 (74-81)	76 (71-81)	<0.001	
	Female (%)	58 (53-61)	65 (62-68)	66 (63-69)	69 (65-72)	71 (68-75)	<0.001	
Sclerotic	Male (%)	14 (11-18)	12 (9-15)	8 (6-10)	9 (6-11)	10 (7-13)	0.012	0.10
	Female (%)	11 (8-13)	10 (8-12)	9 (7-11)	7 (5-9)	5 (3-6)	<0.001	
Mild	Male (%)	14 (11-18)	13 (11-16)	11 (9-13)	11 (8-14)	11 (8-15)	0.1	0.17
	Female (%)	25 (21-28)	19 (16-22)	21 (18-23)	23 (19-26)	21 (17-24)	0.52	
Moderate and Severe	Male (%)	6 (4-9)	7 (5-9)	6 (4-7)	3 (1-5)	3 (0.1-5)	0.004	0.47
	Female (%)	8 (5-10)	6 (4-8)	4 (3-7)	2 (1-3)	3 (1-4)	<0.001	

AVA = Aortic valve area; CVHS = Cardiovascular health score

Table S9. Prevalence of aortic stenosis, defined using the calculated AVA, based on category of percent cumulative CVHS attained from visit 1 through 5 for race. Values and p for trend across categories are adjusted for age, sex, and field center.

		Cumulative percent CVHS attained (Visits 1-5)							
Aortic stenosis Category	Race						P for trend	P for Interaction	
	White (4.713)								
	Black (1.321)	<50%	50% - <60%	60% - <70%	70% - <80%	>80%			
None	White (%)	58 (54–62)	65 (62–68)	70 (68–74)	71 (68–74)	72 (68–75)	<0.001		
	Black (%)	66 (61–70)	71 (67–76)	71 (66–75)	76 (68–84)	89 (80–98)	<0.001		
Sclerotic	White (%)	13 (10–15)	11 (9–13)	9 (8–11)	8 (6–10)	7 (5–9)	<0.001	0.61	
	Black (%)	11 (8–14)	9 (7–12)	7 (4–10)	5 (1–9)	4 (0–10)	0.009		
Mild	White (%)	21 (18–25)	17 (15–20)	16 (14–18)	18 (15–20)	18 (15–21)	0.32	0.66	
	Black (%)	19 (15–23)	15 (11–18)	19 (15–23)	18 (11–25)	7 (0–14)	0.35		
Moderate and Severe	White (%)	8 (6–10)	6 (5–8)	5 (4–6)	3 (1–4)	3 (2–5)	<0.001	0.93	
	Black (%)	5 (3–7)	5 (3–7)	4 (1–5)	1 (0–3)	0	0.032		

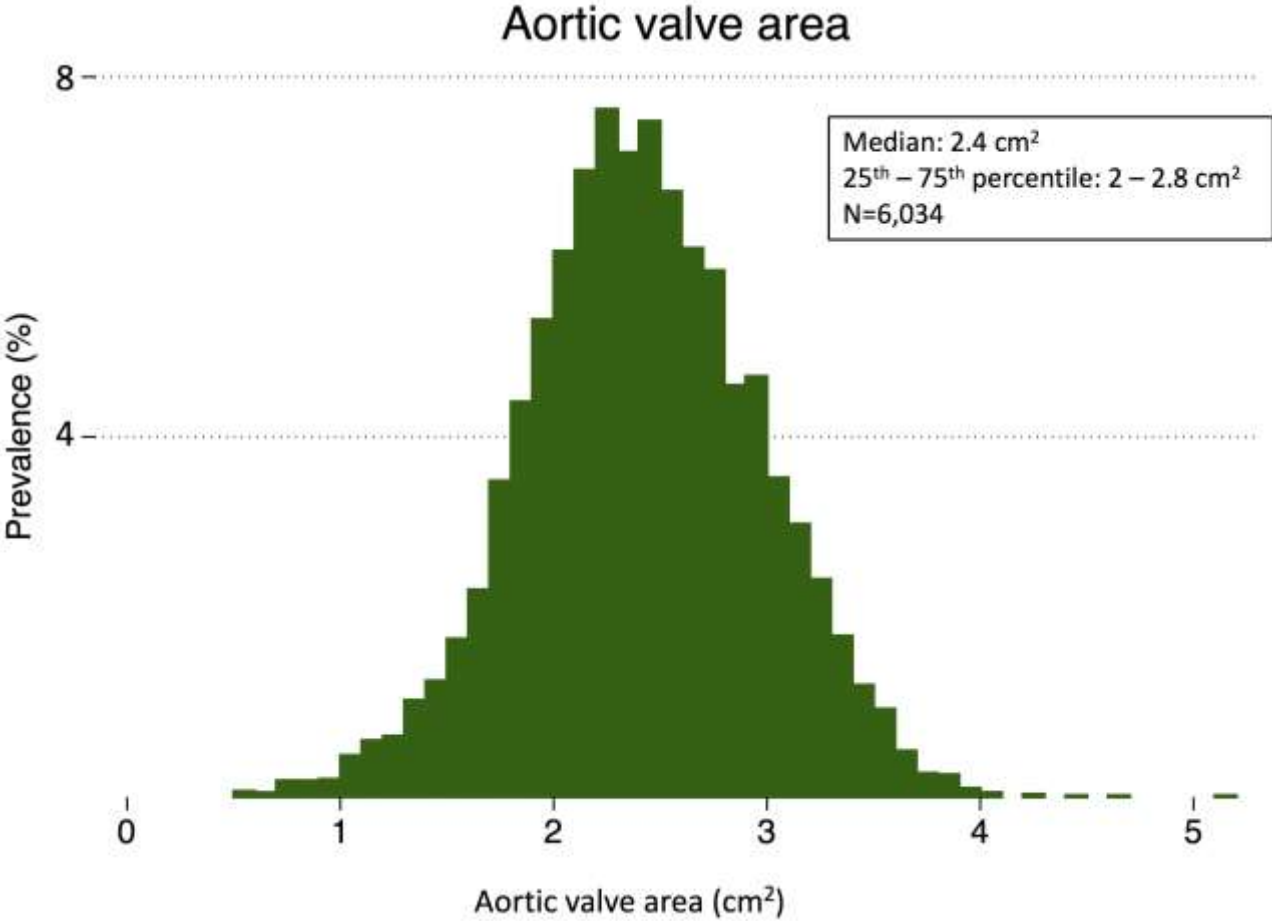
AVA = Aortic valve area; CVHS = Cardiovascular health score

Table S10. Prevalence of aortic stenosis, defined using the AV peak velocity, based on category of percent cumulative CVHS attained from visit 1 through 5 including confidence intervals and utilizing inverse probability attrition weighting. P for trend across categories is adjusted for age, sex, race and field center.

Aortic stenosis	Cumulative percent CVHS attained (Visits 1-5) n=5943					p for trend
	<50%	50% – <60%	60% – <70%	70% – <80%	>80%	
None	68.8% (66.6–72)	76 % (72.6–78.1)	80.3% (78.4–82.1)	85.4% (83.2–87.6)	86.1% (83.7–88.5)	<0.001
Sclerotic	22.5% (19.6-25.4)	18.4% (16.3-20.5)	14.6% (12.9-16.2)	12.2% (10.1-14.2)	11.2% (10-13.4)	<0.001
Mild	7.6% (5.7-9.4)	5.2% (4-6.5)	4.6 % (3.7-5.6)	2.2% (1.2-3.2)	2.5 % (1.4-3.6)	<0.001
Moderate and severe	1.2% (0.4-2.2)	1.4% (0.7-2)	0.6% (0.2-0.9)	0.3% (0-0.7)	0.3 % (0-0,7)	0.001

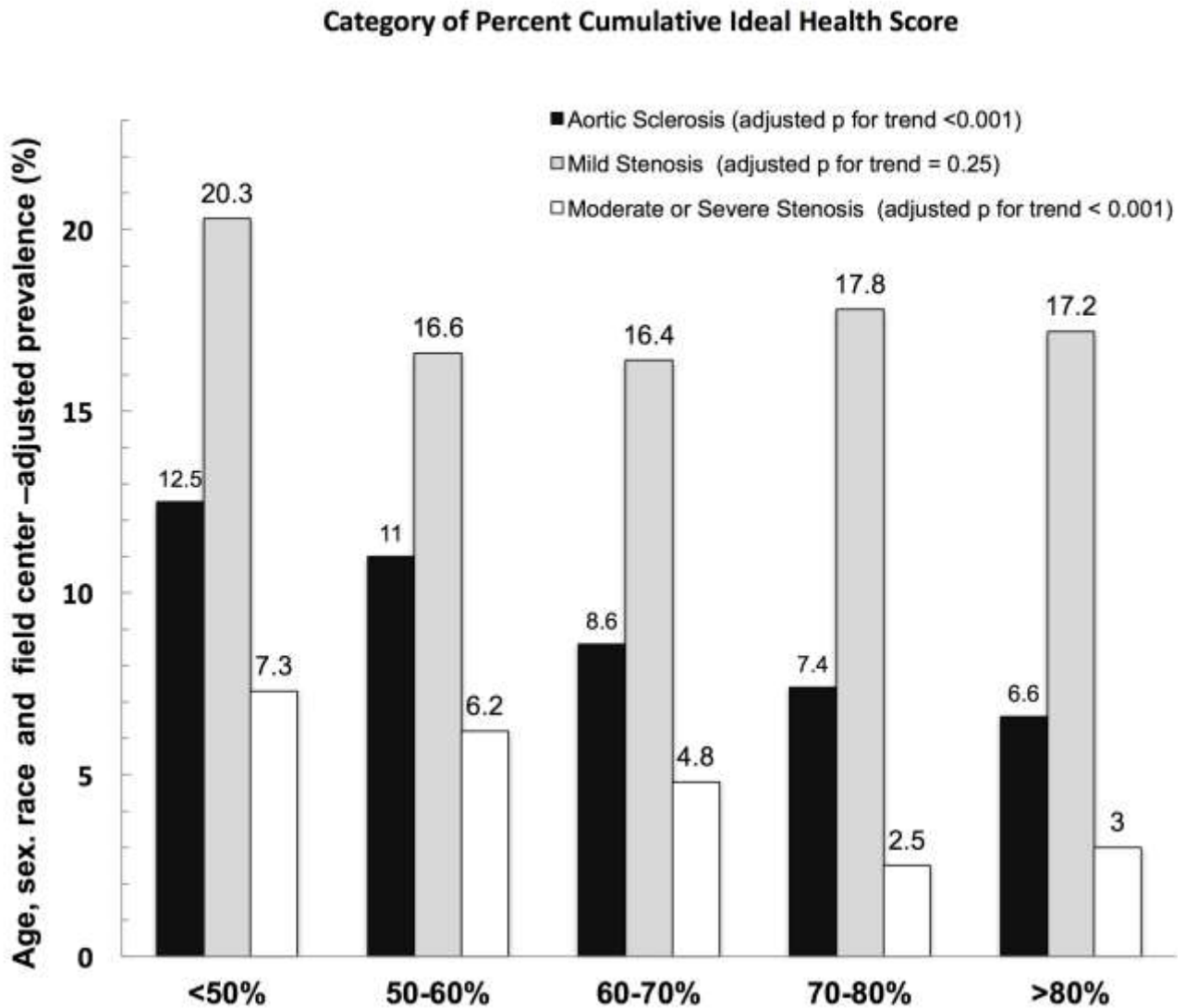
AV = Aortic Valve; CVHS = Cardiovascular health score

Figure S1. Distribution of aortic valve area among ARIC participants at Visit 5.



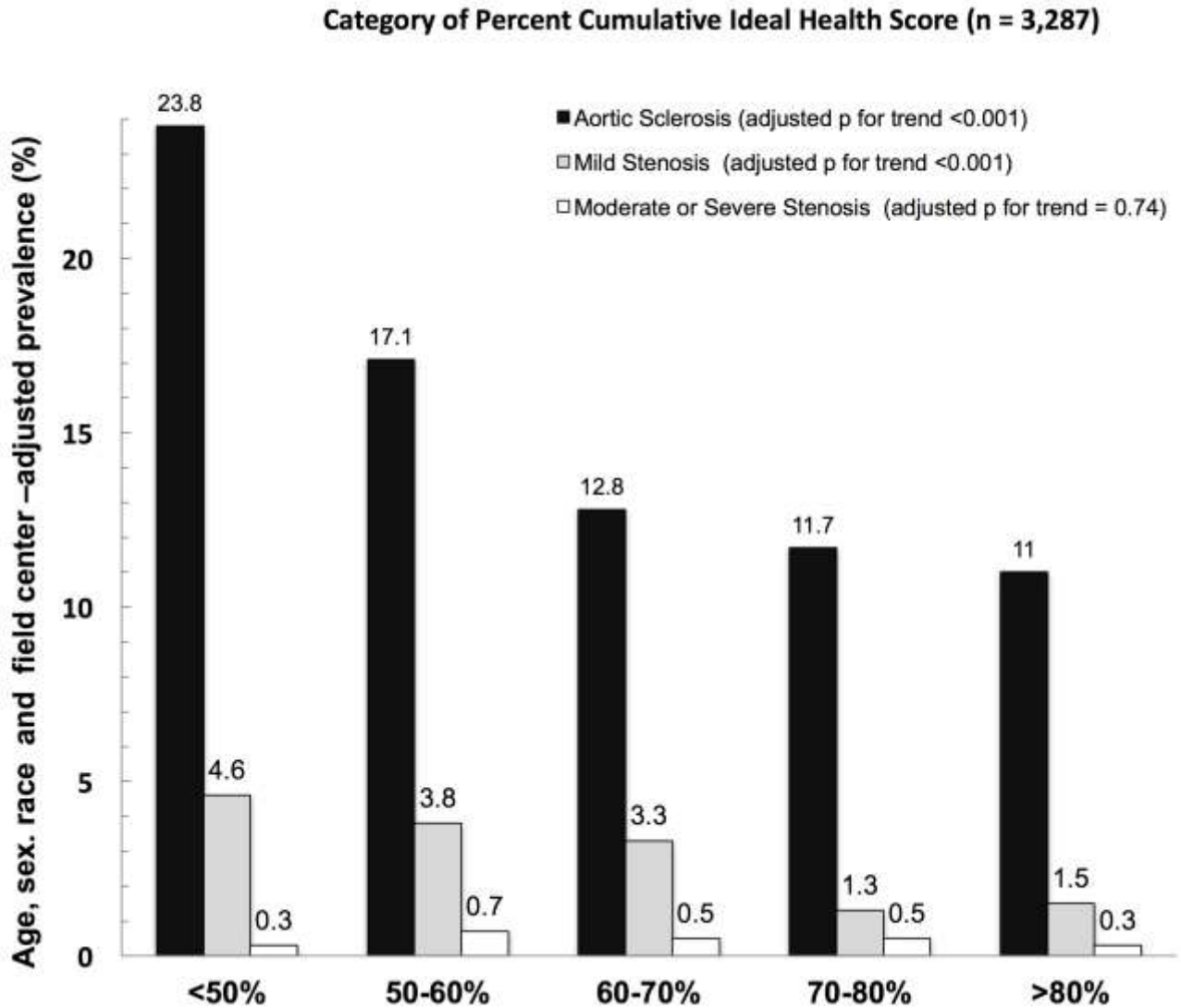
ARIC = Atherosclerosis Risk in Communities Study

Figure S2. Prevalence of aortic stenosis based on AS category, defined using the calculated AVA, and category of percent attained CVHS from visit 1 through 5.



Participants are stratified based on attained CVHS attained from visit 1 through 5. P for trend across categories is adjusted for age, sex, and field center. AS = Aortic stenosis; AVA = Aortic valve area; CVHS = Cardiovascular health score

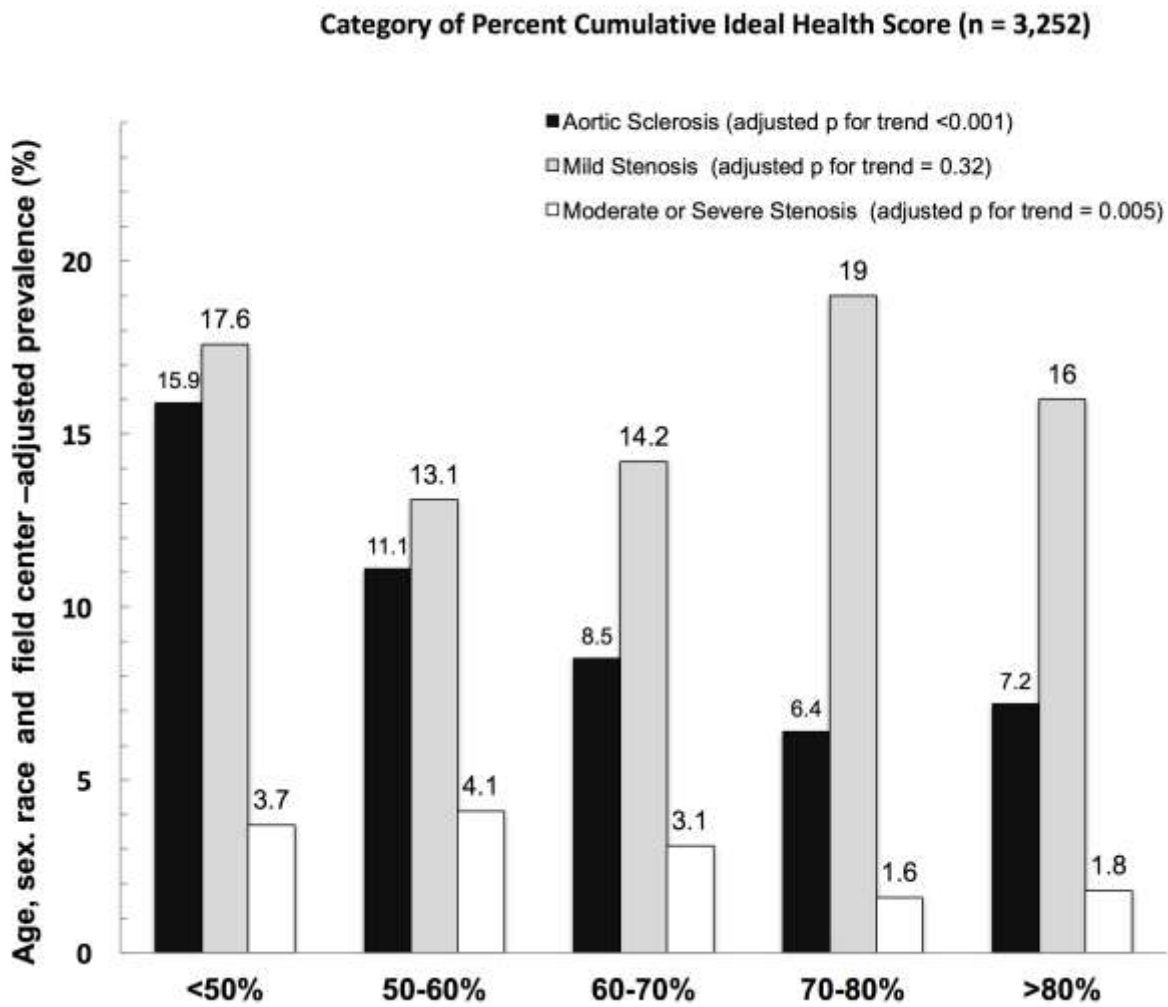
Figure S3. Prevalence of AS, defined using the AV peak velocity, based on category of percent attained CVHS from visit 1 through 5 excluding participants with coronary heart disease, atrial fibrillation, heart failure, stroke and eGFR <60 ml/min/1.73m².



P for trend across categories is adjusted for age, sex, and field center.

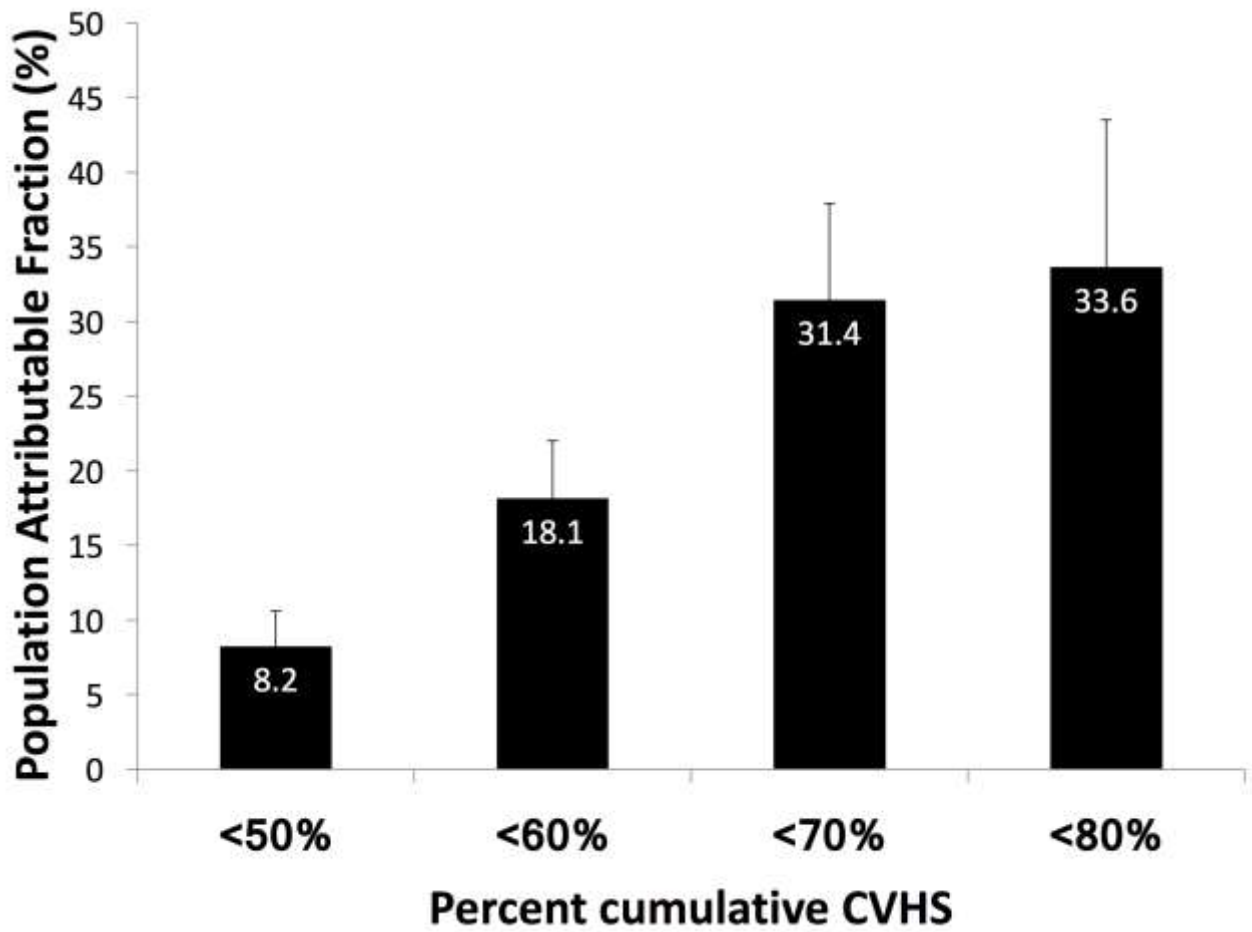
AS = Aortic stenosis; AV = aortic valve; CVHS = Cardiovascular health score; eGFR = Estimated glomerular filtration rate.

Figure S4. Prevalence of AS, defined using the calculated AVA, based on category of percent attained CVHS from visit 1 through 5 excluding participants with coronary heart disease, atrial fibrillation, heart failure, stroke and eGFR <60 ml/min/1.73m².



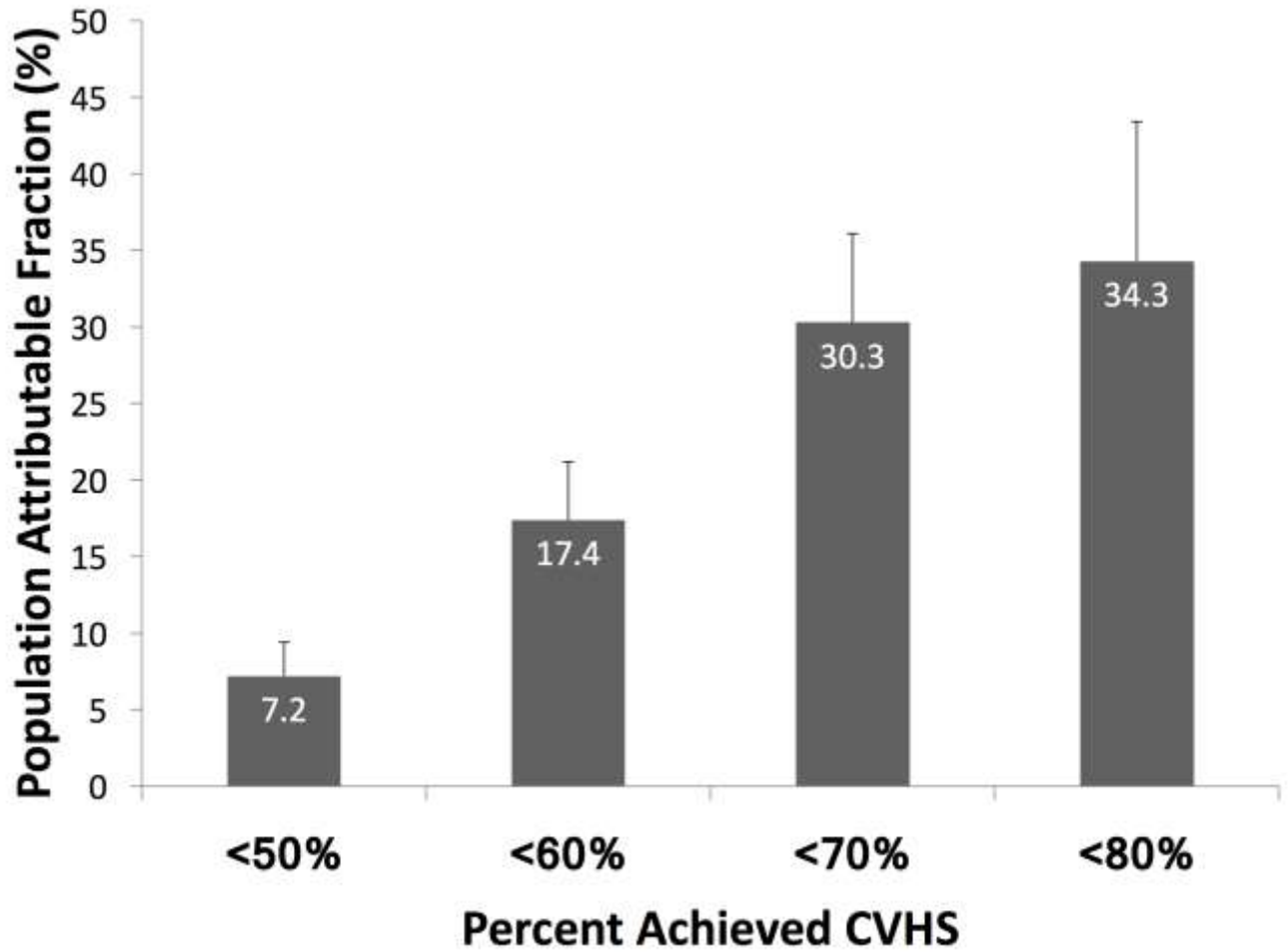
P for trend across categories is adjusted for age, sex, and field center. AS = Aortic stenosis; AVA = Aortic valve area; CVHS = Cardiovascular health score; eGFR = Estimated glomerular filtration rate.

Figure S5. Population attributable fraction for aortic valve dysfunction (sclerosis or stenosis) associated with a percent attained CVHS of <50%, <60%, <70%, and <80%.



Values represent the proportion of aortic valve dysfunction that would be prevented if percent attained CVHS were consistently $\geq 50\%$, $\geq 60\%$, $\geq 70\%$, or $\geq 80\%$ respectively. CVHS = Cardiovascular health score

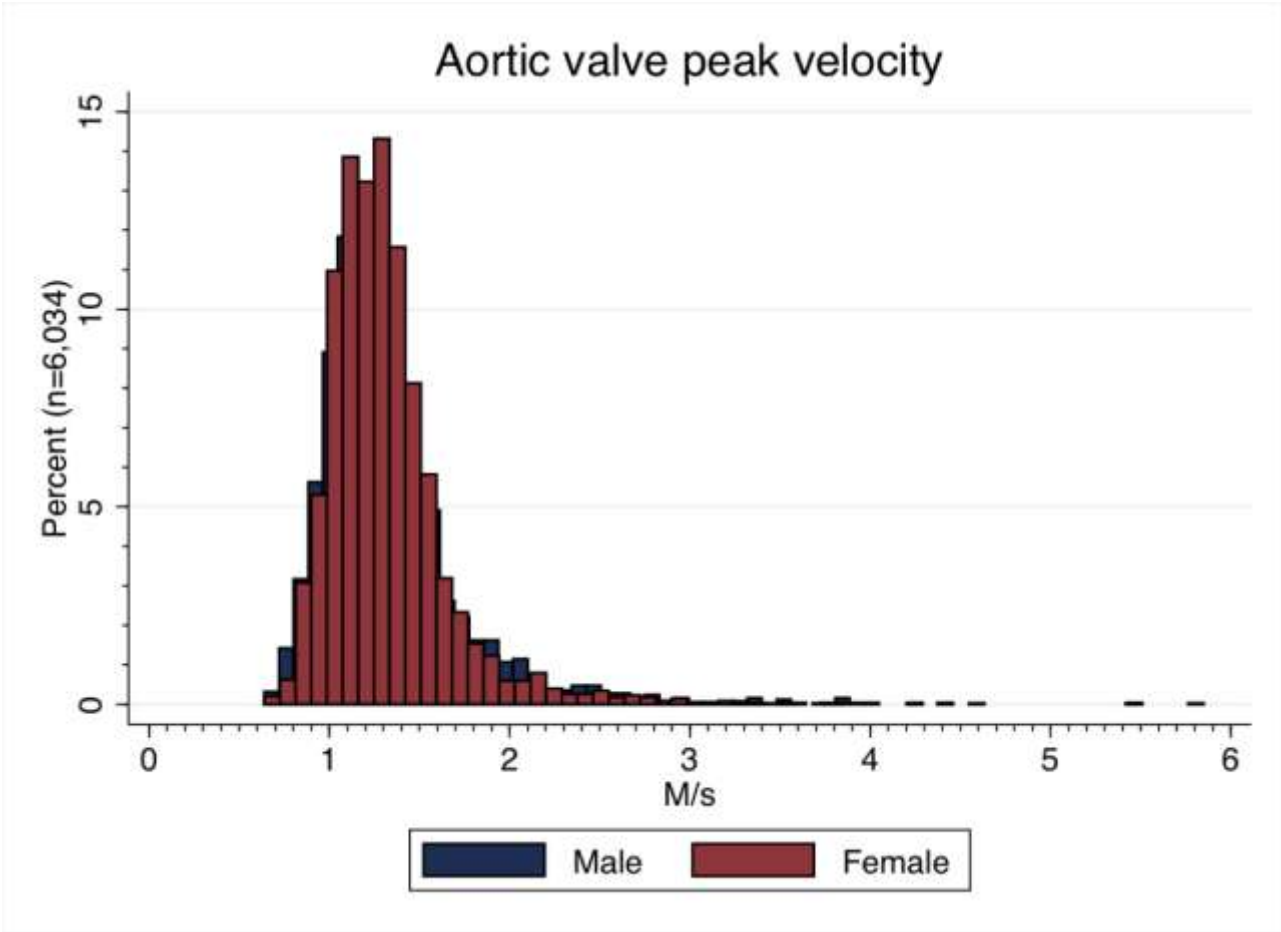
Figure S6. Population attributable fraction for AV dysfunction (sclerosis or stenosis) associated with a percent attained CVHS through Visit 4 of <50%, <60%, <70%, and <80%.



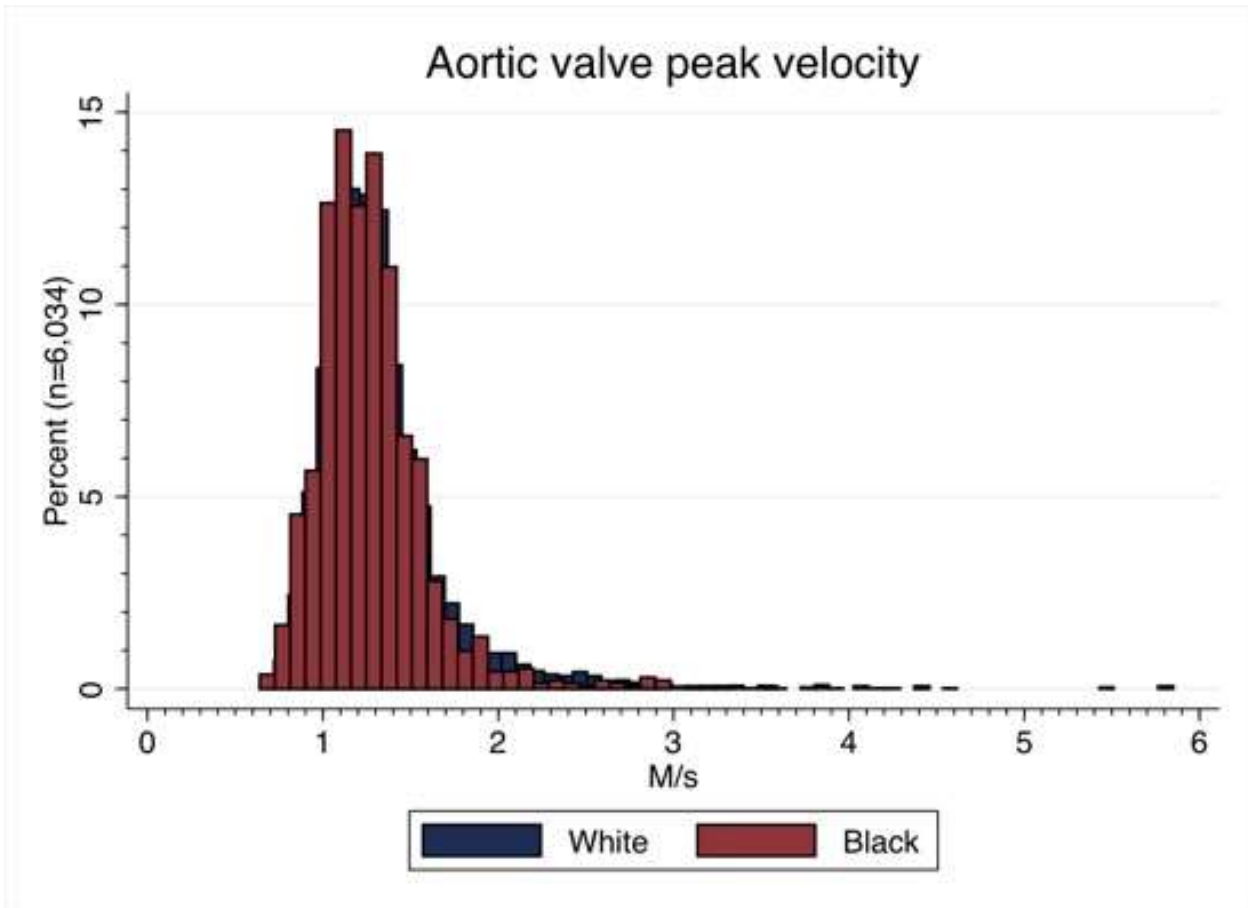
Values represent the proportion of AV dysfunction that would be prevented if percent attained CVHS through Visit 4 were consistently $\geq 50\%$, $\geq 60\%$, $\geq 70\%$, or $\geq 80\%$ respectively. AV = Aortic valve; CVHS = Cardiovascular health score.

Figure S7. Histograms of (a) AV peak velocity and (b) AV area at ARIC visit 5 by sex and race.

a)



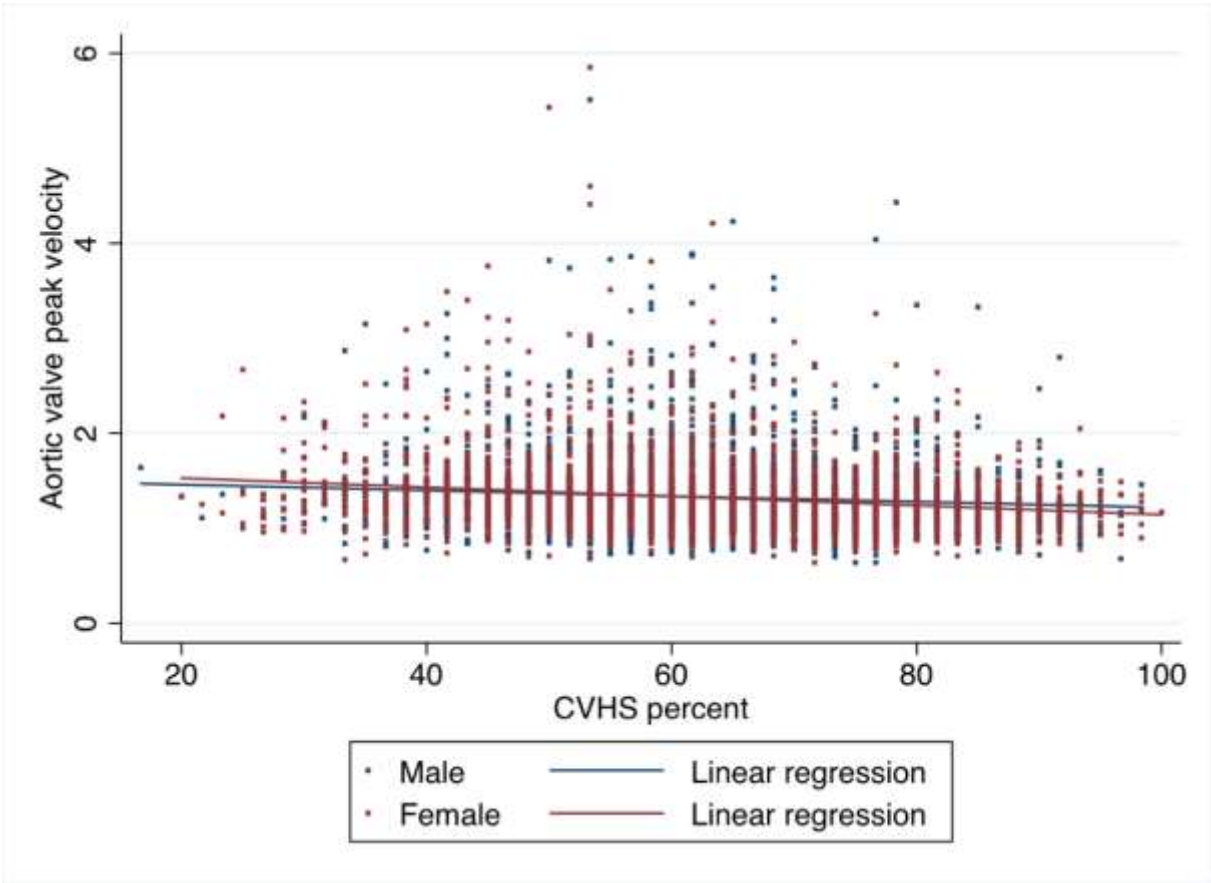
b)



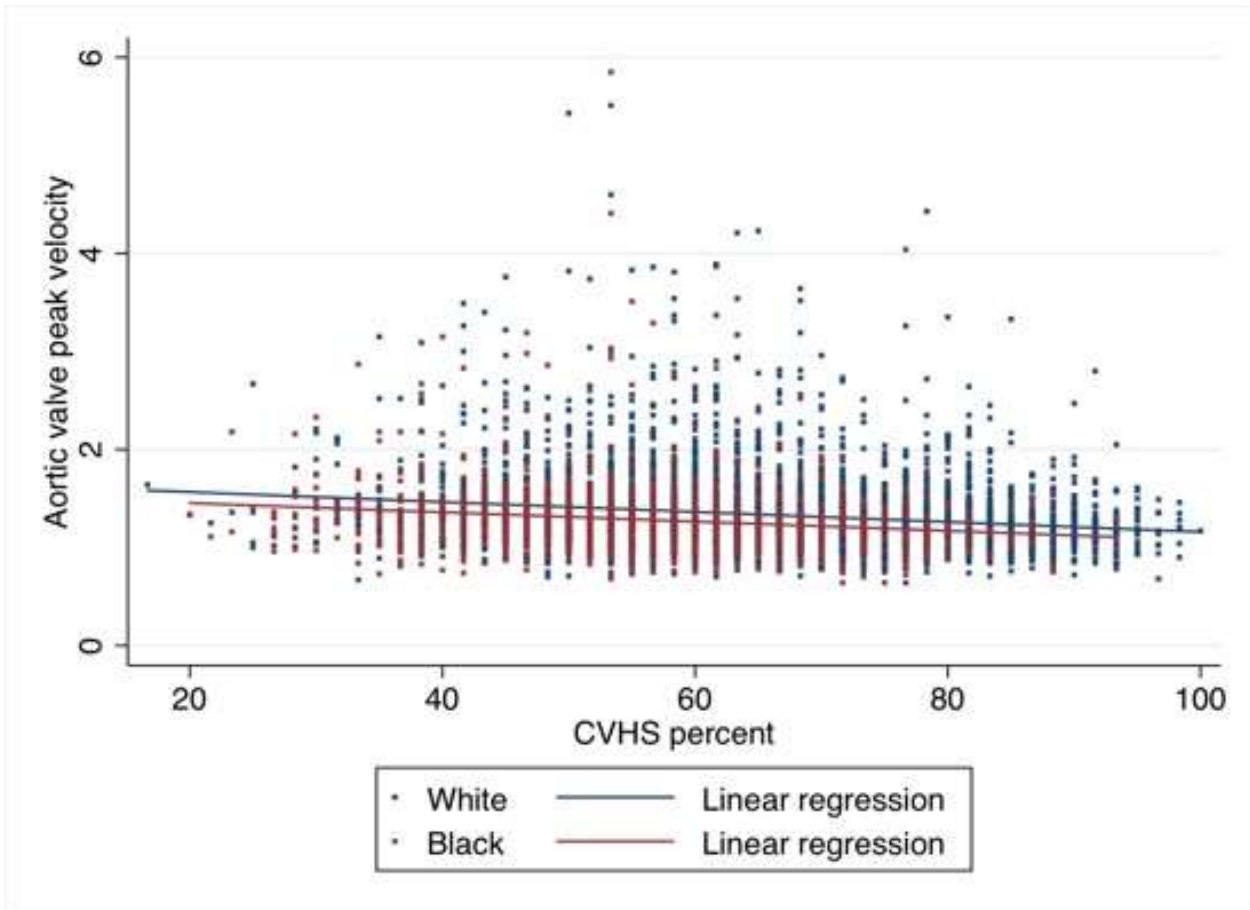
Atherosclerosis Risk in Communities Stud; AV = Aortic valve; CVHS = Cardiovascular health score

Figure S8. Scatter plots of AV peak velocity and percent attained CVHS with fitted linear regression lines by (a) sex and (b) race.

a)

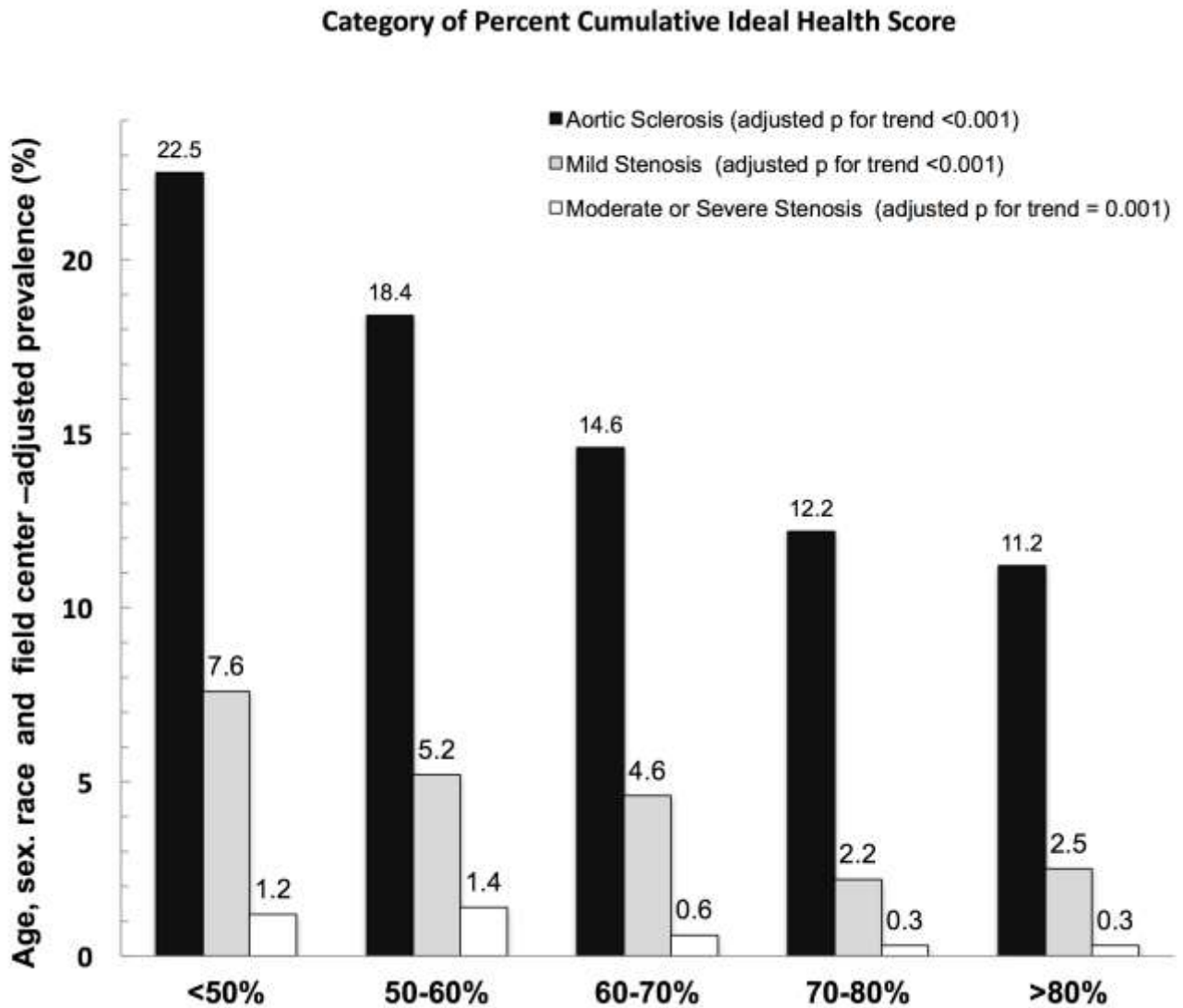


b)



AV = Aortic valve; CVHS = Cardiovascular health score

Figure S9. Prevalence of AS, defined using the AV peak velocity, based on category of percent attained CVHS from visit 1 through 5 utilizing inverse probability of attrition weighting.



P for trend across categories is adjusted for age, sex, and field center. AS = Aortic stenosis; AS = Aortic stenosis; AV = Aortic valve; CVHS = Cardiovascular health score.