Supplemental Material

Supplemental Table 1: Demographics and clinical characteristics of patients hospitalized with acute decompensated heart failure, stratified by absence or presence of in-hospital echocardiography. The community surveillance component of the Atherosclerosis Risk in Communities Study, 2005-2014.

Characteristic	No Echocardiography			In-Hospital Echocardiography			No Echo vs. Echo	
	2005-2009 N=1364 N=6702*	*2010-2014* N=1629 N=7398*	Annual Trend *P-value†*	*2005-2009* N=2092 N=9719*	*2010-2014* N=3368 N=15,218*	Annual Trend *P-value†*	Comparison (Aggregate) *P-value‡*	Comparison (Trends) *P-value§*
Demographics								
Age	76 ± 0.3	77 ± 0.3	0.08	75 ± 0.3	76 ± 0.2	0.02	0.003	1.0
Female	3554 (53%)	3786 (51%)	<0.0001	5294 (54%)	7805 (51%)	<0.0001	0.7	0.7
White	4962 (74%)	5012 (68%)	<0.0001	6703 (69%)	10223 (67%)	0.001	0.008	0.003
Cardiovascular								
Coronary artery disease	4468 (67%)	4310 (58%)	<0.0001	5444 (56%)	6926 (52%)	0.005	<0.0001	0.3
Peripheral artery disease	964 (14%)	1115 (15%)	0.6	1258 (13%)	1782 (12%)	0.2	0.003	0.4
Hypertension	5593 (84%)	6375 (86%)	0.07	8131 (84%)	13473 (89%)	<0.0001	0.06	0.3
Pulmonary hypertension	1247 (19%)	1683 (23%)	0.01	1225 (13%)	2474 (16%)	0.001	<0.0001	0.9
Atrial fibrillation	2753 (41%)	3304 (45%)	0.06	2976 (31%)	5808 (38%)	<0.0001	<0.0001	0.2
Stroke / TIA	1434 (21%)	1650 (22%)	0.6	1831 (19%)	3039 (20%)	0.4	0.03	0.8
Valvular heart disease	1808 (27%)	2106 (28%)	0.4	1909 (20%)	3798 (25%)	<0.0001	<0.0001	0.4
Myocardial infarction	1948 (29%)	1749 (24%)	0.0009	2470 (25%)	3719 (24%)	0.5	0.2	0.2
Non-Cardiovascular								
Obesity	2025 (37%)	2444 (40%)	0.07	2953 (35%)	5594 (40%)	0.0001	0.8	0.6
Diabetes mellitus	3314 (49%)	3688 (50%)	0.05	4422 (45%)	7318 (48%)	0.09	0.04	0.9
Chronic kidney disease	4504 (68%)	3187 (64%)	0.06	6152 (64%)	5776 (61%)	0.2	0.01	0.3
Chronic bronchitis / COPD	2764 (41%)	3153 (43%)	0.5	2888 (30%)	5163 (34%)	0.004	<0.0001	0.4
Sleep apnea	734 (11%)	1269 (17%)	<0.0001	735 (8%)	2217 (15%)	<0.0001	0.005	0.5
Depression	1247 (19%)	1447 (20%)	0.5	1336 (14%)	2892 (19%)	<0.0001	0.03	0.1
Anemia	3043 (46%)	3757 (52%)	0.005	3845 (40%)	7685 (51%)	<0.0001	0.07	0.1
Thyroid disease	1322 (20%)	1706 (23%)	0.04	1813 (19%)	3215 (21%)	0.06	0.2	0.7

*Weighted sample sizes. †P-values for temporal increase or decrease in annual prevalence assessed by logistic regression, regressing on year of admission and using the Cochrane-Armitage test for trend. *P*-values for temporal increase or decrease in annual mean age tested by linear regression, regressing on year of admission.

‡P-values for aggregate comparisons between HFrEF vs. HFpEF analyzed by aggregating data across 2005-2014, with mean values tested by least square means from linear regression, and prevalence values tested by Rao-Scott χ_2 tests.

§P-values comparing differences in temporal comorbidity or demographic trends between HFrEF vs. HFpEF tested by the linear or logistic regression, regressing on echocardiography (yes/no) and year of admission and testing the multiplicative interaction of echocardiography (yes/no) with year of admission

Obesity defined by a BMI ≥30 m/kg$_2$ and limited to patients with available height and weight data (13% missing)

CKD defined by receipt of dialysis or an eGFR <45 mL/min/1.73m$_2$ in patients with available serum creatinine assessments (21% missing, no creatinine abstractions performed in 2014)

Supplemental Table 2: Increment in 28-day mortality hazard ratio per increase in 1 comorbidity among patients hospitalized with acute decompensated heart failure, stratified by heart failure type. The community surveillance component of the Atherosclerosis Risk in Communities (ARIC) study, 2005-2013

28-day mortality	HR (95% CI)	Interaction *P* value
Overall		0.1
HFrEF	1.07 (0.99 - 1.16)	
HFpEF	1.19 (1.10 - 1.29)	
Women		0.1
HFrEF	1.06 (0.94 - 1.20)	
HFpEF	1.22 (1.11 - 1.35)	
Men		0.8
HFrEF	1.09 (0.99 - 1.21)	
HFpEF	1.11 (0.97 - 1.28)	
2005-2009		0.4
HFrEF	1.08 (0.96 - 1.21)	
HFpEF	1.17 (1.04 - 1.31)	
2010-2013		0.3
HFrEF	1.08 (0.98 - 1.19)	
HFpEF	1.20 (1.08 - 1.34)	

Supplemental Table 3: Hazard ratios of 1-year mortality associated with individual comorbidities, stratified by sex and by heart failure type among patients hospitalized with acute decompensated heart failure. The community surveillance component of the Atherosclerosis Risk in Communities study, 2005-2014*
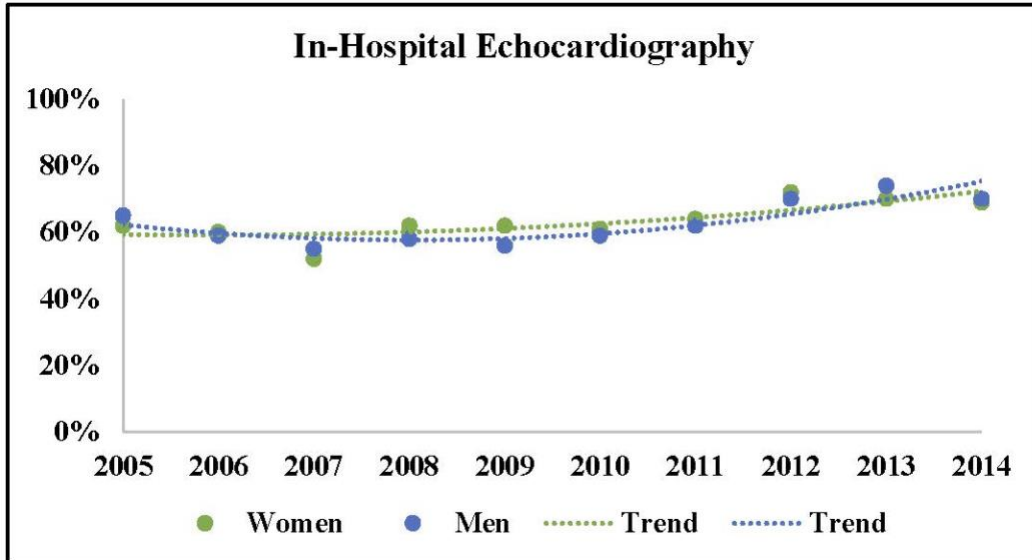
Comorbidity	HFpEF Women HR (95% CI)	HFrEF Women HR (95% CI)	Interaction By HF type P-value	HFpEF Men HR (95% CI)	HFrEF Men HR (95% CI)	Interaction By HF Type P-value
Coronary artery disease	1.15 (0.93 - 1.42)	0.87 (0.69 - 1.10)	0.07	1.10 (0.84 - 1.43)	1.03 (0.84 - 1.25)	0.8
Myocardial infarction	0.97 (0.74 - 1.27)	0.94 (0.73 - 1.20)	0.8	1.15 (0.85 - 1.56)	1.04 (0.85 - 1.27)	0.7
Peripheral artery disease	1.57 (1.17 - 2.12)	1.31 (0.98 - 1.75)	0.4	1.12 (0.78 - 1.61)	1.51 (1.20 - 1.91)	0.1
Hypertension	0.81 (0.58 - 1.11)	1.13 (0.80 - 1.59)	0.2	0.82 (0.55 - 1.21)	1.09 (0.82 - 1.45)	0.2
Atrial fibrillation	1.27 (1.03 - 1.56)	1.00 (0.79 - 1.26)	0.2	1.41 (1.07 - 1.84)	0.94 (0.76 - 1.15)	0.01
Stroke / TIA	1.34 (1.05 - 1.72)	0.96 (0.73 - 1.27)	0.09	1.46 (1.09 - 1.95)	1.29 (1.04 - 1.60)	0.6
Valvular heart disease	1.07 (0.84 - 1.36)	1.25 (0.98 - 1.61)	0.4	1.70 (1.28 - 2.27)	1.14 (0.91 - 1.42)	0.04
Pulmonary hypertension	1.42 (1.12 - 1.80)	1.41 (1.04 - 1.91)	1.0	1.54 (1.11 - 2.14)	1.17 (0.89 - 1.54)	0.3
Obesity	1.14 (0.88 - 1.48)	0.78 (0.54 - 1.14)	0.5	0.88 (0.61 - 1.26)	0.95 (0.69 - 1.32)	0.4
Diabetes mellitus	0.93 (0.74 - 1.17)	1.07 (0.86 - 1.33)	0.5	1.36 (1.05 - 1.77)	1.09 (0.91 - 1.31)	0.3
Chronic kidney disease	1.46 (1.14 - 1.87)	1.57 (1.18 - 2.09)	0.6	1.81 (1.24 - 2.63)	1.75 (1.38 - 2.23)	0.9
Chronic bronchitis / COPD	1.39 (1.12 - 1.72)	1.21 (0.94 - 1.56)	0.5	1.43 (1.09 - 1.89)	1.31 (1.08 - 1.60)	0.4
Sleep apnea	1.26 (0.93 - 1.71)	0.96 (0.59 - 1.55)	0.2	1.06 (0.72 - 1.55)	0.87 (0.63 - 1.22)	0.3
Depression	1.43 (1.13 - 1.81)	1.26 (0.97 - 1.65)	0.4	1.75 (1.24 - 2.47)	1.47 (1.11 - 1.94)	0.6
Anemia	1.58 (1.27 - 1.98)	1.44 (1.16 - 1.79)	0.8	1.89 (1.44 - 2.50)	1.74 (1.44 - 2.10)	0.6
Thyroid disease	1.29 (1.04 - 1.60)	1.17 (0.91 - 1.51)	0.5	1.51 (1.06 - 2.15)	1.08 (0.80 - 1.45)	0.07

*Footnote: Models adjusted for age, race, year of admission, and hospital of admission
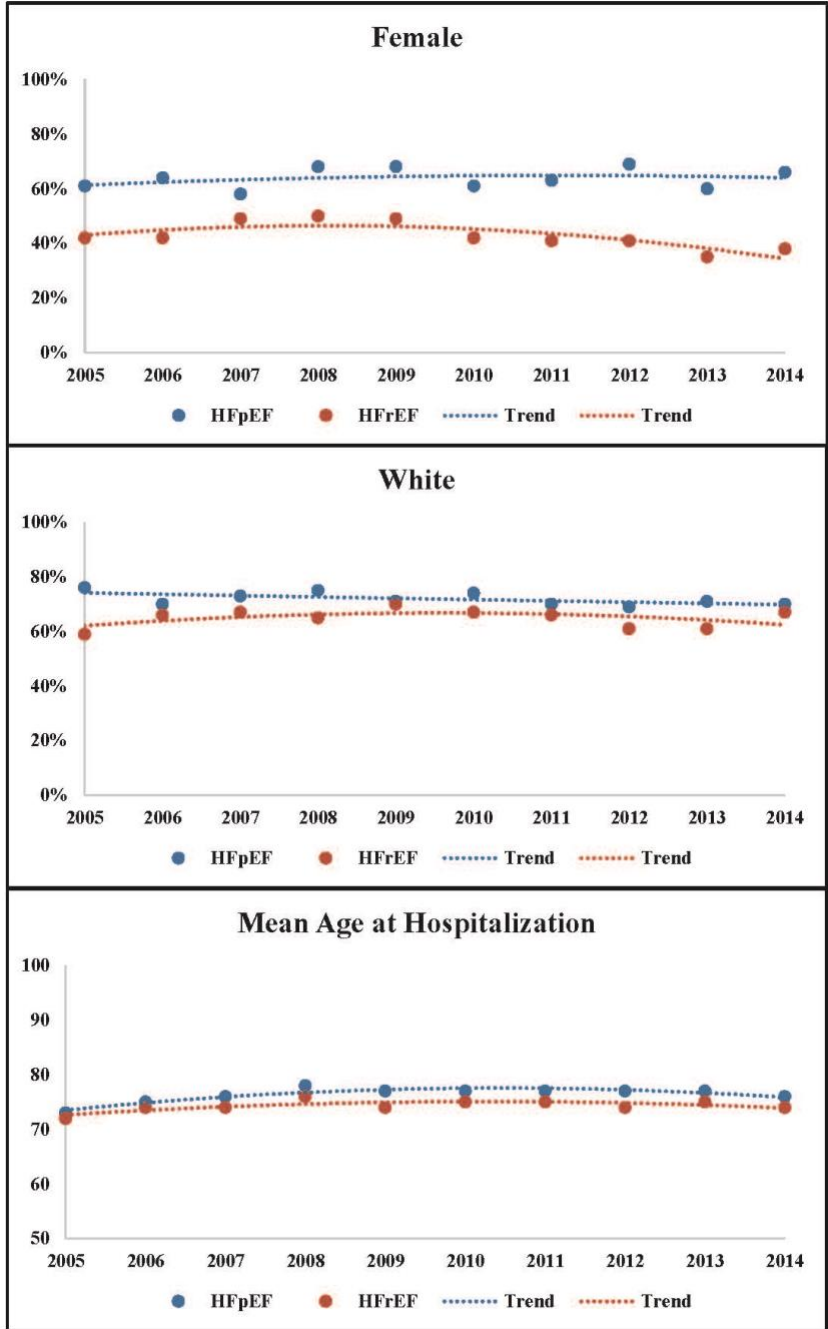
HFpEF = heart failure with preserved ejection fraction, HFrEF = heart failure with reduced ejection fraction,

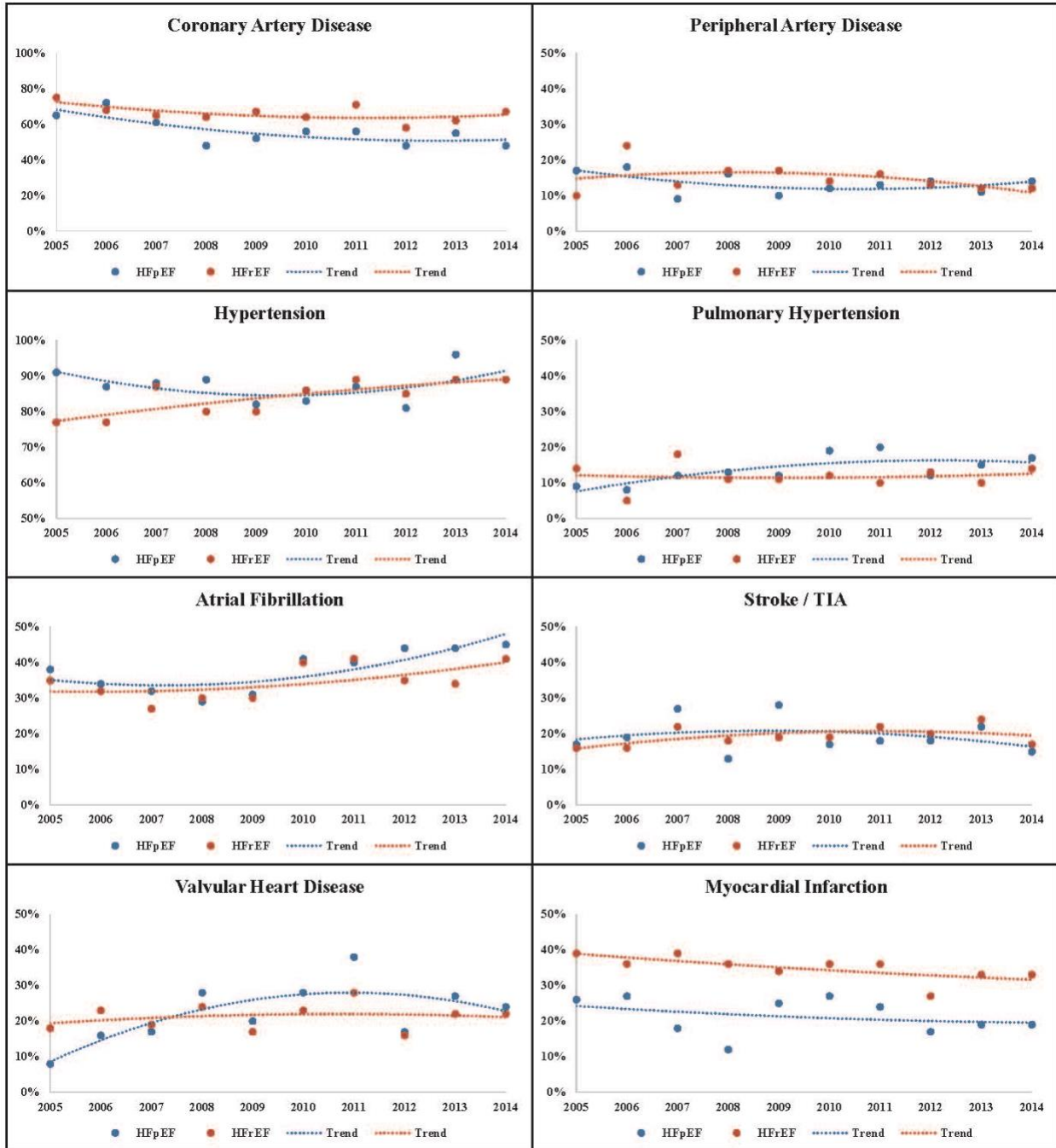TIA = transient ischemic attack, COPD = chronic obstructive pulmonary disease

Supplemental Figure 1: Proportion of patients hospitalized with acute decompensated heart failure who received in-hospital echocardiography, stratified by sex. The community surveillance component of the Atherosclerosis Risk in Communities Study, 2005-2014.
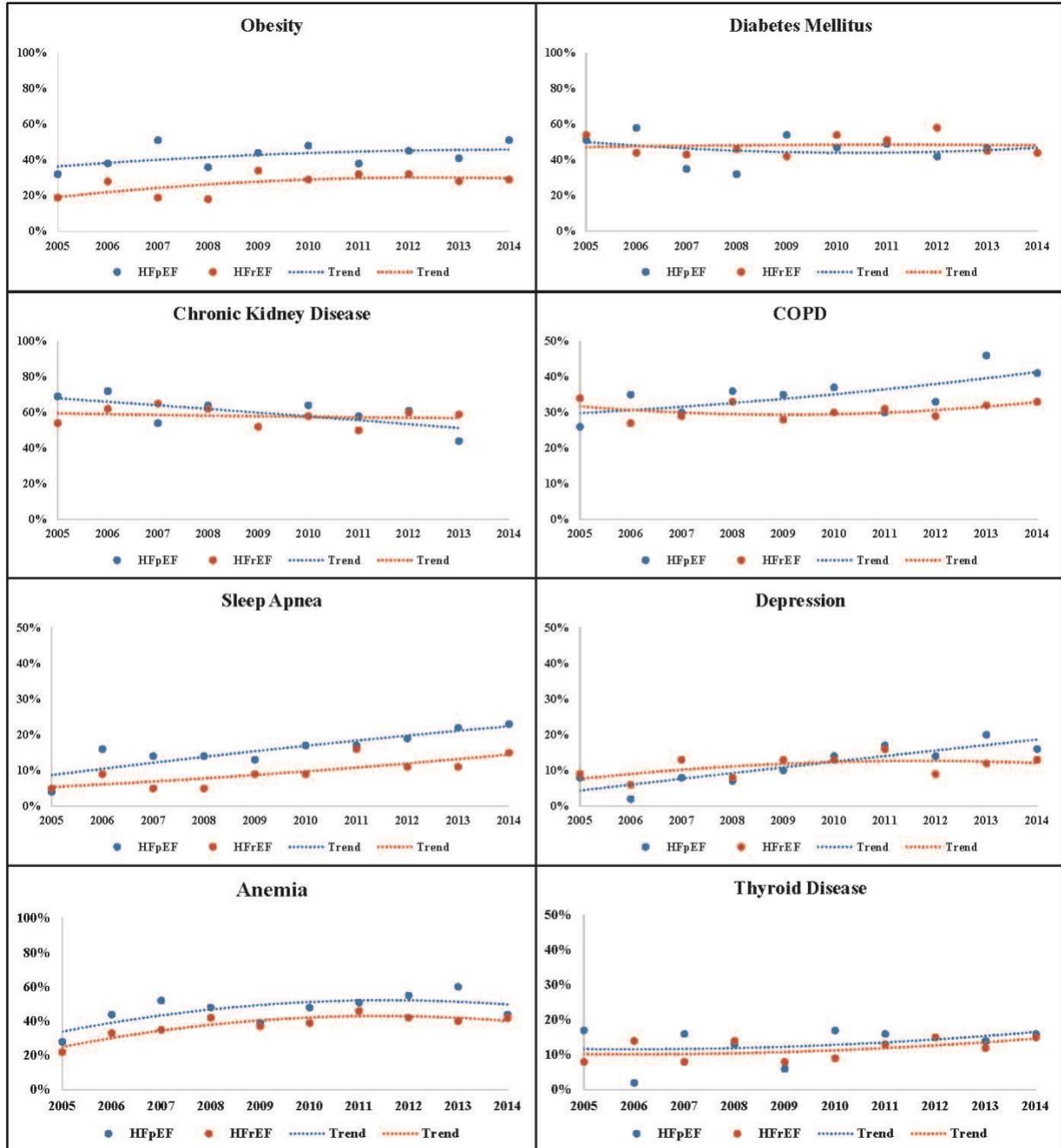
Supplemental Figure 2: Annual demographic distributions among patients hospitalized with acute decompensated heart failure, stratified by heart failure with reduced and preserved ejection fraction. The community surveillance component of the Atherosclerosis Risk in Communities Study, 2005-2014.
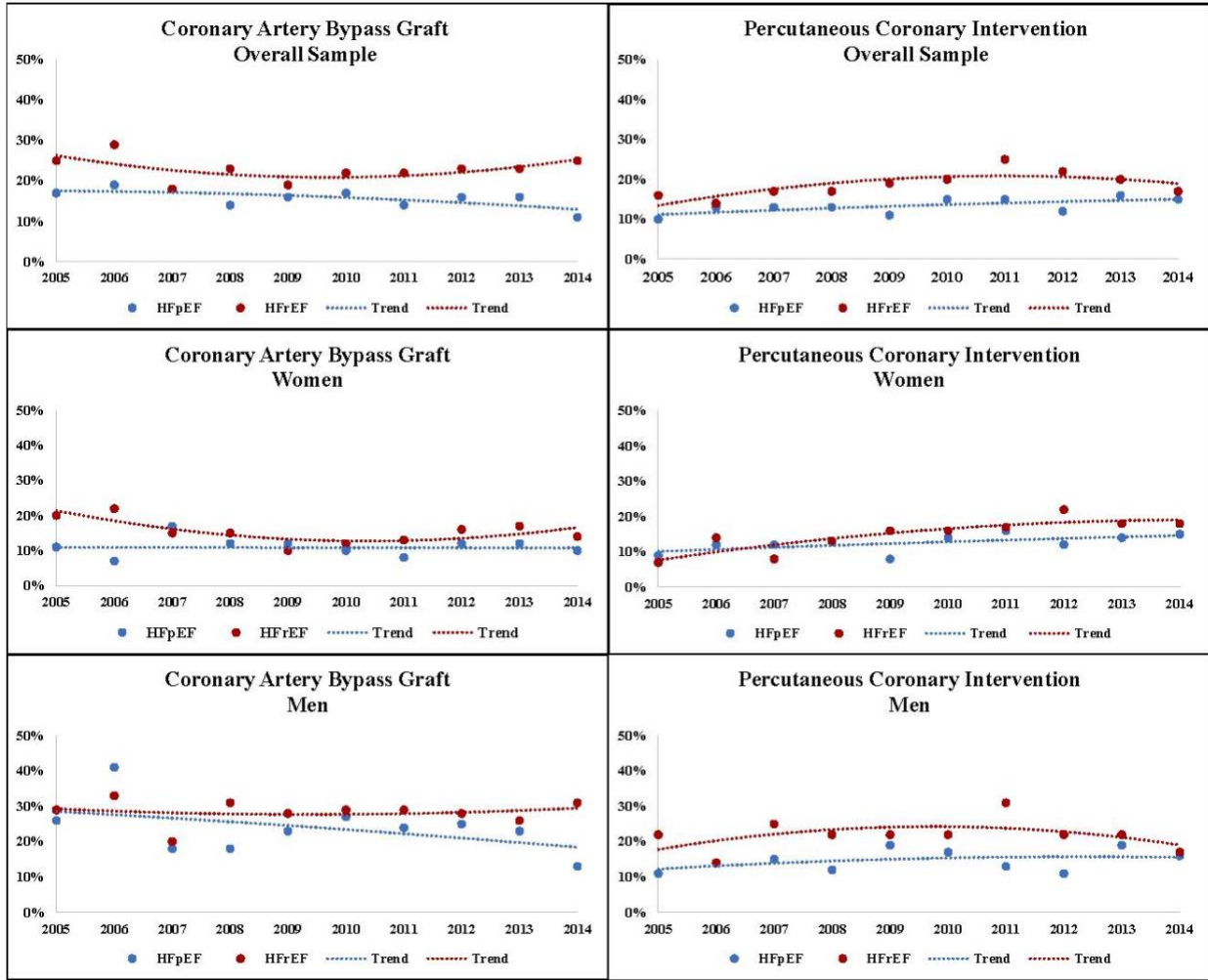
Supplemental Figure 3: Annual prevalence of cardiovascular comorbidities among men hospitalized with acute decompensated heart failure in 2005-2014, stratified by heart failure with preserved and reduced ejection fraction. The community surveillance component of the Atherosclerosis Risk in Communities Study (ARIC).

Supplemental Figure 4: Annual prevalence of non-cardiovascular comorbidities among men hospitalized with acute decompensated heart failure in 2005-2014, stratified by heart failure with preserved and reduced ejection fraction. The community surveillance component of the Atherosclerosis Risk in Communities Study (ARIC).
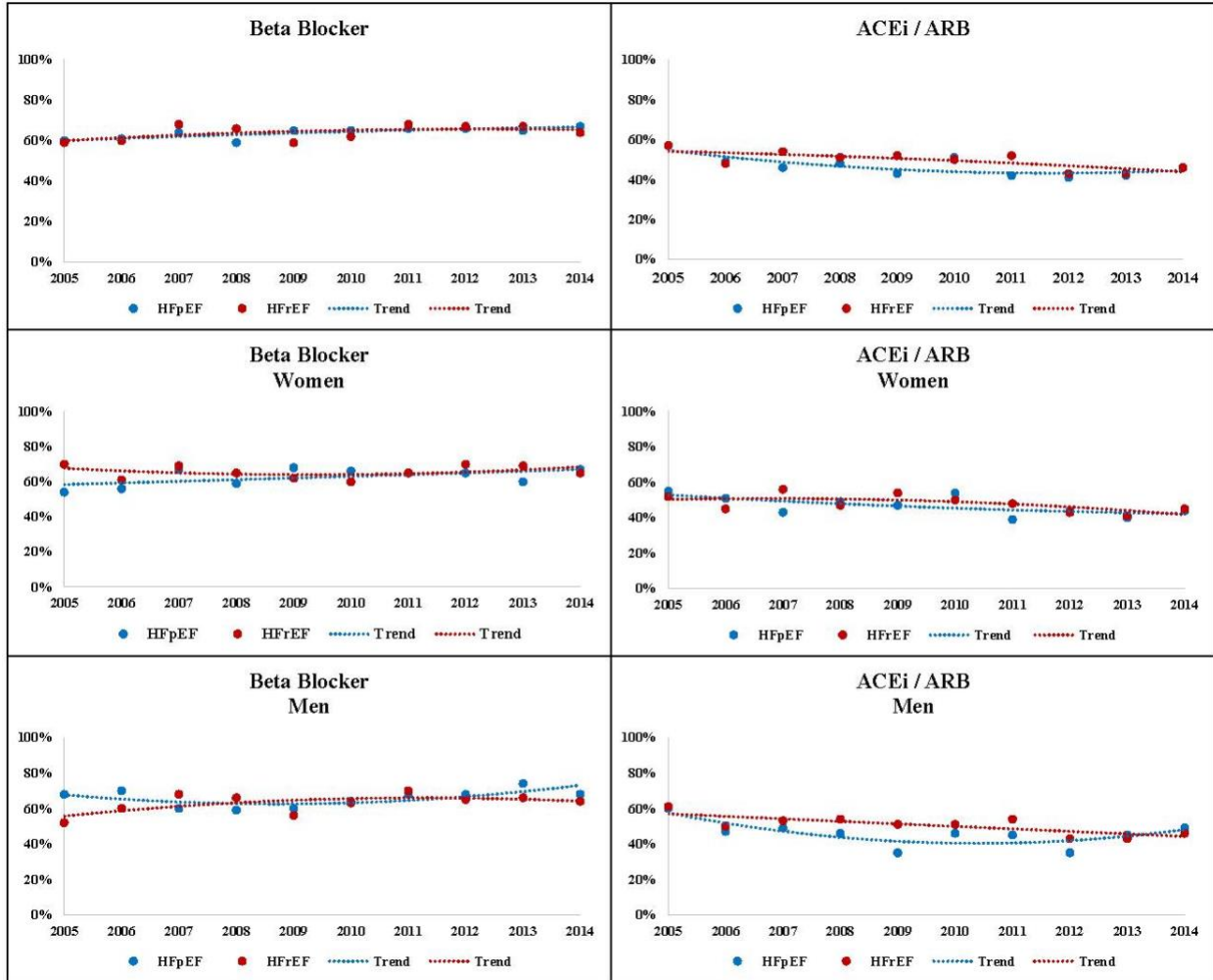
Supplemental Figure 5: Annual proportion of patients undergoing revascularization within 2 years prior to ADHF hospitalization, stratified by sex and heart failure with reduced vs. preserved ejection fraction. The community surveillance component of the Atherosclerosis Risk in Communities Study, 2005-2014.
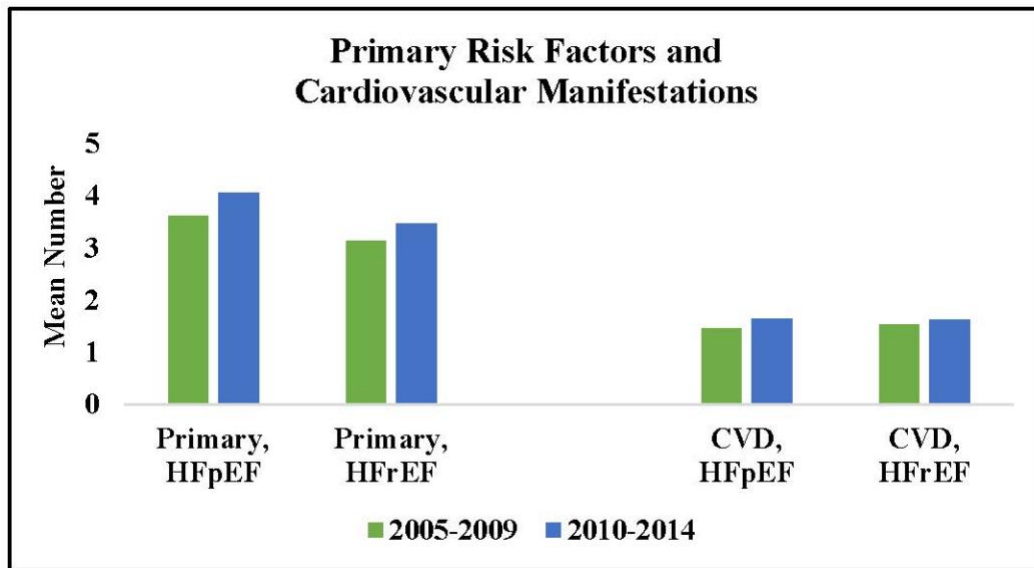

HFpEF = heart failure with preserved ejection fraction
HFrEF = heart failure with reduced ejection fraction

Supplemental Figure 6: Annual proportion of patients receiving beta blockers and angiotensin converting enzyme inhibitor / angiotensin receptor blockers during ADHF hospitalization, stratified by sex and heart failure with reduced vs. preserved ejection fraction. The community surveillance component of the Atherosclerosis Risk in Communities Study, 2005-2014.

ACEi / ARB = angiotensin converting enzyme inhibitor / angiotensin receptor blockers
HFpEF = heart failure with preserved ejection fraction
HFrEF = heart failure with reduced ejection fraction

Supplemental Figure 7: Mean number* of primary heart failure risk factors and co-existing cardiovascular conditions among patients hospitalized with acute decompensated heart failure in 2005-2014†, stratified by heart failure with preserved and reduced ejection fraction. The community surveillance component of the Atherosclerosis Risk in Communities Study (ARIC).

*Primary risk factors for heart failure include a total of 9 possible comorbidities (hypertension, obesity, diabetes mellitus, chronic kidney disease, chronic obstructive pulmonary disease, sleep apnea, depression, anemia and thyroid disease),

*Cardiovascular conditions include a total of 6 possible comorbidities (coronary artery disease, peripheral artery disease, atrial fibrillation, valvular heart disease, pulmonary hypertension, and stroke / transient ischemic attack)

†Primary heart failure risk factors limited to 2005-2013, because serum creatinine not abstracted in 2014.