Supplemental Online Content

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eMethods

1. Derivation of echocardiographic measures

2. Measurements of non-cardiac plasma markers

3. Definition of social determinants of health

4. Details of multiple imputation by chained equations
1. Derivation of echocardiographic measures

Mean wall thickness (MWT) was calculated as the mean of the septal and posterior wall thicknesses. Relative wall thickness (RWT) was calculated using the following formula:

\[
RWT = \frac{2 \times PWT}{LVEDD}
\]

where PWT is posterior wall thickness and LVEDD is left ventricular end-diastolic dimension. Fractional shortening was defined as follows:

\[
\frac{(LVEDD - LVESD)}{(LVEDD)} \times 100\%
\]

where LVESD is LV end-systolic dimension. LV mass (LVM) was calculated using the formula:

\[
0.89 \times (1.04 \times ((SWT + LVEDD + PWT)^3 - (LVEDD)^3)) + 0.6
\]

where SWT is septal wall thickness, and indexed to BSA to derive LV mass index (LVMI). LVEF was calculated using Teichholz method:

\[
\frac{(7/(2.4+LVEDD) \times (LVEDD)^3) - (7/(2.4+LVESD)) \times (LVESD)^3)}{(7/(2.4+LVEDD) \times (LVEDD)^3))} \times 100\%.
\]

When a quantitative LVEF was not available, semiquantitative measures were used (LVEF estimated to nearest 5%). Valvular disease was graded qualitatively as previously described.
2. Measurements of non-cardiac plasma markers

Plasma adiponectin was measured in nanograms per milliliter, by an ELISA system (R&D Systems; Minneapolis, MN, USA)\(^3\). Leptin was analyzed with Human Leptin RIA kit (LINCO Research, St Charles, MI, USA)\(^3\). HbA1c was measured using a TOSOH high-performance liquid chromatography system at the University of Minnesota Department of Laboratory Medicine and Pathology\(^2\). High sensitivity C-reactive protein (hs-CRP) was measured using an immunoturbidimetric CRP-Latex assay from Kamiya Biomedical Company following manufacturer’s high-sensitivity protocol\(^4\).
3. **Definition of social determinants of health**

   Income status was categorized into 4 levels: poor defined as income less than poverty level; lower-middle defined as income 1 to 1.5 times the poverty level; upper-middle defined as income greater than 1.5 but less than 3.5 times the poverty level; and affluent defined as income no less than 3.5 times the poverty level.\(^5\) Educational attainment was based on self-report of years of schooling completed: less than high school; high school graduate or general equivalency; and vocational school, trade school or college graduate.\(^5\) The neighborhood problems scale comprised 6 items scored from 1 (not really a problem) to 4 (very serious problem): excessive noise; heavy traffic or speeding cars; lack of access to adequate food and/or shopping; lack of parks and playground; trash and litter; and no sidewalks and poorly maintained sidewalks.\(^6\)
4. Details of multiple imputation by chained equations

Imputation was performed for 11 clinical and echocardiographic measures (LVMI, LVEF, LAD, PP, ppFEV1, eGFR, HbA1c, Waist, hypertension, diabetes, smoking status) with missing data and was based on linear regression using 9 baseline clinical variables (age, gender, BMI, SBP, adiponectin, leptin, hsCRP, HTN meds, DM meds) and 3 echocardiographic measures (LVEDD, MWT, RWT) as predictor variables and was derived over 40 imputations.
eFigure 1. Study Population Flow Chart

The flow chart of the eligibility of the study population. HF, heart failure.
**eFigure 2.** Associations of Cardiovascular and Noncardiovascular Dysfunctions With Incident HF

Subclinical impairments in both cardiovascular and non-cardiovascular organ function differentially associated with risk of incident HFpEF and HFrEF in Black Adults.

HF = heart failure; HFrEF = HF with reduced ejection fraction; HFpEF = HF with preserved ejection fraction; LVEF = left ventricular ejection fraction; LVMI = left ventricular mass index; ppFEV1 = percent predicted forced expiration volume in 1 second; HbA1c = hemoglobin A1c; LAD = left atrial diameter; PP = pulse pressure; waist = waist circumference; eGFR = estimated glomerular filtration rate.
**eTable 1. Systems Evaluated in Risk Models for Heart Failure**

| Systems               | Variables                                                                 |
|-----------------------|---------------------------------------------------------------------------|
| LV structure          | LV mass index (LVMI), diastolic LV diameter (LVEDD), LV mean wall thickness (MWT), LV relative wall thickness (RWT) |
| LV systolic function  | LV ejection fraction (LVEF), fractional shortening (not used due to high missingness) |
| LV diastolic function | E/A ratio, LA diameter (LAD)                                               |
| Systemic arterial function | Pulse pressure (PP)                                                        |
| Renal function        | eGFR, random spot urine albumin (not used due to high missingness)         |
| Pulmonary function     | Percent predicted forced expiration volume in 1 second (ppFEV1), Percent predicted forced vital capacity (ppFVC), FEV1/FVC |
| Dysglycemia           | Diabetes, diabetes medicine (DM Meds), HbA1c                               |
| Body composition      | body mass index (BMI), waist circumference (waist), adiponectin, leptin    |
| Inflammation          | hs-CRP                                                                     |
## eTable 2. Cardiovascular and Noncardiovascular Characteristics by Incident HF Subtypes in Women

|                      | No HF   | HFpEF  | HFrEF  | Unclassified HF | P value |
|----------------------|---------|--------|--------|-----------------|---------|
| **Age (years)**      | 54±12   | 66±10  | 64±10  | 67±10           | p<0.001 |
| **LV Structure**     |         |        |        |                 |         |
| LVEDD (mm)           | 47.3±3.9| 47.7±4.4| 49.2±4.3| 48.1±5.5        | p<0.001 |
| MWT (mm)             | 8.5±1.3 | 9.2±1.4| 8.9±1.5| 9.3±1.0         | p<0.001 |
| RWT                  | 0.35±0.06| 0.38±0.07| 0.36±0.06| 0.37±0.05       | p<0.001 |
| LVMI (g/m²)          | 70.3±17.1| 77.8±19.7| 80.2±20.8| 81.5±21.9       | p<0.001 |
| **LV Systolic Function** |         |        |        |                 |         |
| LVEF (%)             | 64.4±7.4| 64.7±7.3| 59.9±9.1| 63.5±8.6        | p<0.001 |
| **LV Diastolic Function** |         |        |        |                 |         |
| LA diameter (mm)     | 34.2±4.0| 36.0±4.4| 35.5±6.1| 35.7±3.5        | p<0.001 |
| E/A                  | 1.09±0.34| 0.92±0.28| 0.96±0.27| 0.97±0.20       | p<0.001 |
| **Systemic Arterial Function Related** |         |        |        |                 |         |
| Hypertension         | 1407(55.1%)| 100(84.7%)| 56(74.7%)| 22(78.6%)       | p<0.001 |
| HTN Meds             | 1332(52.5%)| 99(83.9%)| 55(73.3%)| 22(78.6%)       | p<0.001 |
| SBP (mmHg)           | 126±16 | 134±20 | 133±16 | 140±21          | p<0.001 |
| Pulse Pressure (mmHg)| 51±14  | 62±18  | 60±16  | 67±22           | p<0.001 |
| **Pulmonary Function** |         |        |        |                 |         |
| ppFEV1 (%)           | 94±17  | 88±20  | 91±19  | 95±19           | p<0.001 |
| ppFVC (%)            | 93±18  | 88±20  | 94±28  | 93±22           | p=0.039 |
| FEV1/FVC             | 0.82±0.08| 0.79±0.09| 0.78±0.11| 0.80±0.06       | p<0.001 |
| **Renal Function**   |         |        |        |                 |         |
| eGFR (ml/(min.1.73m²)) | 97±20  | 80±26  | 81±30  | 86±24           | p<0.001 |
| **Dysglycemia Related** |         |        |        |                 |         |
| Diabetes             | 528(20.9%)| 62(53.0%)| 40(53.3%)| 11(39.3%)       | p<0.001 |
| HbA1c (%)            | 5.9±1.2 | 6.8±2.0| 6.6±1.8| 6.3±1.2         | p<0.001 |
| DM Meds              | 345(13.6%)| 49(41.9%)| 31(41.3%)| 10(35.7%)       | p<0.001 |
| **Obesity Related**  |         |        |        |                 |         |
| BMI (kg/m²)          | 32.7±7.4| 34.9±7.7| 31.8±6.9| 33.5±7.1        | p=0.01  |
| Waist (cm)           | 100±16 | 109±16 | 102±17 | 105±17          | p<0.001 |
| Adiponectin (ng/ml)  | 4890 [3189,7364]| 5627 [3611,9424]| 5416 [3416,7887]| 5319 [4166,11735]| p=0.01 |
| Leptin (ng/ml)       | 32.9[22.3,46.5]| 39.2[24.9,60.8]| 31.5[20.1,44.1]| 35.0[20.6,57.8]| p=0.009 |
| **Inflammation**     |         |        |        |                 |         |
| hsCRP (mg/L)         | 0.34[0.14,0.68]| 0.52[0.20,0.88]| 0.35[0.19,0.81]| 0.25[0.13,0.54]| p=0.006 |
| **Smoking Status**   |         |        |        |                 |         |
| Ever Smoker          | 604(23.7%)| 43(36.4%)| 26(34.7%)| 8(28.6%)        | p=0.002 |
| Disease History | | | | | p<0.001 |
|-----------------|------------------|------------------|------------------|------------------|
| CHD (MI) history | 90(3.5 %) | 9(7.6 %) | 13(17.3%) | 3(10.7%) |

| Social Determinations of Health | | | | | p<0.001 |
|-------------------------------|------------------|------------------|------------------|------------------|
| **Income Status**             | | | | | |
| Affluent                      | 345(15.9%) | 26(27.1%) | 13(20.3%) | 6(25.0%) |
| Upper-middle                  | 550(25.4%) | 40(41.7%) | 22(34.4%) | 6(25.0%) |
| Lower-middle                  | 661(30.5%) | 20(20.8%) | 19(29.7%) | 4(16.7%) |
| Poor                          | 613(28.3%) | 10(10.4%) | 10(15.6%) | 8(33.3%) |

| Education Attainment Categorization | | | | | p<0.001 |
|-------------------------------------|------------------|------------------|------------------|------------------|
| Attended vocational school, trade school, or college | 374(14.7%) | 55(46.6%) | 26(34.7%) | 13(46.4%) |
| High school graduate/GED            | 514(20.2%) | 24(20.3%) | 17(22.7%) | 4(14.3%) |
| Less than high school               | 1660(65.1%) | 39(33.1%) | 32(42.7%) | 11(39.3%) |

| Neighborhood Problems | 1.56±0.18 | 1.66±0.16 | 1.60±0.15 | 1.60±0.19 | p<0.001 |

HF, heart failure; HFpEF, HF with preserved ejection fraction; HFpEF, HF with reduced ejection fraction; LVEDD, left ventricular end-diastolic dimension; MWT, left ventricular mean wall thickness; RWT, left ventricular relative wall thickness; LVMI, left ventricular mass index; LVEF, left ventricular ejection fraction; LA, left atrium; HTN, hypertension; SBP, systolic blood pressure; ppFEV1, percent predicted forced expiration volume in 1 second; ppFVC, percent predicted forced vital capacity; eGFR, estimated global filtration rate; HbA1c, hemoglobin A1c; Waist, waist circumference; hsCRP, high sensitivity C reactive protein; CHD, coronary heart disease; MI, myocardial infarction; GED, general educational development.
**eTable 3. Cardiovascular and Noncardiovascular Characteristics by Incident HF Subtypes in Men**

|                        | No HF  | HFpEF | HFrEF | Unclassified HF | P value |
|------------------------|--------|-------|-------|-----------------|---------|
| Age (years)            | 53±12  | 61±11 | 61±14 | 73±4            | **p<0.001** |
| LV Structure           |        |       |       |                 |         |
| LVEDD (mm)             | 49.6±4.0 | 48.4±5.0 | 51.9±5.9 | 50.8±3.9 | **p<0.001** |
| MWT (mm)               | 9.1±1.3 | 10.1±1.8 | 9.5±1.6 | 9.8±1.5 | **p<0.001** |
| RWT                    | 0.36±0.06 | 0.42±0.11 | 0.36±0.07 | 0.36±0.05 | **p<0.001** |
| LVMI (g/m²)            | 75.6±17.5 | 81.3±19.5 | 86.2±24.2 | 87.4±24.0 | **p<0.001** |
| LV Systolic Function   |        |       |       |                 |         |
| LVEF (%)               | 61.5±8.0 | 63.4±6.8 | 55.9±11.0 | 61.3±11.3 | **p<0.001** |
| LV Diastolic Function  |        |       |       |                 |         |
| LA diameter (mm)       | 35.9±4.2 | 38.5±4.5 | 37.0±5.5 | 38.3±4.8 | **p<0.001** |
| E/A                    | 1.13±0.35 | 0.98±0.32 | 0.99±0.34 | 0.88±0.21 | **p<0.001** |
| Systemic Arterial Function Related |      |       |       |                 |         |
| Hypertension           | 686(47.1%) | 36(80.0%) | 52(73.2%) | 9(81.8%) | **p<0.001** |
| HTN Meds               | 578(40.0%) | 32(71.1%) | 45(64.3%) | 8(80.0%) | **p<0.001** |
| SBP (mmHg)             | 127±16 | 138±19 | 133±18 | 132±18 | **p<0.001** |
| Pulse Pressure (mmHg)  | 49±13 | 60±17 | 55±14 | 58±13 | **p<0.001** |
| Pulmonary Function      |        |       |       |                 |         |
| ppFEV1 (%)             | 91±16 | 83±17 | 84±18 | 74±22 | **p<0.001** |
| ppFVC (%)              | 90±15 | 82±16 | 85±14 | 74±19 | **p<0.001** |
| FEV1/FVC               | 0.80±0.09 | 0.78±0.08 | 0.77±0.10 | 0.74±0.07 | **p=0.007** |
| Renal Function         |        |       |       |                 |         |
| eGFR(ml/(min.1.73m²))  | 95±19 | 86±22 | 90±23 | 78±17 | **p<0.001** |
| Dysglycemia Related    |        |       |       |                 |         |
| Diabetes               | 259(17.9%) | 24(54.5%) | 28(40.0%) | 6(54.5%) | **p<0.001** |
| HbA1c (%)              | 5.9±1.2 | 6.9±2.0 | 6.6±2.1 | 7.1±2.2 | **p<0.001** |
| DM Meds                | 147(10.2%) | 20(44.4%) | 21(30.0%) | 4(40.0%) | **p<0.001** |
| Obesity Related        |        |       |       |                 |         |
| BMI (kg/m²)            | 29.6±5.8 | 32.3±6.9 | 30.9±5.5 | 30.2±5.1 | **p=0.006** |
| Waist (cm)             | 100±15 | 110±16 | 106±14 | 103±9 | **p=0.001** |
| Adiponectin (ng/ml)    | 3040 [2010,4806] | 3648 [1816,5937] | 3683 [2571,5812] | 5922 [3306,9642] | **p=0.002** |
| Leptin (ng/ml)         | 8.2[4.7,13.7] | 13.6[7.5,21.1] | 9.2[4.4,15.9] | 11.4[5.2,18.5] | **p=0.007** |
| Inflammation           |        |       |       |                 |         |
| hsCRP (mg/L)           | 0.16[0.07,0.35] | 0.25[0.14,0.42] | 0.19[0.10,0.42] | 0.29[0.09,0.43] | **p=0.05** |
| Smoking Status         |        |       |       |                 |         |
| Ever Smoker            | 607(41.7%) | 25(55.6%) | 35(50.0%) | 5(45.5%) | **p=0.16** |

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### Disease History

| CHD (MI) history | 79(5.4%) | 10(22.2%) | 7(9.9%) | 2(18.2%) | p<0.001 |

### Social Determinations of Health

| Income Status | p=0.002 |
|---------------|---------|
| Affluent      | 106(8.6%) | 4(10.3%) | 9(15.3%) | 1(12.5%) |
| Upper-middle  | 233(18.8%) | 11(28.2%) | 22(37.3%) | 2(25.0%) |
| Lower-middle  | 379(30.6%) | 10(25.6%) | 14(23.7%) | 5(62.5%) |
| Poor          | 520(42.0%) | 14(35.9%) | 14(23.7%) | 0(0.0%) |

### Education Attainment Categorization

| Attended vocational school, trade school, or college | 229(15.8%) | 11(24.4%) | 25(35.7%) | 7(63.6%) | p<0.001 |
| High school graduate/GED | 275(18.9%) | 9(20.0%) | 13(18.6%) | 3(27.3%) |
| Less than high school | 949(65.3%) | 25(55.6%) | 32(45.7%) | 1(9.1%) |

### Neighborhood Problems

| 1.54±0.19 | 1.62±0.18 | 1.58±0.18 | 1.63±0.16 | p=0.009 |

HF, heart failure; HFpEF, HF with preserved ejection fraction; HFpEF, HF with reduced ejection fraction; LVEDD, left ventricular end-diastolic dimension; MWT, left ventricular mean wall thickness; RWT, left ventricular relative wall thickness; LVMI, left ventricular mass index; LVEF, left ventricular ejection fraction; LA, left atrium; HTN, hypertension; SBP, systolic blood pressure; ppFEV1, percent predicted forced expiration volume in 1 second; ppFVC, percent predicted forced vital capacity; eGFR, estimated glomerular filtration rate; HbA1c, hemoglobin A1c; Waist, waist circumference; hsCRP, high sensitivity C reactive protein; CHD, coronary heart disease; MI, myocardial infarction; GED, general educational development.
**Table 4.** Associations of Cardiovascular and Noncardiovascular Measures With Incident HF Events in Unipredictor Multivariable Models Additionally Adjusting for Income Status and Education Attainment

|                          | Hazard Ratio for Incident HF |
|--------------------------|------------------------------|
|                          | HR (95% CI)                  | P value  |
| **LV Structure**         |                              |          |
| LVEDD (mm)               | 1.34 (1.19, 1.50)            | <0.001   |
| MWT (mm)                 | 1.17 (1.05, 1.31)            | 0.005    |
| RWT                      | 0.99 (0.88, 1.11)            | 0.91     |
| LVMI (g/m²)              | 1.23 (1.11, 1.35)            | <0.001   |
| **LV Systolic Function** |                              |          |
| LVEF (%)                 | 1.30 (1.17, 1.44)            | <0.001   |
| **LV Diastolic Function**|                              |          |
| LA diameter (mm)         | 1.23 (1.10, 1.37)            | <0.001   |
| E/A ratio                | 0.99 (0.85, 1.17)            | 0.95     |
| **Systemic Arterial Function** |                          |          |
| SBP (mmHg)               | 1.12 (1.00, 1.26)            | 0.054    |
| Pulse Pressure (mmHg)    | 1.16 (1.03, 1.30)            | <0.013   |
| **Pulmonary Function**   |                              |          |
| ppFEV1 (%)               | 1.29 (1.15, 1.45)            | <0.001   |
| ppFVC (%)                | 1.16 (1.03, 1.31)            | 0.014    |
| FEV1/FVC                 | 1.16 (1.04, 1.29)            | 0.006    |
| **Renal Function**       |                              |          |
| eGFR (ml/(min.1.73m²))   | 1.29 (1.12, 1.48)            | <0.001   |
| **Dysglycemia Related**  |                              |          |
| HbA1c (%)                | 1.21 (1.10, 1.35)            | <0.001   |
| **Obesity Related**      |                              |          |
| BMI (kg/m²)              | 1.23 (1.09, 1.39)            | 0.001    |
| Waist (cm)               | 1.35 (1.19, 1.52)            | <0.001   |
| Adiponectin (ng/ml)      | 1.22 (1.08, 1.38)            | 0.002    |
| Leptin (ng/ml)           | 1.23 (1.03, 1.47)            | 0.021    |
| **Inflammation**         |                              |          |
| hsCRP (mg/L)             | 1.13 (0.99, 1.28)            | 0.07     |

The models were adjusted for age, sex, education attainment, income level, hypertension, diabetes, smoking status, and coronary heart disease (myocardial infarction) history.
**eTable 5.** Associations of Cardiovascular and Noncardiovascular Measures With Incident HF Events in Multipredictor Models

|                      | HF (n=3806, events=287) | HFpEF (n=3806, events=131) | HFrEF (n=3806, events=123) | HFrEF vs HFpEF |
|----------------------|-------------------------|-----------------------------|----------------------------|----------------|
|                      | HR (95% CI)             | HR (95% CI)                 | HR (95% CI)                | P value        |
| LVMI (g/m²)          | 1.17 (1.05, 1.29)       | 1.03 (0.87, 1.21)           | 1.25 (1.07, 1.46)          | 0.005          |
|                      | 0.004                   | 0.74                        | 0.005                      | 0.08           |
| LVEF (%)             | 1.27 (1.15, 1.42)       | 1.01 (0.85, 1.19)           | 1.65 (1.42, 1.91)          | <0.001         |
|                      | <0.001                  | 0.94                        | <0.001                     | <0.001         |
| LA diameter (mm)     | 1.16 (1.03, 1.31)       | 1.23 (1.03, 1.47)           | 1.08 (0.90, 1.29)          | 0.43           |
|                      | 0.012                   | 0.021                       | 0.34                       |                |
| PP (mmHg)            | 1.15 (1.03, 1.29)       | 1.23 (1.05, 1.44)           | 1.05 (0.87, 1.27)          | 0.61           |
|                      | 0.012                   | 0.009                       | 0.24                       |                |
| ppFEV1 (%)           | 1.20 (1.08, 1.35)       | 1.22 (1.04, 1.43)           | 1.19 (1.00, 1.42)          | 0.047          |
|                      | 0.001                   | 0.017                       | 0.047                      | 0.86           |
| eGFR (ml/(min.1.73m²)) | 1.30 (1.14, 1.47)      | 1.43 (1.19, 1.72)          | 1.27 (1.04, 1.55)          | 0.022          |
|                      | <0.001                  | <0.001                      | 0.5                        |                |
| HbA1c (%)            | 1.21 (1.08, 1.36)       | 1.25 (1.07, 1.45)           | 1.18 (0.99, 1.41)          | 0.06           |
|                      | 0.001                   | 0.005                       | 0.73                       |                |
| Waist (cm)           | 1.22 (1.08, 1.39)       | 1.41 (1.18, 1.69)           | 1.05 (0.85, 1.30)          | 0.66           |
|                      | 0.002                   | <0.001                      | 0.031                      |                |

The models were adjusted for age, sex, hypertension, diabetes, smoking status, and coronary heart disease (myocardial infarction) history. All continuous variables were standardized. The HRs for LVEF, ppFEV1 and eGFR were inverted to facilitate the comparison of the magnitude of associations of the cardiovascular and non-cardiovascular measures with the outcome.

HF, heart failure; HFpEF, HF with preserved ejection fraction; HFrEF, HF with reduced ejection fraction; HR, hazard ratio; CI, confidence interval; LVMI, left ventricular mass index; LVEF, left ventricular ejection fraction; LA, left atrium; PP, pulse pressure; ppFEV1, percent predicted forced expiration volume in 1 second; eGFR, estimated global filtration rate; HbA1c, hemoglobin A1c; Waist, waist circumference.
### eTable 6. Cox Regression Models for HF, HFpEF, and HFrEF With Multiple Imputation

|                  | HF (n=4361, events=348) | HFpEF (n=4361, events=163) | HFrEF (n=4361, events=146) |
|------------------|-------------------------|-----------------------------|-----------------------------|
|                  | HR (95% CI) P value     | HR (95% CI) P value         | HR (95% CI) P value         |
| LVMI             | 1.15 (1.04, 1.26) 0.005 | 1.03 (0.89, 1.19) 0.71      | 1.23 (1.07, 1.42) 0.005     |
| LVEF             | 1.27 (1.15, 1.40) <0.001| 1.00 (0.85, 1.17) 0.98      | 1.62 (1.41, 1.87) <0.001    |
| LAD              | 1.15 (1.03, 1.29) 0.012 | 1.23 (1.04, 1.46) 0.014     | 1.05 (0.88, 1.25) 0.58      |
| PP               | 1.16 (1.05, 1.29) 0.005 | 1.23 (1.06, 1.42) 0.007     | 1.06 (0.89, 1.27) 0.51      |
| ppFEV1           | 1.22 (1.09, 1.37) <0.001| 1.25 (1.06, 1.47) 0.006     | 1.19 (1.00, 1.42) 0.05      |
| eGFR             | 1.28 (1.14, 1.45) <0.001| 1.43 (1.20, 1.69) <0.001    | 1.24 (1.01, 1.50) 0.035     |
| HbA1c            | 1.22 (1.09, 1.35) <0.001| 1.26 (1.08, 1.46) 0.002     | 1.19 (1.00, 1.41) 0.046     |
| Waist            | 1.21 (1.07, 1.38) 0.002 | 1.39 (1.17, 1.64) <0.001    | 1.05 (0.85, 1.29) 0.65      |

Imputation was performed for 11 clinical and echocardiographic measures (LVMI, LVEF, LAD, PP, ppFEV1, eGFR, HbA1c, Waist, hypertension, diabetes, smoking status) with missing data and was based on linear regression using 9 baseline clinical variables (age, gender, BMI, SBP, adiponectin, leptin, hsCRP, HTN meds, DM meds) and 3 echocardiographic measures (LVEDD, MWT, RWT) as predictor variables and was derived over 40 imputations. Models were adjusted for age, gender, hypertension, diabetes, smoking status and CHD history.

HF, heart failure; HFpEF, HF with preserved ejection fraction; HFrEF, HF with reduced ejection fraction; LVEDD, left ventricular end-diastolic dimension; MWT, left ventricular mean wall thickness; RWT, left ventricular relative wall thickness; LVMI, left ventricular mass index; LVEF, left ventricular ejection fraction; LA, left atrium; HTN, hypertension; SBP, systolic blood pressure; ppFEV1, percent predicted forced expiration volume in 1 second; ppFVC, percent predicted forced vital capacity; eGFR, estimated glomerular filtration rate; HbA1c, hemoglobin A1c; Waist, waist circumference; hsCRP, high sensitivity C reactive protein; HR, hazard ratio; CI, confidence interval.
**eTable 7.** Associations of Cardiovascular and Noncardiovascular Measures With Incident HF Events in Multipredictor Models Excluding Participants With a Baseline LVEF of Less Than 50%

|                        | HFpEF (n=3622, events=130) | HFrEF (n=3622, events=102) |
|------------------------|-----------------------------|-----------------------------|
|                        | HR  | (95% CI) | P value | HR  | (95% CI) | P value |
| LVMI (g/m²)            | 1.05 | (0.90, 1.24) | 0.53 | 1.15 | (0.96, 1.37) | 0.13 |
| LVEF (%)               | 1.12 | (0.95, 1.32) | 0.17 | 1.57 | (1.29, 1.91) | <0.001 |
| LA diameter (mm)       | 1.25 | (1.04, 1.49) | 0.016 | 1.18 | (0.96, 1.44) | 0.13 |
| PP (mmHg)              | 1.24 | (1.06, 1.43) | 0.007 | 1.11 | (0.91, 1.36) | 0.31 |
| ppFEV1 (%)             | 1.21 | (1.03, 1.43) | 0.020 | 1.20 | (0.99, 1.45) | 0.06 |
| eGFR (ml/min1.73m²)    | 1.42 | (1.18, 1.71) | <0.001 | 1.27 | (1.02, 1.58) | 0.034 |
| HbA1c (%)              | 1.23 | (1.05, 1.44) | 0.010 | 1.20 | (1.00, 1.45) | 0.053 |
| Waist (cm)             | 1.42 | (1.19, 1.70) | <0.001 | 1.02 | (0.81, 1.29) | 0.85 |

The models were adjusted for age, sex, hypertension, diabetes, smoking status, and coronary heart disease (myocardial infarction) history. All continuous variables were standardized. The HRs for LVEF, ppFEV1 and eGFR were inverted to facilitate the comparison of the magnitude of associations of the cardiovascular and non-cardiovascular measures with the outcome.

HF, heart failure; HFpEF, HF with preserved ejection fraction; HFrEF, HF with reduced ejection fraction; HR, hazard ratio; CI, confidence interval; LVMI, left ventricular mass index; LVEF, left ventricular ejection fraction; LA, left atrium; PP, pulse pressure; ppFEV1, percent predicted forced expiration volume in 1 second; eGFR, estimated global filtration rate; HbA1c, hemoglobin A1c; Waist, waist circumference.
**eTable 8. Exploration of Potential Interactions of Organ Function Measures With Sex for Incident HF**

|           | HF (n=3808; events=261) | HFpEF (n=3808; events=121) | HFrEF (n=3808; events=115) |
|-----------|--------------------------|-----------------------------|----------------------------|
|           | HR  | 95% CI       | P     | HR  | 95% CI       | P     | HR  | 95% CI       | P     |
| LVMI      | 1.18 | (1.04, 1.35) | 0.011 | 1.10 | (0.91, 1.33) | 0.33  | 1.23 | (0.99, 1.52) | 0.06  |
| LVEF      | 1.30 | (1.13, 1.50) | <0.001| 1.13 | (0.92, 1.33) | 0.24  | 1.65 | (1.33, 2.05) | <0.001|
| LAD       | 1.18 | (1.01, 1.38) | 0.036 | 1.21 | (0.97, 1.33) | 0.09  | 1.17 | (0.90, 1.53) | 0.24  |
| PP        | 1.18 | (1.04, 1.34) | 0.009 | 1.20 | (1.01, 1.33) | 0.038 | 1.09 | (0.87, 1.36) | 0.48  |
| ppFEV1    | 1.22 | (1.06, 1.40) | 0.004 | 1.29 | (1.07, 2.33) | 0.008 | 1.21 | (0.96, 1.53) | 0.11  |
| eGFR      | 1.43 | (1.24, 1.66) | <0.001| 1.55 | (1.26, 1.33) | <0.001| 1.50 | (1.18, 1.91) | 0.001 |
| HbA1c     | 1.36 | (1.23, 1.52) | <0.001| 1.40 | (1.22, 3.33) | <0.001| 1.39 | (1.16, 1.67) | <0.001|
| Waist     | 1.29 | (1.11, 1.50) | 0.001 | 1.52 | (1.24, 2.33) | <0.001| 1.00 | (0.76, 1.32) | 0.99  |
| LVMI*Male | 0.98 | (0.79, 1.22) | 0.88  | 0.81 | (0.56, 1.33) | 0.27  | 1.06 | (0.78, 1.45) | 0.71  |
| LVEF*Male | 0.98 | (0.79, 1.21) | 0.85  | 0.71 | (0.49, 0.93) | 0.06  | 1.01 | (0.75, 1.37) | 0.93  |
| LAD*Male  | 1.09 | (0.85, 1.38) | 0.51  | 1.35 | (0.91, 0.33) | 0.14  | 0.91 | (0.64, 1.30) | 0.62  |
| PP*Male   | 0.96 | (0.77, 1.21) | 0.73  | 1.24 | (0.89, 3.33) | 0.20  | 0.95 | (0.67, 1.35) | 0.78  |
| ppFEV1*Male | 1.08 | (0.86, 1.36) | 0.52  | 0.94 | (0.66, 0.33) | 0.75  | 1.07 | (0.75, 1.51) | 0.72  |
| eGFR*Male | 0.75 | (0.58, 0.98) | 0.032 | 0.78 | (0.52, 3.33) | 0.23  | 0.66 | (0.45, 0.96) | 0.031 |
| HbA1c*Male | 0.97 | (0.82, 1.16) | 0.75  | 0.98 | (0.75, 1.33) | 0.91  | 0.94 | (0.72, 1.21) | 0.62  |
| Waist*Male | 0.90 | (0.68, 1.18) | 0.43  | 0.79 | (0.52, 0.33) | 0.26  | 1.19 | (0.80, 1.77) | 0.39  |
| Age       | 1.07 | (1.06, 1.09) | <0.001| 1.07 | (1.05, 0.33) | <0.001| 1.05 | (1.03, 1.07) | <0.001|
| Male      | 1.11 | (0.79, 1.56) | 0.54  | 0.79 | (0.44, 1.33) | 0.43  | 1.49 | (0.91, 2.45) | 0.11  |

HF, heart failure; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; HR, hazard ratio; CI, confidence interval; LVEF, left ventricular ejection fraction; LVMI, left ventricular mass index; ppFEV1, percent predicted forced expiration volume in 1 second; HbA1c, hemoglobin A1c; LAD, left atrial diameter; PP, pulse pressure; waist, waist circumference; eGFR, estimated glomerular filtration rate.
### eTable 9. Stratified Cox Regression Models for HF, HFpEF, and HFrEF by Sex Categories

|                | HF-Female (n=2404; events=177) | HF-Male (n=1408; events=110) |
|----------------|--------------------------------|--------------------------------|
| **HF overall** |                                |                                |
| LVMI           | 1.18 (1.04, 1.34) P=0.013       | 1.17 (0.98, 1.39) P=0.08       |
| LVEF           | 1.30 (1.13, 1.50) P<0.001       | 1.27 (1.08, 1.49) P=0.003     |
| LAD            | 1.18 (1.01, 1.38) P=0.036       | 1.28 (1.06, 1.55) P=0.009     |
| PP             | 1.17 (1.03, 1.33) P=0.016       | 1.15 (0.94, 1.41) P=0.17      |
| ppFEV1         | 1.22 (1.07, 1.40) P=0.004       | 1.33 (1.11, 1.60) P=0.003     |
| eGFR           | 1.41 (1.21, 1.64) P<0.001       | 1.10 (0.87, 1.40) P=0.43      |
| HbA1c          | 1.36 (1.23, 1.52) P<0.001       | 1.33 (1.16, 1.52) P<0.001     |
| Waist          | 1.29 (1.11, 1.51) P=0.001       | 1.14 (0.91, 1.43) P=0.24      |
| **HFpEF**      |                                |                                |
| LVMI           | 1.09 (0.90, 1.32) P=0.36        | 0.89 (0.65, 1.23) P=0.49      |
| LVEF           | 1.15 (0.93, 1.40) P=0.19        | 0.80 (0.59, 1.07) P=0.17      |
| LAD            | 1.31 (0.97, 1.50) P=0.08        | 1.61 (1.15, 2.26) P=0.006     |
| PP             | 1.16 (0.98, 1.39) P=0.09        | 1.63 (1.19, 2.25) P=0.003     |
| ppFEV1         | 1.30 (1.08, 1.57) P=0.01        | 1.27 (0.92, 1.74) P=0.14      |
| eGFR           | 1.47 (1.20, 1.82) P=0.00        | 1.35 (0.93, 1.97) P=0.12      |
| HbA1c          | 1.41 (1.23, 1.62) P=0.00        | 1.37 (1.10, 1.71) P=0.005     |
| Waist          | 1.54 (1.25, 1.88) P=0.00        | 1.16 (0.81, 1.66) P=0.42      |
| **HFrEF**      |                                |                                |
| LVMI           | 1.23 (0.99, 1.52) P=0.06        | 1.30 (1.03, 1.63) P=0.025     |
| LVEF           | 1.64 (1.32, 2.03) P<0.001       | 1.68 (1.37, 2.07) P<0.001     |
| LAD            | 1.16 (0.89, 1.52) P=0.27        | 1.09 (0.86, 1.38) P=0.49      |
| PP             | 1.11 (0.88, 1.40) P=0.37        | 1.00 (0.75, 1.34) P=0.99      |
| ppFEV1         | 1.20 (0.94, 1.52) P=0.14        | 1.29 (1.00, 1.66) P=0.048     |
| eGFR           | 1.53 (1.20, 1.96) P=0.001       | 0.95 (0.68, 1.32) P=0.76      |
| HbA1c          | 1.39 (1.15, 1.66) P<0.001       | 1.30 (1.08, 1.56) P=0.005     |
| Waist          | 0.99 (0.75, 1.31) P=0.96        | 1.19 (0.89, 1.59) P=0.23      |

Models were adjusted for age. HF, heart failure; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; HR, hazard ratio; CI, confidence interval; LVEF, left ventricular ejection fraction; LVMI, left ventricular mass index; ppFEV1, percent predicted FEV1; HbA1c, hemoglobin A1c; LAD, left atrial diameter; PP, pulse pressure; waist, waist circumference; eGFR, estimated glomerular filtration rate.
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