

## ***Supplementary Material***

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## Supplementary Methods

### Description of covariate definitions

Age, gender, race, marital status, education level, and poverty-income ratio (PIR) of participants were obtained from self-report at the time of the interview. Race was categorized into four groups: non-Hispanic White, non-Hispanic Black, Hispanic (Mexican American), and other racial groups. Marital status was classified as either married or living with a partner, or living alone. Education level was categorized as less than 9 years, 9–12 years, or more than 12 years.

**BMI** was calculated as the weight in kilograms (kg) divided by the square of the height in meters (m<sup>2</sup>) and was used to evaluate obesity.

**Smoking status** was divided into three categories based on lifetime cigarette consumption: never smokers (<100 cigarettes), former smokers (≥100 cigarettes but not currently smoking), and current smokers (≥100 cigarettes and currently smoking).

**Drinking** status was self-reported and categorized as drinkers (defined as having consumed at least 12 alcoholic drinks in their lifetime) or non-drinkers (not meeting this threshold).

**Hypertension** was defined as blood pressure measurement ≥140/90 mmHg or self-reported hypertension diagnosis.

**Diabetes** was determined using a combination of self-reported information and laboratory measurements. Participants were classified as having diabetes if they met any of the following criteria:

1. Self-reported a prior physician diagnosis of diabetes.
2. Glycated hemoglobin (HbA1c) values ≥6.5%.
3. Fasting glucose concentrations ≥7.0 mmol/L after an overnight fast.
4. Random glucose levels ≥11.1 mmol/L.
5. 2-hour post-challenge glucose readings ≥11.1 mmol/L during standard oral glucose tolerance testing.

6. Current use of antidiabetic medications, including insulin therapy.

The diagnosis of ASCVD was based on self-reported responses to the following questions from the MCQ section of the survey:

- "Have you ever been told you have coronary heart disease (CHD)?"
- "Have you ever been told you have angina/angina pectoris?"
- "Have you ever been told you had a heart attack?"
- "Have you ever been told you had a stroke?"

A “yes” response to any of these questions was classified as ASCVD.

**Cancer** was defined as a self-report of ever being diagnosed with cancer or malignancy.

**Eosinophils** were measured as part of the standard complete blood count (CBC) in NHANES and reported in  $\times 10^9/L$ . Blood samples were collected during the physical examination component and analyzed according to NHANES laboratory protocols.

**HDL (High-Density Lipoprotein) cholesterol** was measured enzymatically via Roche Modular P chemistry analyzers and expressed in mmol/L.

**Table S1** Missing Rates of Baseline Covariates

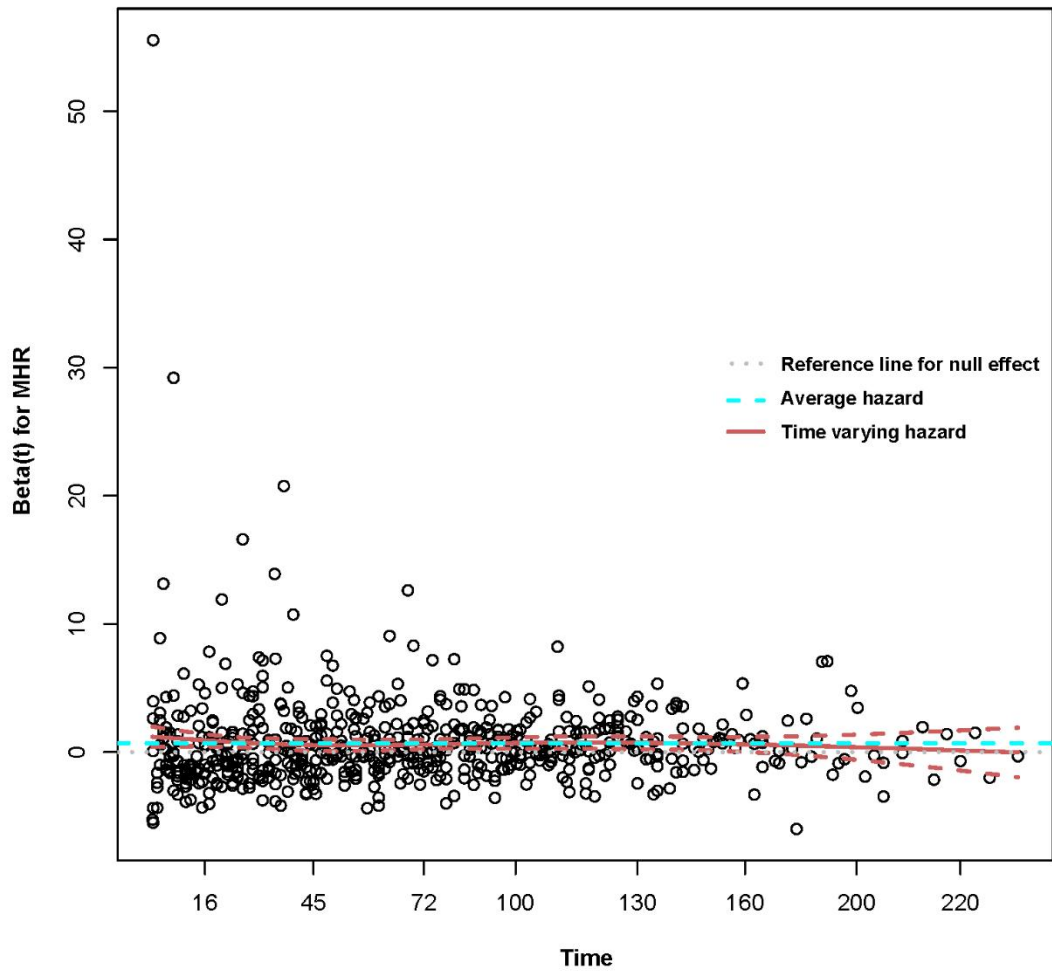
Excluded variable	Missing rate
Age	0.0%
Gender	0.0%
Race	0.0%
Education level	0.13%
Marital Status	0.35%
Smoking status	0.09%
Drinking status	5.56%
Hypertension	0.35%
Diabetes	9.73%
Cancer	0.22%
ASCVD	0.04%
PIR	7.90%
BMI	2.0%
Eosinophils	0.0%

**Abbreviations:** PIR, poverty-income ratio; ASCVD, atherosclerotic cardiovascular disease; BMI, body mass index.

**Table S2** Results of the Proportional Hazards Assumption Testing for Cox Models

<b>Mortality</b>	<b>All-cause Mortality</b>	
	Chi-square( $\chi^2$ )	p-value
Gender	0.283	0.595
Age	0.195	0.659
Race	6.457	0.091
Education level	0.602	0.740
Marital Status	1.082	0.298
PIR	0.698	0.403
BMI	0.056	0.813
Smoking status	1.605	0.448
Drinking status	0.023	0.879
Hypertension	0.046	0.829
Diabetes	2.160	0.142
ASCVD	0.176	0.674
Cancer	1.140	0.286
Eosinophils	0.122	0.727
MHR	1.698	0.193
<b>GLOBAL</b>	16.953	0.593

**Note:** The proportional hazards assumption was assessed using Schoenfeld residual tests. This table presents the results for all-cause mortality models. GLOBAL represents the overall test for all variables combined. p-values greater than 0.05 indicate that the proportional hazards assumption was not violated.



**Figure S1** Assessment of the Proportional Hazards Assumption for MHR using Schoenfeld Residual Plots

Schoenfeld residual plots visually assessing the proportional hazards assumption for MHR in all-cause mortality models (Time in months). The smoothed estimates (red lines with 95% CI) show no clear time-dependent trend, consistent with formal tests (Table S2,  $P=0.193$ )

**Table S3** Association between MHR and COPD All-Cause: Results after Multiple Imputation(N=2303)

	Events	Model					
		Model 1		Model 2		Model 3	
		HR, 95%CI	p-Value	HR, 95%CI	p-Value	HR, 95%CI	p-Value
MHR	801(34.8)	2.14(1.71~2.67)	<0.001	1.87(1.48~2.36)	<0.001	1.71(1.35~2.18)	<0.001
MHR tertile							
T1	254(33.3)	References		References		References	
T2	252(32.9)	0.86(0.67~1.11)	0.256	0.98(0.82~1.18)	0.823	0.91(0.71~1.17)	0.462
T3	295(38.1)	1.36(1.05~1.75)	0.018	1.24(1.03~1.49)	0.024	1.34(1.03~1.75)	0.028
<b>P for trend</b>			<0.001		0.017		0.082

**Notes:**

**Model 1:** no covariates were adjusted;

**Model 2:** Adjusted for gender, age, race, education level, marital status, PIR, BMI, smoking status, drinking status;

**Model 3** was adjusted for model 2+ ASCVD, hypertension, diabetes, cancer, eosinophils

**Abbreviations:** MHR, monocyte-high-density lipoprotein cholesterol ratio; PIR, poverty-income ratio; ASCVD, atherosclerotic cardiovascular disease; BMI, body mass index.

**Table S4** Association between MHR and COPD All-Cause Mortality: Results after Excluding Outliers (>3SD) (N=1750)

	Events	Model					
		Model 1		Model 2		Model 3	
		HR, 95%CI	p-Value	HR, 95%CI	p-Value	HR, 95%CI	p-Value
MHR	596(34.1)	2.03(1.45~2.85)	<0.001	2.02(1.38~2.95)	<0.001	1.88(1.27~2.76)	0.001
MHR tertile							
T 1	195(33.0)	References		References		References	
T 2	186(31.8)	1.04(1.85~1.27)	0.710	1.03(0.84~1.27)	0.775	1.00(0.81~1.24)	0.993
T 3	215(37.4)	1.44(1.18~1.75)	<0.001	1.33(1.07~1.64)	0.010	1.28(1.03~1.59)	0.028
<b>P for trend</b>			<0.001		0.009		0.025

**Notes:** Outliers were defined as values exceeding 3 standard deviations from the mean of the original MHR distribution in the analytic sample (N=1750) and were excluded.

**Model 1:** no covariates were adjusted;

**Model 2:** Adjusted for gender, age, race, education level, marital status, PIR, BMI, smoking status, drinking status;

**Model 3** was adjusted for model 2+ ASCVD, hypertension, diabetes, cancer, eosinophils

**Abbreviations:** MHR, monocyte-high-density lipoprotein cholesterol ratio; PIR, poverty-income ratio; ASCVD, atherosclerotic cardiovascular disease; BMI, body mass index.