Supplemental Methods

Study designs of the CHARLS

The China Health and Retirement Longitudinal Study (CHARLS) was a prospective cohort study conducted in China. In wave 1, a nationally representative sample of 17,708 participants was recruited from 28 provinces in 2011 via multistage probability sampling. The primary aim of this study was to recruit participants aged ≥ 45 years, but some participants aged 40 to 44 years also attended the baseline survey. All 17,708 participants underwent face-to-face interviews by the trained staff using the standardized questionnaire to collect data on sociodemographic information, lifestyles, and health-related information. Among 17,708 participants, 13,978 participants conducted anthropometric measurements to collect data on height, weight, waist circumference, blood pressure, grip strength, and so on. In addition, 11,847 participants provided blood samples for the laboratory test. Biochemical indicators, including total cholesterol, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, glycated hemoglobin, fasting blood glucose, and C-reactive protein were measured by the blood test. The follow-up surveys were conducted in 2013 (wave 2), 2015 (wave 3), 2018 (wave 4), and 2020 (wave 5) with questionnaire interviews and anthropometric measurements. Blood samples were collected in 2015 again, and biochemical indicators were measured by the blood test.

The calculation method for cumulative TyG and its obesity derivatives is as follows:

cumulative TyG index = (TyG index2012 + TyG index2015)/2 * time (2015 - 2012)

cumulative TyG-BMI = (TyG-BMI2012 + TyG-BMI2015)/2 * time (2015 - 2012)

cumulative TyG-WC = (TyG-WC2012 + TyG-WC2015)/2 * time (2015 - 2012)

cumulative TyG-WHtR = (TyG-WHtR2012 + TyG-WHtR2015)/2 * time (2015 - 2012)

cumulative TyG-WWI = (TyG-WWI2012 + TyG-WWI2015)/2 * time (2015 - 2012)

cumulative TyG-ABSI = (TyG-ABSI2012 + TyG-ABSI2015)/2 * time (2015 - 2012)

cumulative TyG-BRI = (TyG-BRI2012 + TyG-BRI2015)/2 * time (2015 - 2012)

cumulative TyG-CVAI = (TyG-CVAI2012 + TyG-CVAI2015)/2 * time (2015 - 2012)

Supplemental Figures

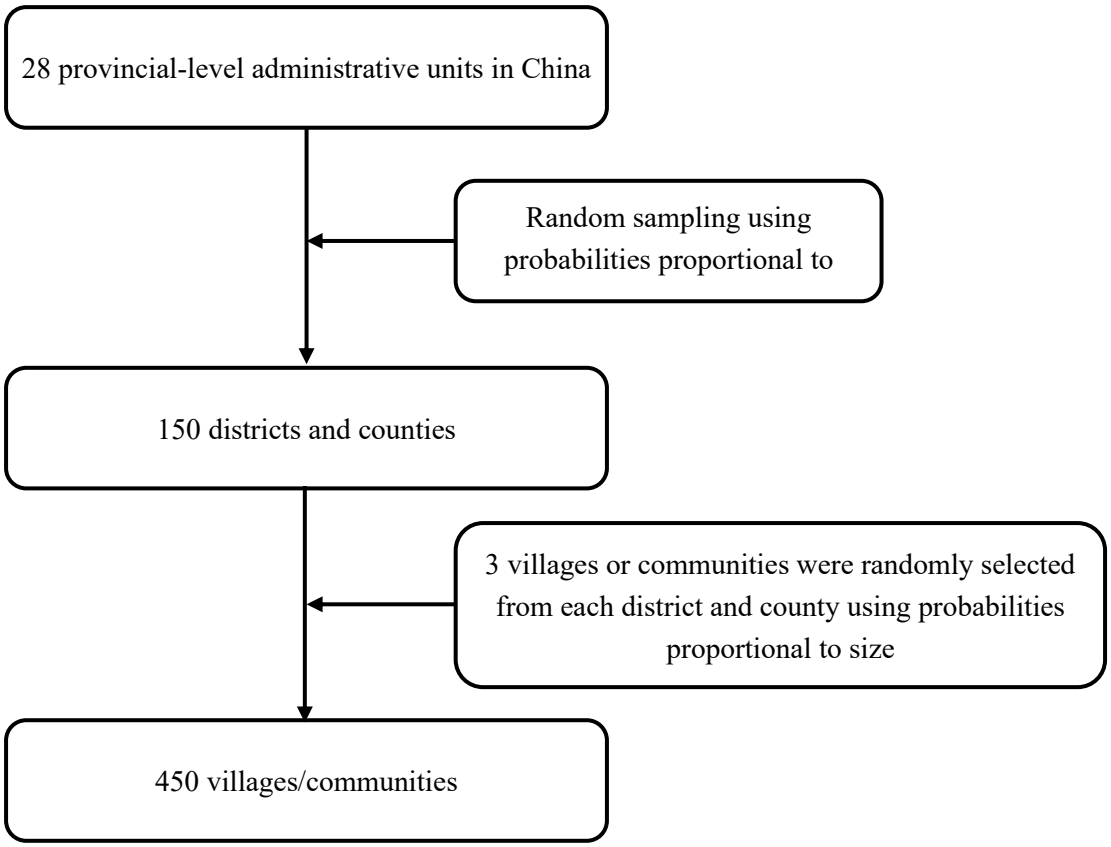

Figure S1: The selection process of CHARLS.

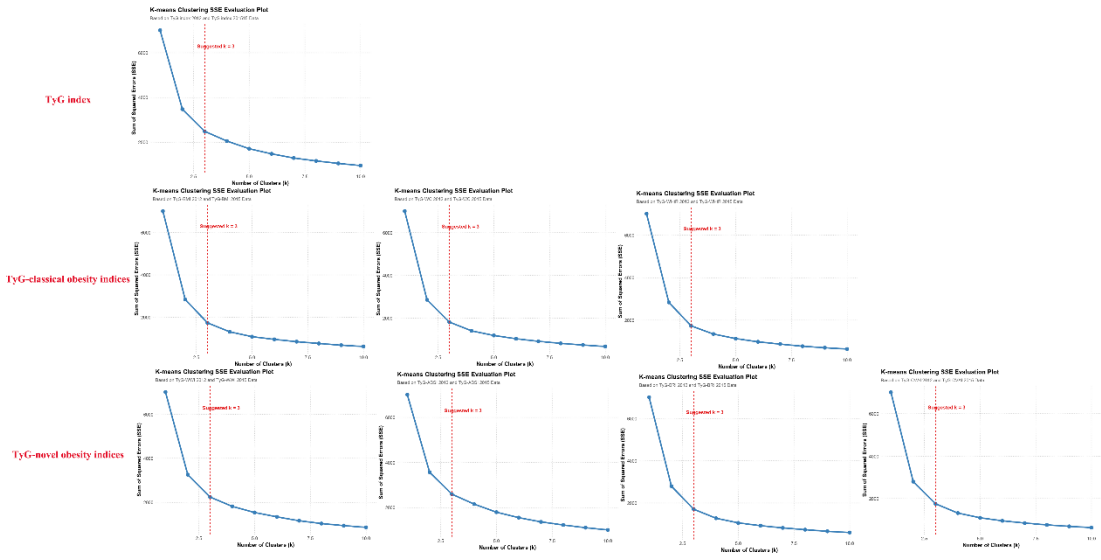

Figure S2: Elbow method to identify the appropriate number of clusters.

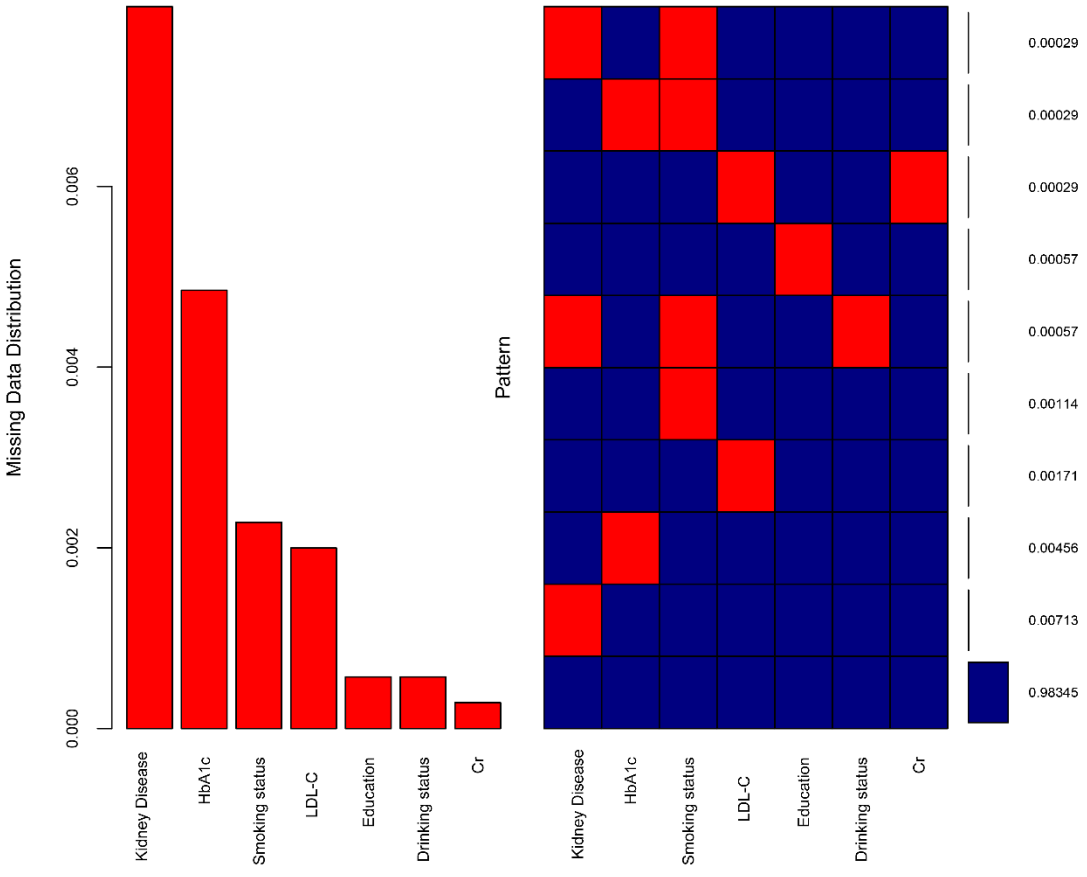

Figure S3: Missing data cross-information diagram.

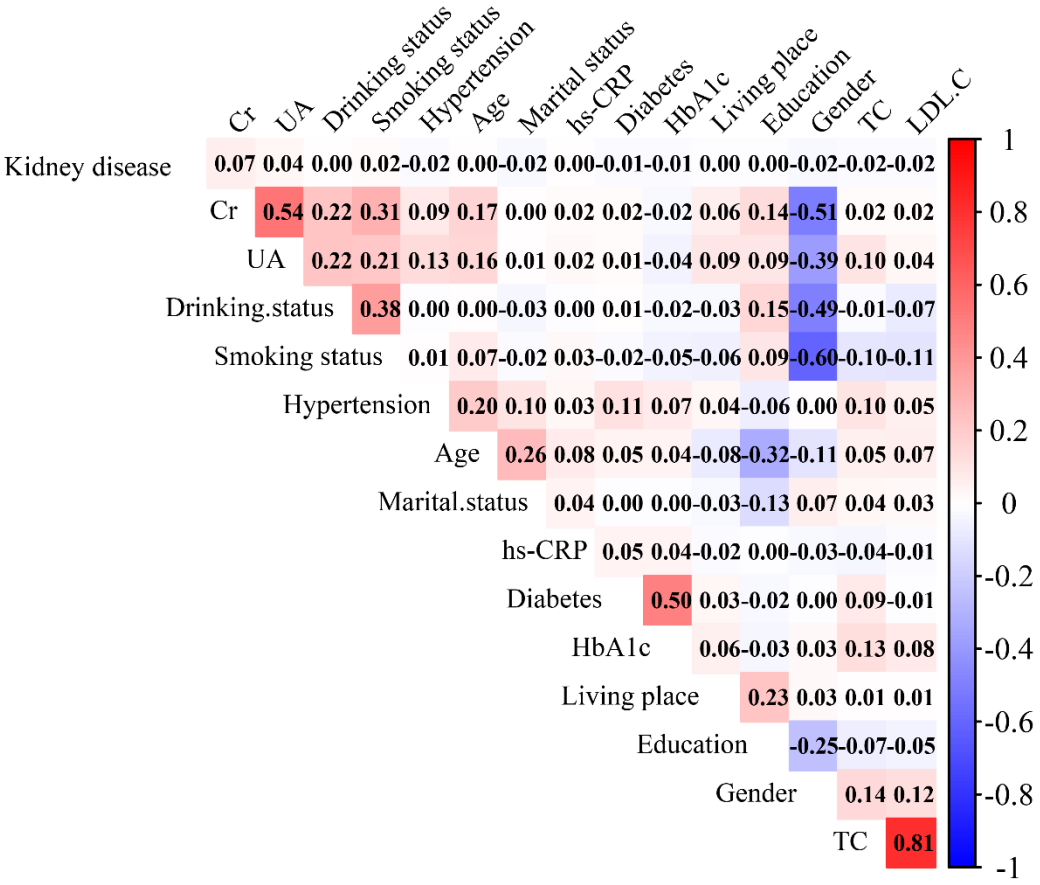

Figure S4: Spearman's correlations among the baseline clinical data.