Table S1 Baseline characteristics of participants attending the baseline survey of CHARLS after interpolation

Characteristics	Total (n=6,153)	Tertiles of RFM			P value
		T1 (n=2,050)	T2 (n=2,051)	T3 (n=2,052)	
Age (years)	59.00 (53.00, 66.00)	59.00 (53.00, 66.00)	59.00 (53.00, 66.00)	59.00 (52.00, 66.00)	0.62
Educational levels					<0.001
Literate	4,163 (67.66)	1,307 (63.76)	1,365 (66.55)	1,491 (72.66)	
Illiterate	1,990 (32.34)	743 (36.24)	686 (33.45)	561 (27.34)	
Cigarette consumption					<0.001
Current smoker	3,591 (58.36)	1,383 (67.46)	1,219 (59.43)	989 (48.20)	
Non-smoker	1,540 (25.03)	422 (20.59)	507 (24.72)	611 (29.78)	
Ex-smoker	1,022 (16.61)	245 (11.95)	325 (15.85)	452 (22.03)	
Alcohol consumption					0.14
Drink more than once a month	2,757 (44.81)	924 (45.07)	944 (46.03)	889 (43.32)	
Drink but less than once a month	666 (10.82)	229 (11.17)	230 (11.21)	207 (10.09)	
None of these	2,730 (44.37)	897 (43.76)	877 (42.76)	956 (46.59)	
Depression					<0.001
No	4,600 (74.76)	1,461 (71.27)	1,525 (74.35)	1,614 (78.65)	
Yes	1,553 (25.24)	589 (28.73)	526 (25.65)	438 (21.35)	
Hypertension					<0.001
No	3,878 (63.03)	1,545 (75.37)	1,358 (66.21)	975 (47.51)	
Yes	2,275 (36.97)	505 (24.63)	693 (33.79)	1,077 (52.49)	
Sleep duration (hours)					0.03
≤6	2,969 (48.25)	1,029 (50.20)	999 (48.71)	941 (45.86)	
>6 and ≤8	2,681 (43.57)	847 (41.32)	900 (43.88)	934 (45.52)	
>8	503 (8.17)	174 (8.49)	152 (7.41)	177 (8.63)	
Afternoon nap					<0.001
No	2,460 (39.98)	902 (44.00)	841 (41.00)	717 (34.94)	
Yes	3,693 (60.02)	1,148 (56.00)	1,210 (59.00)	1,335 (65.06)	
Uric acid (mg/dL)	4.95±1.26	4.78±1.19	4.93±1.25	5.15±1.31	<0.001
LDL cholesterol (mg/dL)	109.79 (89.69, 131.83)	106.32 (86.70, 127.58)	109.02 (90.27, 131.06)	114.43 (92.78, 136.86)	<0.001
Total cholesterol (mg/dL)	184.79 (162.37, 209.15)	179.38 (158.89, 205.57)	185.18 (162.95, 207.60)	189.43 (166.62, 214.18)	<0.001
HDL cholesterol (mg/dL)	48.33 (39.05, 59.54)	52.96 (43.30, 63.40)	49.48 (39.82, 59.92)	43.69 (35.57, 53.35)	<0.001
Glucose (mg/dL)	102.42 (94.50, 113.94)	100.62 (92.88, 110.16)	102.24 (94.14, 112.86)	104.58 (96.30, 118.44)	<0.001
Triglycerides (mg/dL)	97.35 (69.92, 146.91)	83.19 (62.83, 120.36)	96.46 (68.14, 143.37)	115.93 (81.42, 177.00)	<0.001
LUTS/BPH					<0.001
No	5,566 (90.46)	1,894 (92.39)	1,859 (90.64)	1,813 (88.35)	
Yes	587 (9.54)	156 (7.61)	192 (9.36)	239 (11.65)	

The missing values were interpolated using the random forest method. Data are presented as mean (lower quantile, upper quantile) for continuous measures with negative normality test, mean ± SD for continuous measures with positive normality test, and n (%) for categorical measures. $RFM_{men} = 64 - \left[20 \times \left(\frac{height(m)}{waist(m)} \right) \right]$. RFM was stratified as tertiles (T1, T2, and T3 groups). The differences of covariates across tertiles were tested using one-way analysis of variance for continuous variables and chi-square test for categorical data. CHARLS, China Health and Retirement Longitudinal Study; RFM, relative fat mass; LDL, low-density lipoprotein; HDL, high-density lipoprotein; LUTS/BPH, lower urinary tract symptoms suggestive of benign prostate hyperplasia; SD, standard deviation.

Table S2 The cross-sectional association between the RFM and incident LUTS/BPH after exclusion of participants younger than 60 years of age (including 60 years old)

Models	RFM (continuous)	RFM (as tertiles)			
	OR (95% CI)	T1 (reference)	T2 group, OR (95% CI)	T3 group, OR (95% CI)	P for trend
Model 1	1.04 (1.021–1.065)***	1.00	1.23 (0.92–1.64)	1.63 (1.24–2.14)***	<0.001
Model 2	1.04 (1.017–1.061)***	1.00	1.22 (0.91–1.63)	1.55 (1.18–2.05)**	0.002
Model 3	1.04 (1.018–1.066)***	1.00	1.15 (0.85–1.56)	1.53 (1.14–2.05)**	0.004
Model 4	1.05 (1.021–1.070)***	1.00	1.19 (0.87–1.61)	1.63 (1.20–2.21)**	0.001

A total 3,455 males of age ≤60 years were excluded. The T1 group was used as the reference group. **, P<0.01; ***, P<0.001. Model 1, crude model; Model 2, adjusting for age and educational levels; Model 3, further adjusting for sleep duration, cigarette and alcohol consumption, hypertension and depression; Model 4, further adjusting for blood biomarkers including uric acid, LDL, triglycerides, glucose, HDL and total cholesterol. RFM, relative fat mass; LUTS/BPH, lower urinary tract symptoms suggestive of benign prostate hyperplasia; OR, odds ratio; CI, confidence interval; LDL, low-density lipoprotein; HDL, high-density lipoprotein.

Table S3 The longitudinal association between the RFM and incident LUTS/BPH in the 2011–2013 cohort (after interpolation)

Models	RFM (continuous)	RFM (as tertiles)			
	OR (95% CI)	T1 (reference)	T2 group, OR (95% CI)	T3 group, OR (95% CI)	P for trend
Model 1	1.04 (1.019–1.065)***	1.00	1.40 (1.04–1.87)*	1.85 (1.40–2.44)***	<0.001
Model 2	1.04 (1.016–1.062)***	1.00	1.38 (1.03–1.84)*	1.80 (1.36–2.39)***	<0.001
Model 3	1.03 (1.009–1.059)***	1.00	1.37 (1.02–1.84)*	1.60 (1.19–2.17)**	0.002
Model 4	1.04 (1.006–1.058)***	1.00	1.36 (1.00–1.83)*	1.55 (1.14–2.12)**	0.006

A total of 4,577 males were followed up to 2013 years. RFM was stratified according to the tertiles and used as a continuous variable in these regression models. Model 1, crude model; Model 2, adjusting for age and educational levels; Model 3, further adjusting for sleep duration, cigarette and alcohol consumption, hypertension, and depression; Model 4, further adjusting for blood biomarkers including uric acid, LDL, triglycerides, glucose, HDL and total cholesterol. *, P<0.05; **, P<0.01; ***, P<0.001. RFM, relative fat mass; LUTS/BPH, lower urinary tract symptoms suggestive of benign prostate hyperplasia; OR, odds ratio; CI, confidence interval; LDL, low-density lipoprotein; HDL, high-density lipoprotein.

Table S4 The longitudinal association between the RFM and incident LUTS/BPH in the 2011–2015 cohort (after interpolation)

Models	RFM (continuous)	RFM (as tertiles)			
	OR (95% CI)	T1 (reference)	T2 group, OR (95% CI)	T3 group, OR (95% CI)	P for trend
Model 1	1.044 (1.023–1.064)***	1.00	1.29 (1.01–1.65)*	1.63 (1.29–2.07)***	<0.001
Model 2	1.041 (1.021–1.062)***	1.00	1.27 (0.99–1.63)	1.60 (1.26–2.03)***	<0.001
Model 3	1.039 (1.017–1.061)***	1.00	1.25 (0.97–1.61)	1.47 (1.13–1.89)**	0.003
Model 4	1.036 (1.014–1.060)***	1.00	1.23 (0.95–1.58)	1.42 (1.09–1.84)**	0.01

A total of 4,466 males were followed up to 2015 years. RFM was stratified according to the tertiles and used as a continuous variable in these regression models. Model 1, crude model; Model 2, adjusting for age and educational levels; Model 3, further adjusting for sleep duration, cigarette and alcohol consumption, hypertension, and depression; Model 4, further adjusting for blood biomarkers including uric acid, LDL, triglycerides, glucose, HDL and total cholesterol. *, P<0.05; **, P<0.01; ***, P<0.001. RFM, relative fat mass; LUTS/BPH, lower urinary tract symptoms suggestive of benign prostate hyperplasia; OR, odds ratio; CI, confidence interval; LDL, low-density lipoprotein; HDL, high-density lipoprotein.
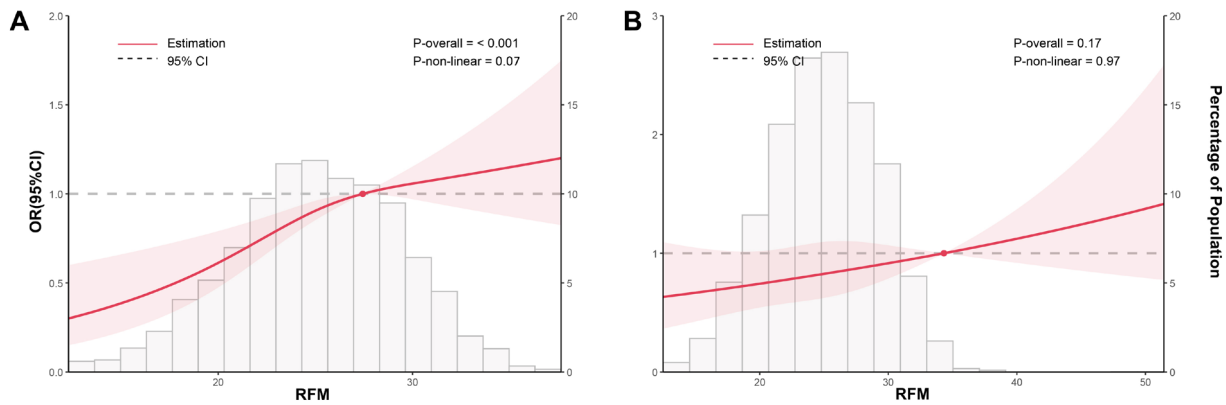
Figure S1 The dose-response associations between RFM and prevalent LUTS/BPH in different ages (after interpolation). The missing values were first interpolated using the random forest method. Then, RCS regression replicates the dose-response relationship between RFM and prevalent LUTS/BPH. In males aged ≥60 years (A) and <60 years (B), age was not adjusted, while educational levels, sleep duration cigarette and alcohol consumption, hypertension, depression, uric acid, LDL, triglycerides, glucose, HDL and total cholesterol were adjusted. The red line shows the OR and the pink area shows the 95% CI. OR, odds ratio; CI, confidence interval; RFM, relative fat mass; LUTS/BPH, lower urinary tract symptoms suggestive of benign prostate hyperplasia; RCS, restricted cubic spline; LDL, low-density lipoprotein; HDL, high-density lipoprotein.
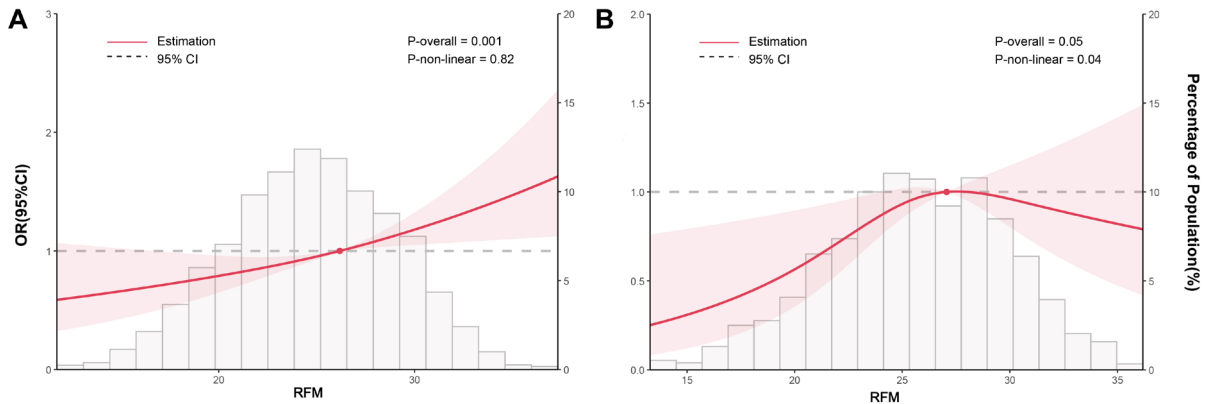

Figure S2 The dose-response associations between RFM and prevalent LUTS/BPH in participants with and without cigarette consumption (after interpolation). The missing values were first interpolated using the random forest method. RCS regression was used to investigate the dose-response relationship between RFM and prevalent LUTS/BPH in participants with (A) and without (B) cigarette consumption. Age, educational levels, sleep duration, alcohol consumption, hypertension, depression, uric acid, LDL, triglycerides, glucose, HDL, and total cholesterol were adjusted. The red line shows the OR and the pink area shows the 95% CI. OR, odds ratio; CI, confidence interval; RFM, relative fat mass; LUTS/BPH, lower urinary tract symptoms suggestive of benign prostate hyperplasia; RCS, restricted cubic spline; LDL, low-density lipoprotein; HDL, high-density lipoprotein.