

Supplementary Table SI. Baseline characteristics of the study population by CVD status at follow-up

Parameter	Total (<i>n</i> = 4562)	Non-CVD (<i>n</i> = 4064)	CVD (<i>n</i> = 498)	<i>P</i>-value
Age	57 (51, 64)	57 (51, 64)	60 (54, 66)	< 0.01
Gender				0.03
Female	2250 (49.32)	1981 (48.75)	269 (54.02)	
Male	2312 (50.68)	2083 (51.25)	229 (45.98)	
Marital				0.74
Married	4100 (89.87)	3655 (89.94)	445 (89.36)	
Non-married	462 (10.13)	409 (10.06)	53 (10.64)	
Education				0.64
Elementary school and below	3186 (69.84)	2831 (69.66)	355 (71.29)	
High school	935 (20.5)	841 (20.69)	94 (18.88)	
College and higher	441 (9.67)	392 (9.65)	49 (9.84)	
Location				0.77
Urban	4306 (94.39)	3834 (94.34)	472 (94.78)	
Rural	256 (5.61)	230 (5.66)	26 (5.22)	

Smoking				0.13
Never	2663 (58.37)	2364 (58.17)	299 (60.04)	
Former smoker	329 (7.21)	285 (7.01)	44 (8.84)	
Current smoker	1570 (34.41)	1415 (34.82)	155 (31.12)	
Drinking				0.42
None of these	2887 (63.28)	2559 (62.97)	328 (65.86)	
Drink but less than once a month	383 (8.40)	346 (8.51)	37 (7.43)	
Drink more than once a month	1292 (28.32)	1159 (28.52)	133 (26.71)	
Sleep time	7 (5, 8)	7 (5, 8)	6 (5, 8)	< 0.01
Developed heart disease				< 0.01
No	4238 (92.9)	4064 (100)	174 (34.94)	
Yes	324 (7.1)	0 (0)	324 (65.06)	
Developed stroke				< 0.01
No	4357 (95.51)	4064 (100)	293 (58.84)	
Yes	205 (4.49)	0 (0.00)	205 (41.16)	
Glucose [mg/dl]	100.26 (93.06, 109.08)	100.08 (92.88, 108.72)	101.43 (94.14, 110.52)	0.06
TG [mg/dl]	89.39 (67.26, 118.59)	88.5 (67.26, 117.71)	94.69 (72.57, 120.36)	< 0.01

HDL-C [mg/dl]	53.35 (44.46, 63.02)	53.35 (44.85, 63.02)	52.58 (43.78, 61.86)	0.32
LDL-C [mg/dl]	113.66 (94.72, 134.44)	113.27 (94.23, 134.15)	115.59 (95.59, 137.92)	0.11
METS-IR	31.92 (28.54, 35.84)	31.82 (28.47, 35.72)	32.73 (29.35, 36.86)	< 0.01
METS-VF	6.52 (6.16, 6.85)	6.51 (6.14, 6.83)	6.65 (6.31, 6.96)	< 0.01

p-values were calculated from chi-square tests (categorical variables) or rank-sum tests (continuous variables without normal distribution), or t-tests (continuous variables with normal distribution). CVD – cardiovascular disease, METS-IR – metabolic score for insulin resistance, METS-VF – metabolic score for visceral fat, TG – triglyceride, HDL-C – high-density lipoprotein cholesterol, LDL-C – low-density lipoprotein cholesterol.

Supplementary Table SII. Baseline characteristics of the study population according to METS-VF

Variables	Total (<i>n</i> = 4562)	Q1 (<i>n</i> = 1141)	Q2 (<i>n</i> = 1140)	Q3 (<i>n</i> = 1140)	Q4 (<i>n</i> = 1141)	<i>P</i> -value
Age	57 (51, 64)	55 (49, 61)	57 (51, 62)	57 (51, 63)	61 (54, 68)	< 0.01
Gender						< 0.01
Female	2250 (49.32)	569 (49.87)	594 (52.11)	590 (51.75)	497 (43.56)	
Male	2312 (50.68)	572 (50.13)	546 (47.89)	550 (48.25)	644 (56.44)	
Marital						< 0.01
Married	4100 (89.87)	1048 (91.85)	1008 (88.42)	1041 (91.32)	1003 (87.91)	
Non-married	462 (10.13)	93 (8.15)	132 (11.58)	99 (8.68)	138 (12.09)	
Education						0.36
Elementary school and below	3186 (69.84)	770 (67.48)	810 (71.05)	799 (70.09)	807 (70.73)	
High school	935 (20.5)	251 (22)	215 (18.86)	241 (21.14)	228 (19.98)	
College and higher	441 (9.67)	120 (10.52)	115 (10.09)	100 (8.77)	106 (9.29)	
Location						0.36
Urban	4306 (94.39)	1087 (95.27)	1079 (94.65)	1069 (93.77)	1071 (93.87)	

Rural	256 (5.61)	54 (4.73)	61 (5.35)	71 (6.23)	70 (6.13)	
Smoking						< 0.01
Never	2663 (58.37)	636 (55.74)	673 (59.04)	692 (60.7)	662 (58.02)	
Former smoker	329 (7.21)	64 (5.61)	64 (5.61)	83 (7.28)	118 (10.34)	
Current smoker	1570 (34.41)	441 (38.65)	403 (35.35)	365 (32.02)	361 (31.64)	
Drinking						0.10
None of these	2887 (63.28)	720 (63.1)	713 (62.54)	719 (63.07)	735 (64.42)	
Drink but less than once a month	383 (8.4)	108 (9.47)	86 (7.54)	111 (9.74)	78 (6.84)	
Drink more than once a month	1292 (28.32)	313 (27.43)	341 (29.91)	310 (27.19)	328 (28.75)	
Sleep time	7 (5, 8)	7 (5, 8)	6.25 (5, 8)	7 (5, 8)	7 (5, 8)	0.63
Developed heart disease						0.01
No	4238 (92.9)	1083 (94.92)	1058 (92.81)	1054 (92.46)	1043 (91.41)	
Yes	324 (7.1)	58 (5.08)	82 (7.19)	86 (7.54)	98 (8.59)	
Developed stroke						< 0.01

No	4357 (95.51)	1114 (97.63)	1096 (96.14)	1085 (95.18)	1062 (93.08)	
Yes	205 (4.49)	27 (2.37)	44 (3.86)	55 (4.82)	79 (6.92)	
Developed CVD						< 0.01
No	4064 (89.08)	1058 (92.73)	1018 (89.3)	1009 (88.51)	979 (85.8)	
Yes	498 (10.92)	83 (7.27)	122 (10.7)	131 (11.49)	162 (14.2)	
Glucose [mg/dl]	100.26 (93.06, 109.08)	98.46 (91.26, 106.74)	99.54 (92.7, 107.82)	100.98 (93.78, 109.8)	101.88 (95.04, 111.24)	< 0.01
TG [mg/dl]	89.39 (67.26, 118.59)	79.65 (61.95, 111.51)	88.5 (65.49, 122.13)	92.93 (70.8, 123.01)	95.58 (74.34, 115.93)	< 0.01
HDL-C [mg/dl]	53.35 (44.46, 63.02)	56.44 (47.17, 67.27)	55.28 (47.17, 65.34)	52.19 (44.46, 61.86)	48.71 (40.98, 57.99)	< 0.01
LDL-C [mg/dl]	113.66 (94.72, 134.44)	110.18 (90.08, 129.9)	112.11 (92.4, 131.83)	114.82 (95.1, 136.86)	117.91 (99.36, 138.79)	< 0.01
METS-VF	31.92 (28.54, 35.84)	27.85 (25.45, 30.2)	30.53 (28.16, 33.26)	33.23 (30.79, 36.02)	37.26 (33.85, 40.67)	< 0.01

p-values were calculated from chi-square tests (categorical variables) or rank-sum tests (continuous variables without normal distribution), or t-tests (continuous variables with normal distribution). CVD – cardiovascular disease, METS-IR – metabolic score for insulin resistance, METS-VF – metabolic score for visceral fat, TG – triglyceride, HDL-C – high-density lipoprotein cholesterol, LDL-C – low-density lipoprotein cholesterol.

Supplementary Table SIII. Prospective associations between baseline METS-VF with follow-up incident CVD/stroke/heart disease in CHARLS

Parameter	Model 1	P-value	Model 2	P-value	Model 3	P-value
CVD						
METS-VF per IQR	1.409 (1.233, 1.611)	< 0.001	1.332 (1.162, 1.528)	< 0.001	1.347 (1.174, 1.546)	< 0.001
Q1	Ref.		Ref.		Ref.	
Q2	1.53 (1.14, 2.05)	0.004	1.49 (1.11, 2.00)	0.008	1.48 (1.11, 2.00)	0.008
Q3	1.65 (1.24, 2.21)	0.001	1.58 (1.19, 2.12)	0.002	1.59 (1.19, 2.14)	0.002
Q4	2.11 (1.60, 2.80)	< 0.001	1.88 (1.42, 2.51)	< 0.001	1.91 (1.44, 2.55)	< 0.001
<i>p</i> for trend	< 0.001		< 0.001		< 0.001	
Stroke						
METS-VF per IQR	1.711 (1.384, 2.115)	< 0.001	1.540 (1.244, 1.907)	< 0.001	1.544 (1.245, 1.914)	< 0.001
Q1	Ref.		Ref.		Ref.	
Q2	1.66 (1.03, 2.72)	0.042	1.59 (0.98, 2.62)	0.062	1.59 (0.98, 2.62)	0.062
Q3	2.09 (1.32, 3.39)	0.002	2.00 (1.26, 3.24)	0.004	2.00 (1.26, 3.24)	0.004
Q4	3.07 (1.99, 4.87)	< 0.001	2.57 (1.65, 4.12)	< 0.001	2.58 (1.66, 4.13)	< 0.001
<i>p</i> for trend	0.001		< 0.001		< 0.001	
Heart disease						

METS-VF per IQR	1.302 (1.11, 1.528)	< 0.001	1.267 (1.074, 1.495)	0.005	1.282 (1.085, 1.515)	0.003
Q1	Ref.		Ref.		Ref.	
Q2	1.45 (1.03, 2.05)	0.037	1.42 (1.01, 2.03)	0.047	1.42 (1.00, 2.02)	0.051
Q3	1.52 (1.08, 2.16)	0.016	1.46 (1.04, 2.07)	0.032	1.47 (1.04, 2.09)	0.028
Q4	1.75 (1.26, 2.47)	0.001	1.64 (1.17, 2.33)	0.005	1.67 (1.19, 2.37)	0.004
<i>p</i> for trend	< 0.001		< 0.001		< 0.001	

Model 1 was crude model. Model 2 was adjusted for age, gender, education level, location, and marital status. Model 3 was further adjusted for smoking status, drinking status and sleep time. CVD – cardiovascular disease, METS-VF – metabolic score for visceral fat, IQR – interquartile range.

Supplementary Table SIV. Mediation of associations between METS-VF and CVD/stroke/heart disease in CHARLS, by TG

(METS-VF)-TG-CVD	Estimate	95% CI Lower	95% CI Upper	P-value
ACME (average)	0.00013	0.000027	0.000000	0.040 *
ADE (average)	0.00399	0.001910	0.010000	< 0.001 ***
Prop. Mediated	0.02930	0.008150	0.060000	0.040 *
(METS-VF)-TG-stroke				
ACME (average)	0.00003	0.000002	0.000000	< 0.001 ***
ADE (average)	0.00071	0.000173	0.000000	< 0.001 ***
Prop. Mediated	0.03320	0.011100	0.090000	< 0.001 ***
(METS-VF)-TG-(heart disease)				
ACME (average)	0.00005	-0.000072	0.000000	0.440
ADE (average)	0.00318	0.001690	0.000000	< 0.001 ***
Prop. Mediated	0.01250	-0.018100	0.070000	0.440

CI – confidence interval, METS-VF – metabolic score for visceral fat, CVD – cardiovascular disease, TG – triglyceride, ADE – average direct effect, ACME – average causal mediation effect.

Supplementary Table SV. Incremental predictive value of METS-VF

Parameter	C statistic			NRI (continuous)			IDI		
	Estimate	(95% CI)	P-value	Estimate	(95% CI)	P-value	Estimate	(95% CI)	P-value
CVD									
Basic model	0.597	(0.570, 0.623)		ref			ref		
Basic model + METS-VF	0.613	(0.587, 0.639)	0.039	0.150	(0.058, 0.242)	< 0.001	0.004	(0.002, 0.006)	< 0.001
Stroke									
Basic model	0.617	(0.577, 0.657)		ref			ref		
Basic model + METS-VF	0.648	(0.587, 0.639)	0.019	0.278	(0.143, 0.414)	< 0.001	0.004	(0.002, 0.006)	< 0.001
Heart disease									
Basic model	0.614	(0.582, 0.646)		ref			ref		
Basic model + METS-VF	0.623	(0.587, 0.639)	0.1774	0.097	(-0.015, 0.209)	0.089	0.002	(0.001, 0.004)	0.002

The basic model included age, gender, education level, location, marital status, smoking status, drinking status and sleep time. METS-VF – metabolic score for visceral fat, CVD – cardiovascular disease, NRI – net reclassification improvement, IDI – integrated discrimination improvement.