Electronic Supplementary Material (ESI) for Food & Function.

Individual and interactive effects of monounsaturated fatty acids on their associations with hypertension in Chinese residents

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Table S1. Spearman correlations between daily intake levels of individual MUFAs and food categories.

□	Grains	Tubers	Soybeans	Vegetables	Fungi	Fruits	Seeds and nuts	Dairy	Red meat	Poultry	Fish and seafoods	Eggs	Oils
MUFA14	-0.06	-0.04	0.05	0.03	0.06	0.10	0.04	0.60	0.23	0.07	0.16	0.08	0.04
P-value	<0.001	0.010	<0.001	0.030	0.010	<0.001	0.140	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MUFA15	0.24	0.12	0.05	0.05	0.08	0.13	0.08	0.43	-0.02	0.06	0.18	0.12	-0.02
P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.110	<0.001	<0.001	<0.001	0.200
MUFA16	-0.12	-0.02	0.10	0.01	0.05	0.18	0.02	0.26	0.22	0.32	0.22	0.15	0.27
P-value	<0.001	0.140	<0.001	0.520	0.010	<0.001	0.360	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MUFA17	-0.04	-0.06	0.04	0.14	0.03	-0.05	0.03	0.12	0.28	0.06	0.16	-0.01	0.16
P-value	<0.001	<0.001	<0.001	<0.001	0.080	<0.001	0.220	<0.001	<0.001	<0.001	<0.001	0.440	<0.001
MUFA18	0.04	-0.10	0.06	0.22	0.09	0.02	0.25	0.13	0.30	0.28	0.14	0.09	0.64
P-value	<0.001	<0.001	<0.001	<0.001	<0.001	0.200	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MUFA20	0.04	-0.13	0.01	0.25	0.10	-0.13	0.11	-0.04	0.26	0.10	0.21	-0.08	0.46
P-value	<0.001	<0.001	0.320	<0.001	<0.001	<0.001	<0.001	0.040	<0.001	<0.001	<0.001	<0.001	<0.001
MUFA22	0.04	-0.04	0.21	0.11	0.13	-0.05	0.04	0.01	0.10	0.03	0.12	0.04	0.26
P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.050	0.550	<0.001	0.110	<0.001	<0.001	<0.001

The daily intake levels of individual MUFAs were log-transformed. **Abbreviations:** MUFA: monounsaturated fatty acid.

Table S2. Eigenvalues of components in principal components analysis using 7 individual MUFAs.

	Eigenvalue	Difference	Proportion	Cumulative proportion
1	2.14	0.65	0.31	0.31
2	1.49	0.31	0.21	0.52
3	1.18	0.31	0.17	0.69
4	0.87	0.26	0.12	0.81
5	0.60	0.11	0.09	0.90
6	0.49	0.24	0.07	0.97
7	0.24	-	0.04	1.00

The log-transformed intake levels of individual MUFAs were used in the principal components analysis. **Abbreviations:** MUFA: monounsaturated fatty acid.

Table S3. Eigenvectors of different individual MUFAs in components.

	Principal components						
	1	2	3	4	5	6	7
MUFA14	0.372	0.427	0.325	0.002	-0.505	-0.565	-0.013
MUFA15	0.250	0.551	0.358	0.208	0.150	0.656	-0.095
MUFA16	0.432	0.168	-0.489	0.258	0.480	-0.289	-0.407
MUFA17	0.407	-0.012	0.129	-0.774	0.389	-0.022	0.258
MUFA18	0.468	-0.074	-0.519	0.126	-0.389	0.289	0.506
MUFA20	0.398	-0.549	0.178	-0.107	-0.297	0.228	-0.597
MUFA22	0.263	-0.423	0.457	0.514	0.319	-0.176	0.383

The log-transformed intake levels of individual MUFAs were used in the principal components analysis.

Abbreviations: MUFA: monounsaturated fatty acid.

Table S4. Linear and nonlinear *P*-values for associations of MUFA15, MUFA17, MUFA18 and MUFA20 with hypertension and BPs in different MUFA subgroups, as well as interactions by MUFA subgroups.

			MUFA15	MUFA17	MUFA18	MUFA20
			Hypertension			
MUFA15	high	linear	-	0.215	0.031	0.001
		nonlinear	-	0.382	0.044	0.086
	low	linear	-	<0.001	0.001	0.001
		nonlinear	-	0.039	0.001	0.001
	interaction	linear	-	0.02	0.808	0.32
		nonlinear	-	0.096	0.704	0.422
MUFA17	high	linear	<0.001	-	0.103	0.001
		nonlinear	0.037	-	0.057	0.006
	low	linear	0.146	-	0.002	0.001
		nonlinear	0.068	-	0.006	<0.001
	interaction	linear	<0.001	-	0.982	0.015
		nonlinear	0.006	-	0.958	0.979
MUFA18	high	linear	0.735	<0.001	-	0.979
		nonlinear	0.662	0.429	-	0.869
	low	linear	0.009	<0.001	-	<0.001
		nonlinear	0.928	0.532	-	<0.001
	interaction	linear	0.268	0.893	-	0.038
		nonlinear	0.764	0.89	-	0.03
MUFA20	high	linear	0.534	<0.001	0.044	-
		nonlinear	0.942	0.635	0.021	-
	low	linear	0.07	<0.001	<0.001	-
		nonlinear	0.72	0.088	0.523	-
	interaction	linear	0.74	0.49	0.038	-
		nonlinear	0.751	0.329	0.417	-
			SBP			
MUFA15	high	linear	-	0.001	0.11	0.11
		nonlinear	-	0.466	0.166	0.601
	low	linear	-	<0.001	0.199	0.014
		nonlinear	-	0.168	0.125	0.076
	interaction	linear	-	0.243	0.092	0.655
		nonlinear	-	0.509	0.774	0.558
MUFA17	high	linear	0.005	-	0.467	0.203
		nonlinear	0.083	-	0.269	0.253
	low	linear	0.002	-	0.747	0.484
		nonlinear	0.781	-	0.684	0.404
	interaction	linear	0.306	-	0.667	0.9
		nonlinear	0.124	-	0.481	0.851
MUFA18	high	linear	0.465	0.028	-	0.716
		nonlinear	0.542	0.333	-	0.693
	low	linear	<0.001	<0.001	-	0.005
		nonlinear	0.781	0.141	-	0.479
	interaction	linear	0.054	0.041	-	0.216
		nonlinear	0.92	0.144	-	0.284
MUFA20	high	linear	0.009	0.013	0.721	-
		nonlinear	0.034	0.472	0.58	-

	low	linear	0.003	<0.001	0.071	-
		nonlinear	0.419	0.34	0.412	-
	interaction	linear	0.084	0.426	0.208	-
		nonlinear	0.03	0.744	0.793	-
			DBP			
MUFA15	high	linear	-	<0.001	0.013	<0.001
		nonlinear	-	0.657	0.622	0.302
	low	linear	-	<0.001	0.033	<0.001
		nonlinear	-	0.006	0.016	<0.001
	interaction	linear	-	0.37	0.01	0.007
		nonlinear	-	0.189	0.33	0.126
MUFA17	high	linear	<0.001	-	0.388	<0.001
		nonlinear	0.053	-	0.181	<0.001
	low	linear	0.017	-	0.36	<0.001
		nonlinear	0.52	-	0.843	0.455
	interaction	linear	0.037	-	0.124	0.075
		nonlinear	0.309	-	0.262	0.027
MUFA18	high	linear	0.125	0.002	-	0.022
		nonlinear	0.716	0.232	-	0.259
	low	linear	<0.001	<0.001	-	<0.001
		nonlinear	0.032	0.232	-	0.351
	interaction	linear	0.01	0.001	-	0.034
		nonlinear	0.056	0.123	-	0.919
MUFA20	high	linear	0.041	<0.001	0.044	-
		nonlinear	0.209	0.69	0.763	-
	low	linear	<0.001	<0.001	<0.001	-
		nonlinear	0.427	0.267	0.978	-
	interaction	linear	0.191	0.436	<0.001	-
		nonlinear	0.633	0.202	0.953	-

Log-transformed daily intake levels of MUFAs were used, and regression models were adjusted for age, gender, physical activity, smoking, alcohol drinking, as well as intakes of carbohydrate, fat, protein, and sodium. Participants were those without any anti-hypertensive treatment for associations between MUFAs and BPs. Abbreviations: MUFA: monounsaturated fatty acid; SBP: systolic blood pressure; DBP: diastolic blood pressure.

Table S5. Associations of daily MUFAs intakes with BMI and WC.

	BMI		WC	
□	Coefficient (95%CI)	*P*-value	Coefficient (95%CI)	*P*-value
MUFA15	0.15 (0.05, 0.25)	0.003	0.47 (0.24, 0.71)	<0.001
MUFA17	-0.29 (-0.37, -0.20)	<0.001	-0.97 (-1.17, -0.76)	<0.001
MUFA18	-0.00 (-0.10, 0.09)	0.967	-0.11 (-0.34, 0.12)	0.360
MUFA20	-0.24 (-0.33, -0.16)	<0.001	-0.80 (-1.01, -0.60)	<0.001

Regression models were adjusted for age, gender, physical activity, smoking, alcohol drinking, as well as intakes of carbohydrate, fat, protein. **Abbreviations:** MUFA: monounsaturated fatty acid; BMI: body mass index; WC: waist circumference; 95% CI: 95% confidence interval.

Table S6. Associations of BMI and WC with hypertension and BPs.

	Hypertension		SBP (mmHg)		DBP (mmHg)	
□	HR (95%CI)	*P*-value	Coefficient (95%CI)	*P*-value	Coefficient (95%CI)	*P*-value
BMI	1.09 (1.08, 1.10)	<0.001	0.70 (0.61, 0.79)	<0.001	0.55 (0.49, 0.61)	<0.001
WC	1.04 (1.03, 1.04)	<0.001	0.35 (0.31, 0.39)	<0.001	0.27 (0.24, 0.30)	<0.001

Regression models were adjusted for age, gender, physical activity, smoking, alcohol drinking, as well as intakes of carbohydrate, fat, protein and sodium. **Abbreviations:** BMI: body mass index; WC: waist circumference; SBP: systolic blood pressure; DBP: diastolic blood pressure; HR: hazard ratio; 95% CI: 95% confidence interval.

Table S7. Mediation effects of obesity estimated by anthropometric measurements on the association between MUFAs and SBP.

□	ACME (95%CI)	ADE (95%CI)	Total effect (95%CI)	Prop. Mediated (95%CI)	*P*-value
			BMI		
MUFA15	0.12 (0.05, 0.20)	0.53 (0.21, 0.86)	0.65 (0.32, 0.99)	0.18 (0.08, 0.39)	0.002
MUFA17	-0.19 (-0.25, -0.12)	-0.50 (-0.77, -0.25)	-0.69 (-0.97, -0.43)	0.27 (0.17, 0.44)	<0.001
MUFA18	0.05 (-0.13, 0.24)	-0.72 (-1.49, 0.02)	-0.67 (-1.45, 0.10)	-0.06 (-1.18, 0.80)	0.688
MUFA20	-0.19 (-0.26, -0.12)	-0.49 (-0.75, -0.20)	-0.68 (-0.94, -0.38)	0.28 (0.17, 0.49)	<0.001
			WC		
MUFA15	0.14 (0.06, 0.22)	0.51 (0.18, 0.87)	0.65 (0.31, 1.02)	0.21 (0.09, 0.44)	<0.001
MUFA17	-0.22 (-0.29, -0.15)	-0.47 (-0.74, -0.20)	-0.69 (-0.96, -0.40)	0.31 (0.21, 0.53)	<0.001
MUFA18	-0.05 (-0.23, 0.15)	-0.65 (-1.44, 0.09)	-0.69 (-1.50, 0.06)	0.06 (-0.63, 0.65)	0.640
MUFA20	-0.18 (-0.26, -0.11)	-0.49 (-0.78, -0.18)	-0.67 (-0.97, -0.36)	0.27 (0.16, 0.51)	<0.001

Regression models were adjusted for age, gender, physical activity, smoking, alcohol drinking, as well as intakes of carbohydrate, fat, protein, and sodium. Mediation analyses were performed in participants without any anti-hypertensive treatment. **Abbreviations:** MUFA: monounsaturated fatty acid; SBP: systolic blood pressure; ACME: average causal mediation effect; ADE: average direct effect; Prop. Mediated: proportion of mediation effect; 95% CI: 95% confidence interval.

Table S8. Mediation effects of obesity estimated by anthropometric measurements on the association between MUFAs and DBP.

□	ACME (95%CI)	ADE (95%CI)	Total effect (95%CI)	Prop. Mediated (95%CI)	*P*-value
			BMI		
MUFA15	0.10 (0.04, 0.16)	0.51 (0.29, 0.73)	0.61 (0.37, 0.83)	0.16 (0.07, 0.29)	<0.001
MUFA17	-0.15 (-0.20, -0.10)	-0.49 (-0.67, -0.29)	-0.64 (-0.83, -0.43)	0.24 (0.15, 0.36)	<0.001
MUFA18	0.04 (-0.11, 0.20)	-0.80 (-1.37, -0.24)	-0.75 (-1.35, -0.15)	-0.05 (-0.53, 0.15)	0.606
MUFA20	-0.15 (-0.20, -0.10)	-0.75 (-0.94, -0.56)	-0.90 (-1.09, -0.70)	0.17 (0.11, 0.23)	<0.001
			WC		
MUFA15	0.11 (0.04, 0.17)	0.50 (0.27, 0.73)	0.61 (0.37, 0.84)	0.18 (0.07, 0.31)	<0.001
MUFA17	-0.16 (-0.22, -0.11)	-0.47 (-0.65, -0.29)	-0.63 (-0.82, -0.44)	0.26 (0.17, 0.37)	<0.001
MUFA18	-0.04 (-0.18, 0.12)	-0.71 (-1.22, -0.18)	-0.75 (-1.30, -0.18)	0.06 (-0.23, 0.31)	0.554
MUFA20	-0.14 (-0.19, -0.09)	-0.76 (-0.95, -0.58)	-0.90 (-1.10, -0.71)	0.16 (0.09, 0.22)	<0.001

Regression models were adjusted for age, gender, physical activity, smoking, alcohol drinking, as well as intakes of carbohydrate, fat, protein, and sodium. Mediation analyses were performed in participants without any anti-hypertensive treatment. **Abbreviations:** MUFA: monounsaturated fatty acid; DBP: diastolic blood pressure; ACME: average causal mediation effect; ADE: average direct effect; Prop. Mediated: proportion of mediation effect; 95% CI: 95% confidence interval.

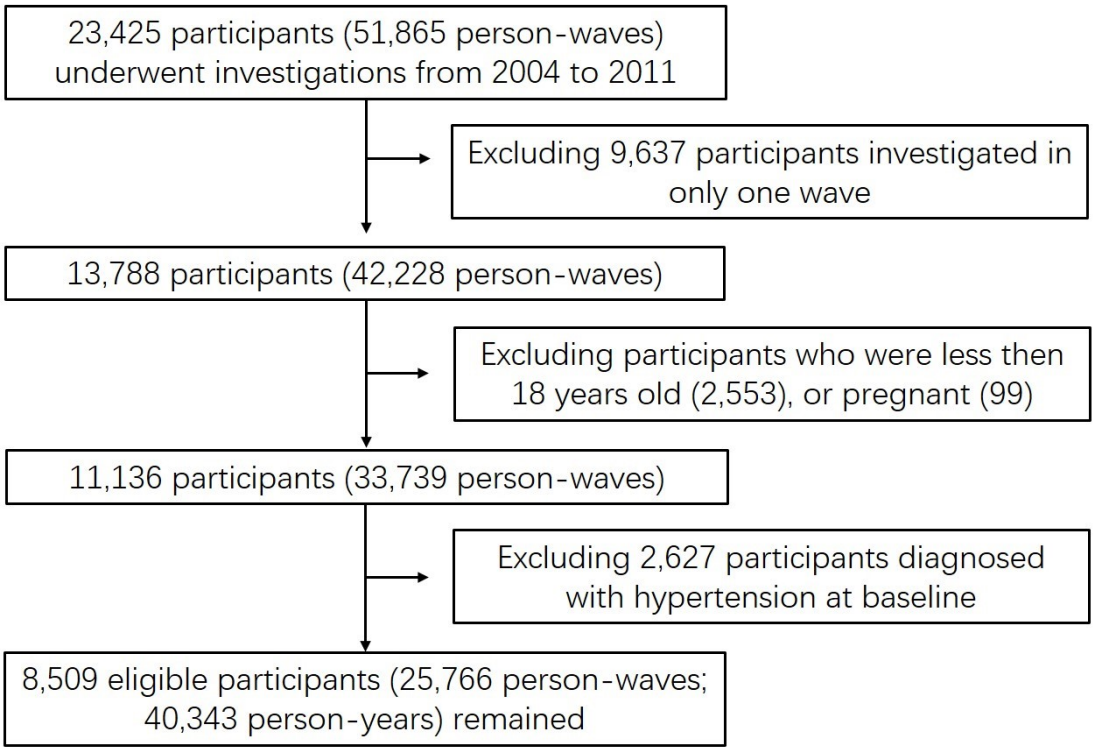

Figure S1. Flow chart of current study.

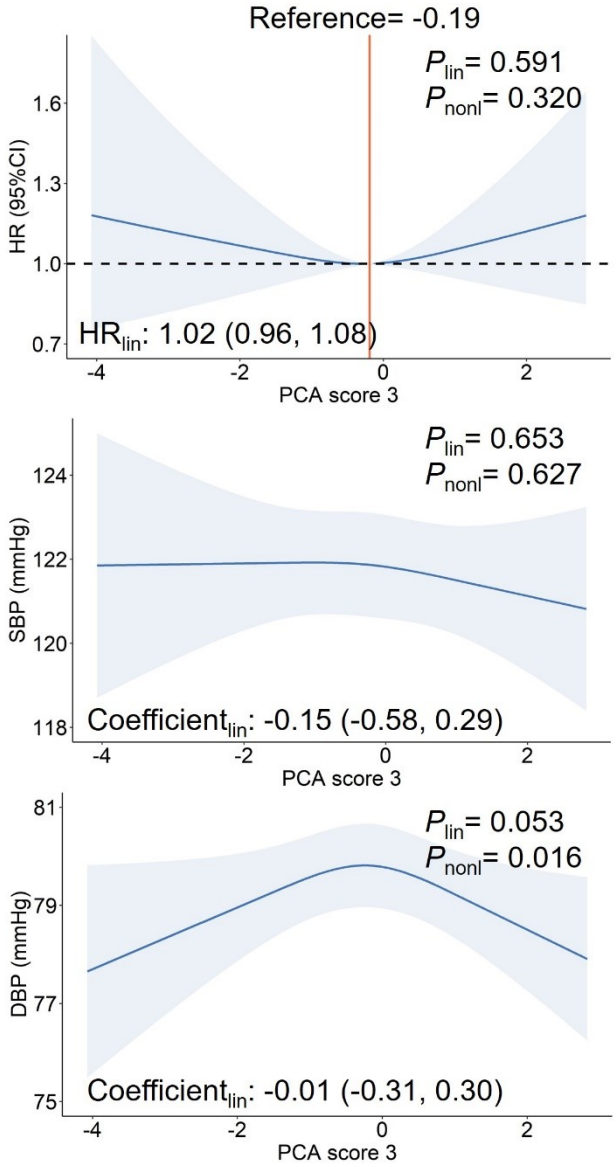

Figure S2. The associations of PCA score 3 with hypertension and BPs. PCA score 3 were calculated based on both z-scores of log-transformed MUFAs and eigenvectors. Regression models were adjusted for age, gender, physical activity, smoking, alcohol drinking, as well as intakes of carbohydrate, fat, protein, and sodium. BP-related analyses were performed in participants without any anti-hypertensive treatment. Abbreviations: MUFA: monounsaturated fatty acid; SBP: systolic blood pressure; DBP: diastolic blood pressure; HR: hazard ratio; 95%CI: 95% confidence interval; P_{lin}: *P*-value for linearity; P_{nonl}: *P*-value for nonlinearity; HR_{lin}: hazard ratio for linearity; $Coefficient_{lin}$: regression coefficient for linearity.