SUPPLEMENTAL MATERIAL

Body composition and risk factors for cardiovascular disease in global multi-ethnic populations

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Supplemental Table 1. Characteristics of the subsample of The Malaysia Cohort with HbA1c measurements available ($N=12,031;\ 18.1\%$), and the UK Biobank sample with measurements available (N=413,737).

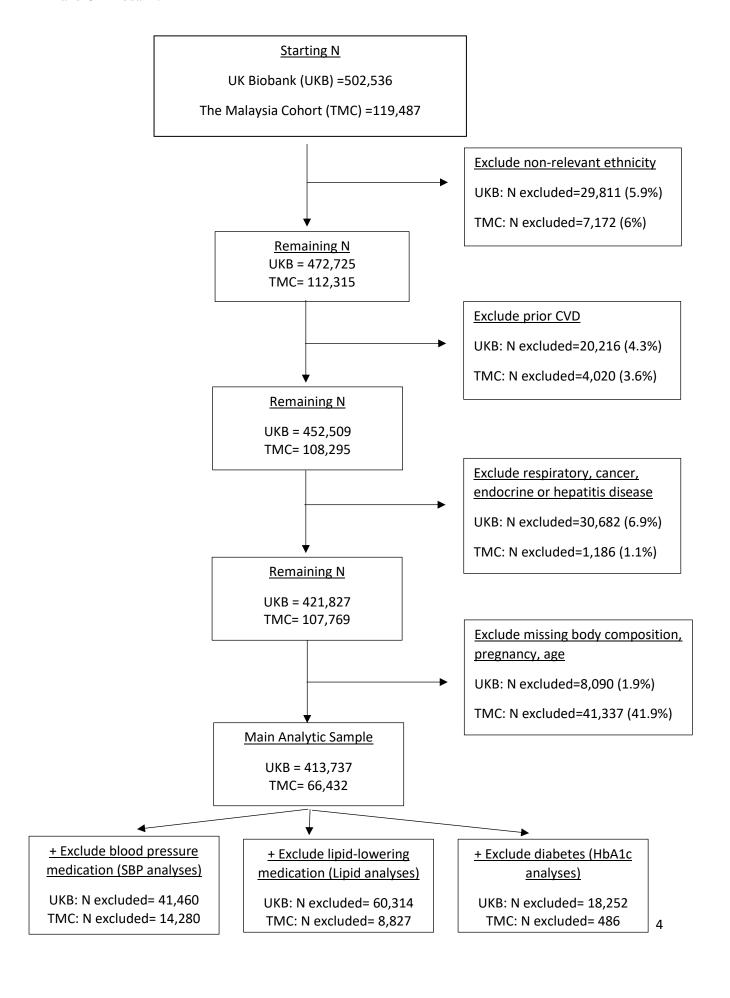
	MEN						
	White (n=184,433)	Malay (N=2,323)	Chinese (N=1,908)	Indian (N=716)			
Age, years	56.4 (8.1)	50.4 (6.9)	52.5 (7.1)	51.3 (6.8)			
Body composition							
Weight, kg	86.2 (14.1)	72.4 (11.3)	69.8 (10.6)	74.9 (12.0)			
Height, cm	176.0 (6.7)	166.1 (5.8)	168.5 (5.7)	168.8 (6.3)			
Body mass index, kg/m ²	27.8 (4.2)	26.2 (3.8)	24.6 (3.4)	26.3 (4.1)			
Total fat mass, kg	22.2 (8.2)	21.1 (7.4)	18.6 (6.7)	23.1 (8.1)			
Lean mass, kg	28.8 (4.0)	28.6 (3.5)	28.5 (3.5)	28.9 (3.6)			
Waist circumference,	96.8 (11.1)	88.3 (10.1)	86.4 (9.4)	92.7 (10.8)			
cm	yele (1111)	00.0 (10.1)	001. (91.)) 2 17 (1010)			
Cardiovascular risk factors							
SBP, mmHg	141 (17)	132.9 (18.5)	133.7 (17.9)	132.2 (17.7)			
LDL cholesterol, mmol/L	3.5 (0.8)	4.0 (1.0)	3.5 (0.9)	3.7 (1.0)			
Triglycerides, mmol/L	2.0 (1.2)	1.8 (1.2)	1.7 (1.4)	1.7 (1.0)			
HbA1c, % *	5.4 (0.6)	5.9 (1.2)	5.8 (1.0)	6.2 (1.3)			
Lifestyle (n, %)	3.4 (0.0)	3.9 (1.2)	3.6 (1.0)	0.2 (1.3)			
Current drinkers	175 795 (05 2)	20 (1.2)	221 (16.9)	02 (12 0)			
	175,785 (95.3)	30 (1.3)	321 (16.8)	93 (13.0)			
Current smokers	21,727 (11.8)	813 (35.0)	481 (25.2)	168 (23.5)			
Moderate physical activity	85,042 (46.1)	980 (42.2)	848 (44.4)	303 (42.3)			
Tertiary education	108,146 (58.6)	731 (31.5)	545 (28.6)	205 (28.6)			
•	WOMEN	` '		, ,			
	White	Malay	Chinese	Indian			
	(n=229,304)	(n=2,839)	(n=3,335)	(n=910)			
Age, years	56.3 (8.0)	49.5 (6.3)	51.6 (6.8)	50.0 (6.5)			
Body composition							
Weight, kg	71.3 (13.8)	64.8 (11.3)	57.8 (9.8)	66.0 (11.5)			
Height, cm	162.7 (6.2)	154.3 (5.5)	156.7 (5.5)	155.5 (5.7)			
Body mass index, kg/m ²	27.0 (5.1)	27.2 (4.4)	23.5 (3.8)	27.3 (4.5)			
Total fat mass, kg	26.8 (9.9)	26.9 (7.9)	20.7 (6.7)	28.3 (8.2)			
Lean mass, kg	19.5 (2.5)	20.31 (2.9)	19.8 (2.7)	20.2 (2.9)			
Waist circumference,	84.3 (12.4)	83.9 (11.0)	78.4 (9.7)	86.9 (10.7)			
cm	04.3 (12.4)	03.5 (11.0)	70.4 (2.7)	00.5 (10.7)			
Cardiovascular risk factors							
SBP, mmHg	135 (19)	130.8 (20.6)	129.5 (20.3)	129.3 (19.7)			
LDL cholesterol, mmol/L	3.7 (0.9)	` ,		* *			
		3.8 (1.0)	3.5 (0.9)	3.6 (0.9)			
Triglycerides, mmol/L	1.5 (0.9)	1.3 (0.7)	1.2 (0.7)	1.3 (0.8)			
HbA1c, % *	5.4 (0.5)	5.8 (1.1)	5.6 (0.7)	6.0 (1.3)			
Lifestyle (n, %)	211 (10 (02 2)	6 (0.2)	112 (2.4)	7 (0.0)			
Current drinkers	211,610 (92.3)	6 (0.2)	113 (3.4)	7 (0.8)			
Current smokers	19,611 (8.6)	23 (0.8)	87 (2.6)	4 (0.4)			
Moderate physical activity	109,023 (47.6)	1,390 (49.0)	1,793 (53.8)	430 (47.3)			
Tertiary education	122,936 (53.6)	818 (28.8)	762 (22.9)	158 (17.4)			
Ternary education	144,930 (33.0)	010 (20.0)	102 (22.3)	130 (17.4)			

Supplemental Table 2. Fully adjusted associations with risk factors for cardiovascular disease for a 1 SD increase in waist (cm)-to-height (cm) ratio. ^a

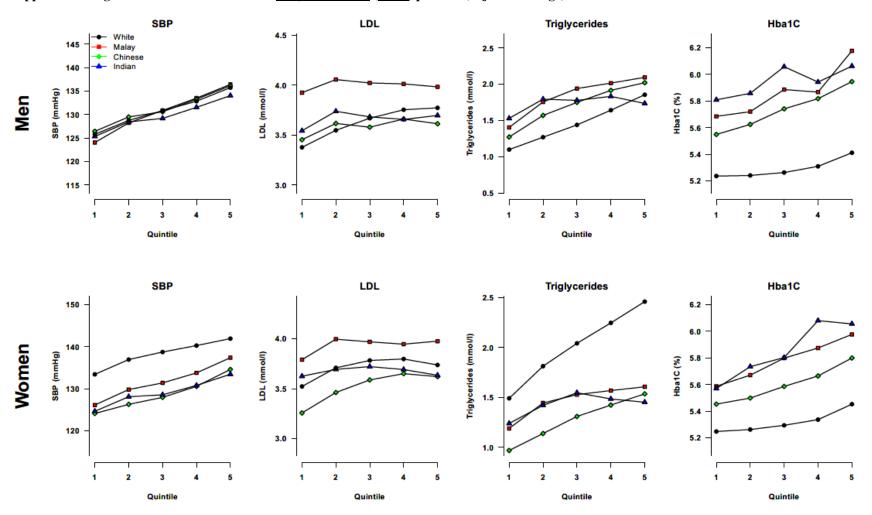
MEN		Standard Deviation	SBP, mmHg	LDL, mmol/L	TRIGLYCERIDES, mmol/L	HbA1c, %
	Chinese	0.06	3.63 (3.25, 4.01)	0.07 (0.05, 0.09)	0.28 (0.25, 0.30)	0.05 (0.04, 0.06)
	Malay	0.06	4.07 (3.74, 4.39)	0.04 (0.02, 0.06)	0.28 (0.26, 0.30)	0.06 (0.05, 0.08)
	Indian	0.06	2.95 (2.43, 3.48)	0.05 (0.02, 0.08)	0.08 (0.05, 0.12)	0.04 (0.02, 0.07)
	White	0.06	2.74 (2.66, 2.82)	0.00 (-0.01, 0.00)	0.32 (0.32, 0.33)	0.14 (0.14, 0.15)
WOMEN						
	Chinese	0.06	3.59 (3.27, 3.91)	0.14 (0.12, 0.16)	0.21 (0.19, 0.22)	0.03 (0.02, 0.03)
	Malay	0.07	3.41 (3.08, 3.74)	0.07 (0.05, 0.08)	0.18 (0.16, 0.20)	0.04 (0.03, 0.05)
	Indian	0.07	2.34 (1.84, 2.85)	0.03 (0.00, 0.05)	0.10 (0.08, 0.13)	0.07 (0.05, 0.09)
	White	0.08	3.51 (3.43, 3.58)	0.08 (0.08, 0.08)	0.31 (0.30, 0.31)	0.12 (0.12, 0.12)

^a Adjusted for age, education, smoking, alcohol and physical activity. SBP= Systolic blood pressure; LDL=Low density lipoprotein; HbA1c=glycated haemoglobin.

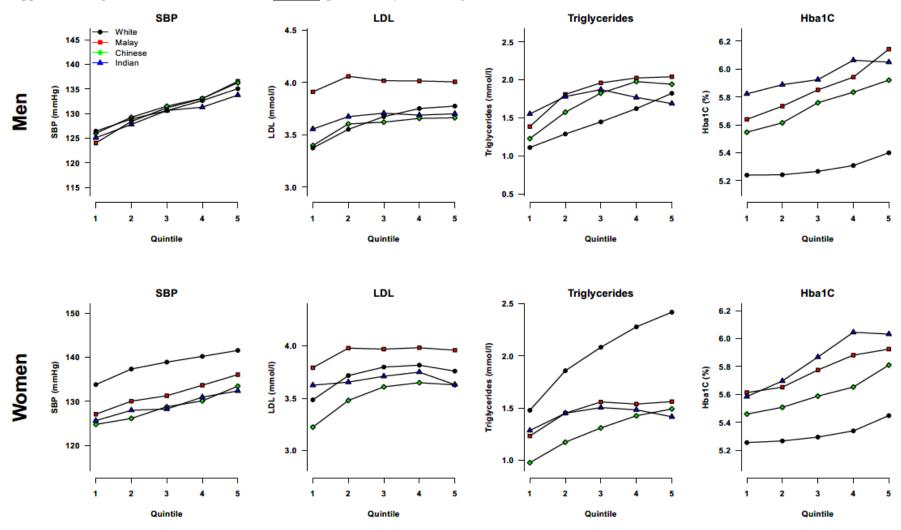
Supplemental Figure e1. Flow diagram of exclusions made to analytic samples of The Malaysia Cohort and UK Biobank.



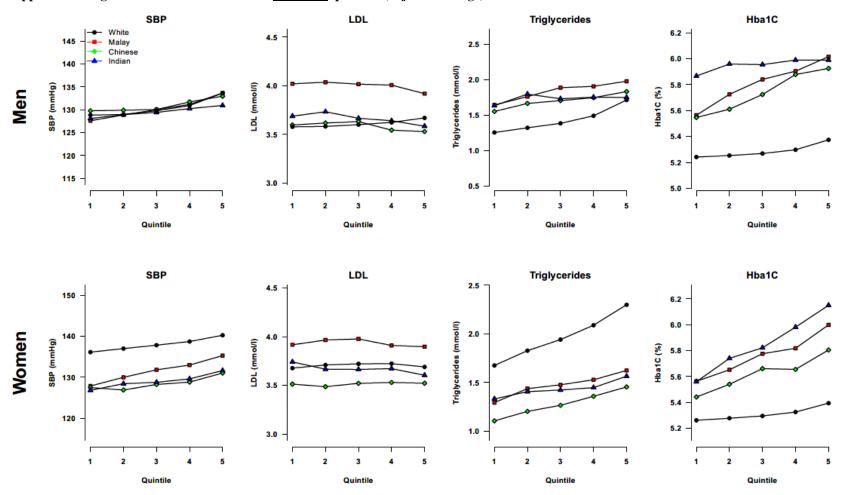
Supplemental Figure e2. Associations between body mass index (BMI) quintiles (adjusted for age) and cardiovascular risk factors across ethnicities.



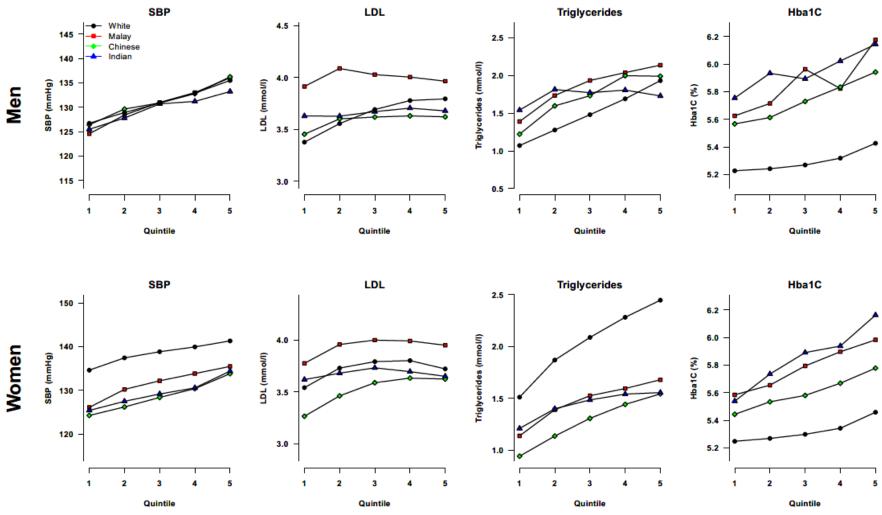
Supplemental Figure e3. Associations between fat mass quintiles (adjusted for age) and cardiovascular risk factors across ethnicities.



Supplemental Figure e4. Associations between <u>lean mass</u> quintiles (adjusted for age) and cardiovascular risk factors across ethnicities.







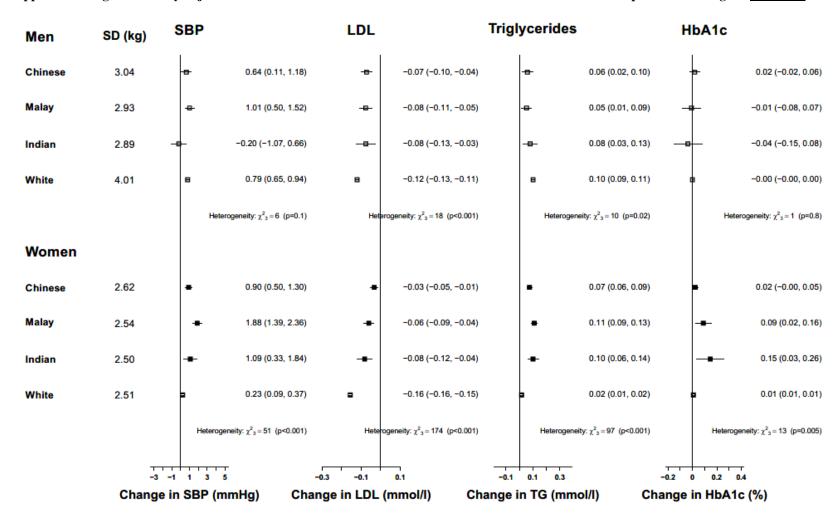
Supplemental Figure e6. Fully adjusted associations between cardiovascular risk factors a 1 sex- and ethnic- specific SD change in body mass index (BMI).

Men	SD (kg/m²)	SBP	LDL	Triglycerides	HbA1c
Chinese	3.42	2.85 (2.06, 3.65)	0.02 (-0.03, 0.06)	0.10 (0.04, 0.16)	-B 0.15 (0.12, 0.19)
Malay	3.85	- B- 3.55 (2.87, 4.23)	0.03 (-0.01, 0.07)	0.04 (-0.01, 0.09)	- a- 0.19 (0.15, 0.23)
Indian	3.77	2.43 (1.36, 3.51)	— — 0.08 (0.02, 0.14)	0.01 (-0.05, 0.08)	0.10 (0.04, 0.17)
White	4.19	3.32 (3.16, 3.49)	0.04 (0.03, 0.05)	0.16 (0.15, 0.17)	0.08 (0.08, 0.08)
		Heterogeneity: χ ² ₃ = 4 (p=0.2)	Heterogeneity: $\chi^2_3 = 3$ (p=0.4)	Heterogeneity: χ ² ₃ = 41 (p<0.001)	Heterogeneity: $\chi^2_{3} = 46 \text{ (p<0.001)}$
Women					
Chinese	3.80	2.55 (1.98, 3.13)	- = - 0.06 (0.03, 0.09)	0.07 (0.04, 0.09)	0.12 (0.11, 0.14)
Malay	4.47	3.20 (2.66, 3.73)	0.01 (-0.02, 0.04)	0.00 (-0.02, 0.03)	0.13 (0.10, 0.17)
Indian	4.37	1.78 (0.96, 2.59)	-0.00 (-0.04, 0.04)	-0.04 (-0.08, 0.00)	0.19 (0.13, 0.25)
White	5.11	3.03 (2.88, 3.19)	-0.01 (-0.02, -0.00)	-0.03 (-0.04, -0.03)	0.06 (0.06, 0.07)
		Heterogeneity: $\chi^2_{3} = 12 \text{ (p=0.009)}$	Heterogeneity: $\chi^2_{3} = 26 \text{ (p<0.001)}$	Heterogeneity: χ ² ₃ = 66 (p<0.001)	Heterogeneity: $\chi^2_{3} = 70 \text{ (p<0.001)}$
		-1 1 3 5 -0.3	3 -0.1 0.1	-0.1 0.1 0.3	-0.2 0 0.2 0.4
	Change	in SBP (mmHg) Chang	ge in LDL (mmol/l) C	hange in TG (mmol/l) Cha	ange in HbA1c (%)

Supplemental Figure e7. Fully adjusted associations between cardiovascular risk factors a 1 sex- and ethnic- specific SD change in <u>fat mass</u>. SBP LDL Triglycerides HbA1c

Men	SD (kg)				
Chinese	6.57	3.63 (3.21, 4.05)	0.11 (0.09, 0.13)	0.31 (0.27, 0.35)	0.14 (0.11, 0.18)
Malay	7.46	3.93 (3.53, 4.32)	- 0.08 (0.05, 0.10)	- 0.35 (0.31, 0.39)	0.20 (0.15, 0.25)
Indian	7.52	-■- 3.36 (2.74, 3.98)	0.08 (0.05, 0.12)	0.06 (0.01, 0.11)	-■ — 0.12 (0.04, 0.20)
White	8.17	2.36 (2.24, 2.49)	0.16 (0.16, 0.17)	0.24 (0.23, 0.25)	0.07 (0.07, 0.07)
		Heterogeneity: χ ² ₃ = 87 (p<0.001)	Heterogeneity: $\chi^2_3 = 82 \ (p<0.001)$	Heterogeneity: χ ² ₃ = 82 (p<0.001)	Heterogeneity: $\chi^2_3 = 40 \text{ (p<0.001)}$
Women					
Chinese	6.73	2.87 (2.52, 3.22)	0.15 (0.14, 0.17)	0.19 (0.18, 0.21)	0.11 (0.09, 0.13)
Malay	7.97	2.48 (2.08, 2.87)	0.09 (0.07, 0.11)	0.12 (0.09, 0.14)	0.08 (0.03, 0.13)
Indian	7.88	- - 1.93 (1.33, 2.52)	0.06 (0.03, 0.09)	0.03 (-0.01, 0.07)	0.09 (0.01, 0.17)
White	9.95	3.35 (3.22, 3.48)	0.25 (0.24, 0.25)	0.23 (0.22, 0.23)	0.05 (0.05, 0.05)
	Heterogeneity: χ ² ₃ = 39 (p<0.001)		Heterogeneity: χ ² ₃ = 376 (p<0.001)	Heterogeneity: $\chi^2_3 = 165 \ (p<0.001)$	Heterogeneity: χ ² ₃ = 30 (p<0.001)
	-2 Change		-0.1 0 0.1 0.2 ange in LDL (mmol/l) Cha		0.1 0.3 0.5 ge in HbA1c (%)

Supplemental Figure e8. Fully adjusted associations between cardiovascular risk factors a 1 sex- and ethnic- specific SD change in lean mass.



Supplemental Figure e9. Fully adjusted associations between cardiovascular risk factors a 1 sex- and ethnic- specific SD change in waist circumference.

Men		SD (cm)	SBP		LDL	Tr	riglycerides		HbA1c	
	Chinese	9.31	-	3.64 (3.26, 4.02)	-	0.07 (0.05, 0.09)	-	0.28 (0.25, 0.31)	-	0.14 (0.11, 0.17)
Basic	Malay	10.11		4.15 (3.82, 4.47)	0	0.03 (0.01, 0.05)	e	0.29 (0.26, 0.31)	-	0.20 (0.15, 0.24)
adjustment	Indian	9.96		2.99 (2.46, 3.52)	-	0.04 (0.01, 0.07)	-	0.08 (0.05, 0.11)		0.14 (0.07, 0.20)
	White	11.22		2.48 (2.39, 2.56)		0.06 (0.06, 0.07)		0.31 (0.31, 0.32)		0.07 (0.07, 0.08)
			Heteroger	neity: $\chi^2_3 = 127 \text{ (p<0.001)}$	Hetero	geneity: $\chi^2_3 = 11 \text{ (p=0.01)}$	Heterogeneit	$y: \chi^2_3 = 202 \text{ (p<0.001)}$	Heterog	peneity: $\chi^2_3 = 48 \text{ (p<0.001)}$
	Chinese	9.31	-	1.57 (0.70, 2.44)	-	0.09 (0.04, 0.13)		0.24 (0.17, 0.30)	+	0.02 (-0.05, 0.10)
+ adjustment	Malay	10.11		1.06 (0.31, 1.81)	-	0.03 (-0.02, 0.08)	-	0.29 (0.23, 0.34)		0.12 (0.03, 0.20)
for BMI	Indian	9.96	-	0.80 (-0.40, 2.00)	-	0.02 (-0.05, 0.09)	-	0.10 (0.02, 0.17)		0.23 (0.08, 0.37)
	White	11.22	=	-0.45 (-0.61, -0.28)	=	0.03 (0.02, 0.04)	=	0.18 (0.16, 0.19)		0.03 (0.03, 0.04)
			Heteroge	eneity: $\chi^2_3 = 37 \ (p<0.001)$	Hete	erogeneity: χ ² ₃ = 5 (p=0.2)	Heterogene	wity: $\chi^2_3 = 23$ (p<0.001)	Hetero	geneity: χ ² ₃ = 10 (p=0.02)
Women										
	Chinese	9.52		3.51 (3.18, 3.83)	-	0.13 (0.12, 0.15)	8	0.21 (0.20, 0.22)	8	0.11 (0.09, 0.13)
Basic	Malay	11.11		3.43 (3.10, 3.75)	-	0.06 (0.04, 0.08)	8	0.18 (0.16, 0.20)	-0-	0.15 (0.11, 0.18)
adjustment	Indian	10.25	•	2.45 (1.95, 2.94)	-	0.02 (-0.00, 0.05)	e e	0.11 (0.08, 0.13)	-0-	0.22 (0.16, 0.28)
	White	12.40		3.29 (3.21, 3.36)		0.14 (0.13, 0.14)		0.29 (0.28, 0.29)		0.07 (0.07, 0.07)
			Heteroge	eneity: $\chi^2_3 = 13$ (p=0.004)	Heteroge	neity: $\chi^2_3 = 140 \text{ (p<0.001)}$	Heterogeneit	$y: \chi^2_3 = 445 \text{ (p<0.001)}$	Heterog	peneity: $\chi^2_3 = 62 \text{ (p<0.001)}$
	Chinese	9.52	•	1.86 (1.25, 2.47)	•	0.12 (0.09, 0.15)		0.16 (0.14, 0.19)	•	0.04 (0.00, 0.07)
+ adjustment	Malay	11.11	•	0.75 (0.19, 1.32)	-	0.07 (0.04, 0.10)	•	0.19 (0.16, 0.22)	-	0.11 (0.05, 0.16)
for BMI	Indian	10.25	-	0.93 (0.08, 1.79)	-	0.04 (0.00, 0.09)	•	0.14 (0.10, 0.19)		0.20 (0.10, 0.30)
	White	12.40	-	0.66 (0.51, 0.81)	-	0.15 (0.14, 0.15)	•	0.32 (0.31, 0.32)	•	0.06 (0.06, 0.06)
			Heteroge	eneity: $\chi^2_3 = 14 \text{ (p=0.002)}$	Heterog	eneity: $\chi^2_3 = 44 \text{ (p<0.001)}$	Heterogeneit	$\text{ty: } \chi^2_3 = 242 \text{ (p<0.001)}$	Heterog	peneity: $\chi^2_3 = 12 \text{ (p=0.008)}$
			-2 0 2 4 6	-0	0.1 0.1		0 0.2 0.4 0.6		0.1 0.1 0.3 0.4	i
		Chang	ge in SBP (m	nmHg) Change	in LDL (n	nmol/l) Chang	ge in TG (mm	ol/l) Chang	ge in HbA1	c (%)