

SUPPLEMENTARY DATA

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PART 1: ANALYSES STRATIFIED BY GENDER (Supplementary Tables A-B-C-D)

Supplementary Table A. Study Participant Characteristics at Phase 3 by Socioeconomic Status and Diabetes Incidence Over 17.7 years of Follow-up.

	MEN (N=5041)				WOMEN (N=2196)			
	Socioeconomic Status			<i>p</i> ^c	Socioeconomic Status			<i>p</i> ^c
	High	Mid	Low		High	Mid	Low	
N (%)	2470 (49.0)	2273 (45.1)	298 (5.9)		361 (16.4)	1019 (46.4)	816 (37.2)	
Type 2 diabetes incidence, N (% ^a)	225(6.4)	285(8.7)	46(11.5)	<0.001	18 (3.6)	122(9.2)	123(9.6)	<0.001
Demographics								
Age, Mean (SD)	44.5 (5.8)	43.3 (6.0)	44.3 (6.3)	<0.001	42.3 (5.3)	44.2 (6.0)	46.6 (5.7)	<0.001
White ethnic group, N (%)	2439 (98.7)	2044 (89.9)	225 (75.5)	<0.001	355 (98.3)	927 (90.9)	608 (74.5)	<0.001
Family history of T2D, N (%)	21 (8.8)	238 (10.5)	38 (12.8)	=0.030	29 (8.0)	130 (12.8)	134 (16.4)	<0.001
Health behaviours								
Smoking, N (% ^b)	199 (7.6)	323 (15.4)	87 (23.2)	<0.001	35 (9.2)	162 (15.2)	154 (21.2)	<0.001
Heavy Drinking, N (% ^b)	483 (19.1)	410 (16.9)	34 (14.7)	=0.018	90 (20.7)	95 (11.6)	23 (2.5)	<0.001
Unhealthy Diet, N (% ^b)	743 (29.3)	945 (40.7)	141 (52.1)	<0.001	66 (17.4)	267 (25.6)	255 (33.8)	<0.001
Physical Inactivity, N (% ^b)	241 (9.1)	319 (17.6)	477 (26.1)	<0.001	100 (27.5)	293 (32.3)	358 (37.1)	=0.001
Other metabolic risk factors								
Obesity, N (% ^b)	152 (5.6)	154 (7.2)	30 (8.9)	=0.006	39 (12.1)	141 (14.1)	146 (16.1)	=0.086
High Triglycerides (≥150 mg/dL), N (% ^b)	760 (23.0)	862 (26.9)	284 (30.9)	=0.016	66 (10.0)	267 (14.5)	255 (19.0)	<0.001
Low HDL-cholesterol (<40/50 mg/dL in men/women), N (% ^b)	441 (17.8)	479 (21.1)	72 (24.4)	=0.001	31 (7.9)	150 (14.9)	177 (22.0)	<0.001
High Systolic Blood Pressure (≥140 mmHg), N (% ^b)	204 (8.2)	191 (8.7)	22 (9.1)	=0.476	13 (6.0)	61 (5.7)	57 (5.3)	=0.632

HDL: High Density Lipoprotein; Mid: Intermediate; SD: Standard Deviation

^aAge, sex and ethnicity adjusted diabetes incidence rate per 1000 person-years

^bAge, sex and ethnicity adjusted prevalence

^c*p* for linear trend across socioeconomic categories

Supplementary Table B. Association of Health Behaviours and other Risk Factors assessed at baseline (Phase 3) with Type 2 Diabetes Incidence.

	MEN (N=5041)		WOMEN (N=2196)	
	HR^a	(95% CI)	HR^a	(95% CI)
Family history of type 2 diabetes (Yes vs. No)	1.81	1.45, 2.26	2.81	2.15, 3.67
Smoking (Yes vs. No)	1.64	1.30, 2.06	1.19	0.85, 1.67
Alcohol Consumption				
Abstainers (0 unit/week) vs. moderate drinkers	1.05	0.82, 1.33	1.37	1.06, 1.78
Heavy (> 21/14 units/week for men/women) vs. moderate drinkers ^b	1.09	0.87, 1.35	0.70	0.40, 1.24
Diet				
Unhealthy vs. Healthy ^c	1.31	1.07, 1.90	1.43	1.06, 1.92
Moderately vs. Healthy ^c	0.90	0.75, 1.60	1.07	0.80, 1.43
Physical Activity				
Inactive vs. Active	1.30	1.08, 1.56	1.47	1.07, 2.01
Moderate vs. Active	1.17	0.91, 1.50	1.35	1.00, 1.83
Body Mass Index				
Overweight (25- 29.9 kg/m ² vs. <25 kg/m ²)	1.85	1.53, 2.23	2.13	1.53, 2.23
Obese (≥30 kg/m ² vs. <25 kg/m ²)	5.22	4.10, 6.64	4.35	1.57, 2.89
High Triglyceride^d (Yes vs. No)	3.06	2.58, 3.62	2.71	2.08, 3.53
Low HDL-cholesterol^e (Yes vs. No)	2.19	1.83, 2.61	2.36	1.82, 3.07
High Systolic Blood Pressure^f (Yes vs. No)	1.76	1.38, 2.26	2.05	1.42, 2.97

BMI: Body Mass Index; CI: Confidence Interval; HDL: High Density Lipoprotein; HR: Hazard Ratio

^a Age and ethnicity adjusted

^b Moderate drinkers defined as 1-21/1-14 units/week for men/women

^c Healthy diet defined as the upper tertile of the Alternative Healthy Eating Index (see Methods)

^d High Triglyceride defined as ≥ 1.7 mmol/l

^e Low HDL-cholesterol defined as <1/1.2 mmol/l in men/women

^f High Systolic Blood Pressure >140 mmHg

Supplementary Table C. Contribution of Baseline Risk Factors/Markers (Phase 3) in Explaining Social Inequalities in Type 2 Diabetes Incidence.

	MEN (N=5041)			WOMEN (N=2196)		
	HR	95% CI	% Δ^a	HR	95% CI	% Δ^a
Model 1: Lowest vs Highest SES	1.85	1.40, 2.45		1.71	1.16, 2.54	
Model 1 + smoking	1.71	1.29, 2.27	-13%	1.69	1.14, 2.50	-3%
Model 1 + alcohol	1.86	1.4, 2.47	1%	1.52	1.01, 2.27	-23%
Model 1 + diet	1.75	1.32, 2.32	-9%	1.63	1.10, 2.42	-9%
Model 1 + physical activity	1.86	1.40, 2.47	1%	1.70	1.15, 2.52	-1%
Model 2: Model 1 + All health behaviours	1.68	1.26, 2.24	-16%	1.45	0.96, 2.18	-31%
Model 1+ BMI	1.67	1.26, 2.21	-17%	1.49	1.01, 2.22	25%
Model 3: Model 2 (All health behaviours) + BMI	1.52	1.13, 2.03	-32%	1.30	0.86, 1.96	-52%
Model 3 + Triglyceride Level	1.44	1.08, 1.93	-12% ^b	1.17	0.77, 1.78	-38% ^b
Model 3 + HDL-cholesterol	1.50	1.12, 2.01	-2% ^b	1.21	0.8, 1.83	-26% ^b
Model 3 + Systolic Blood Pressure	1.50	1.12, 2.01	-2% ^b	1.32	0.87, 2.00	6% ^b
Model 4: All above risk factors	1.43	1.07, 1.91	-42%	1.25	0.82, 1.9	-59%

BMI: Body Mass Index; CI: Confidence Interval; HR: Hazard Ratio; Δ : Difference; SES: Socioeconomic Status

Model 1: Age, sex, ethnicity and family history of type 2 diabetes adjusted

^a% attenuation in log HR = $100 \times (\beta_{SES} - \beta_{SES + risk\ factor(s)}) / (\beta_{SES})$, where $\beta = \log(HR)$

^b Additional contribution of the risk factor to the model adjusted for all health behaviours and BMI (Model 3)

Supplementary Table D. Contribution of Repeatedly Measured Risk Factors/Markers in Explaining Social Inequalities in Type 2 Diabetes Incidence in men (N=5041, 556 incident diabetes cases) and women (N=2196, 263 incident diabetes cases).

	Longitudinal assessment ^a						Longitudinal + long-term assessment ^b					
	MEN			WOMEN			MEN			WOMEN		
	HR	95% CI	% Δ ^c	HR	95% CI	% Δ ^c	HR	95% CI	% Δ ^c	HR	95% CI	% Δ ^c
Lowest vs Highest SES												
Model 1^d	1.85	1.40, 2.45		1.71	1.16, 2.54		1.85	1.40, 2.45		1.71	1.16, 2.54	
Model 1 + smoking	1.75	1.32, 2.32	-9%	1.72	1.16, 2.55	1%	1.71	1.29, 2.27	-19%	1.72	1.16, 2.54	0%
Model 1 + alcohol	1.87	1.41, 2.48	2%	1.61	1.07, 2.40	-12%	1.85	1.39, 2.46	0%	1.48	0.99, 2.23	-27%
Model 1 + diet	1.76	1.33, 2.34	-8%	1.64	1.11, 2.44	-8%	1.77	1.33, 2.35	-7%	1.63	1.10, 2.41	-10%
Model 1 + physical activity	1.82	1.37, 2.41	-3%	1.62	1.09, 2.40	-10%	1.76	1.33, 2.34	-8%	1.60	1.08, 2.37	-13%
Model 2: Model 1												
+ All health behaviours	1.70	1.27, 2.27	-14%	1.50	1.00, 2.26	-24%	1.61	1.21, 2.16	-22%	1.37	0.91, 2.07	-41%
Model 1 + BMI	1.66	1.25, 2.19	-18%	1.43	0.96, 2.13	-33%	1.63	1.23, 2.16	-21%	1.44	0.97, 2.13	-33%
Model 3: Model 2												
(All health behaviours) + BMI	1.51	1.13, 2.02	-33%	1.29	0.86, 1.94	-52%	1.42	1.06, 1.90	-43%	1.20	0.79, 1.82	-66%
Model 3 + Triglyceride Level ^{ef}	1.48	1.11, 1.98	-5%	1.24	0.82, 1.87	-16%	1.39	1.04, 1.87	-6%	1.13	0.74, 1.71	-35%
Model 3 + HDL-cholesterol ^e	1.50	1.12, 2.01	-2%	1.18	0.78, 1.78	-35%	1.44	1.06, 1.95	4%	1.11	0.72, 1.70	-45%
Model 3 + SBP ^e	1.53	1.14, 2.05	3%	1.29	0.86, 1.94	0%	1.43	1.07, 1.92	2%	1.23	0.81, 1.87	14%
Model 4: All above risk factors	1.49	1.11, 2.00	-35%	1.16	0.77, 1.76	-72%	1.42	1.05, 1.93	-42%	1.11	0.72, 1.72	-81%

BMI: Body Mass Index; CI: Confidence Interval; HR: Hazard Ratio; SBP: Systolic Blood Pressure; SES: Socioeconomic Status; Δ: Difference

^a Risk factors updated at Phases 3, 5 & 7.

^b Risk factors updated at Phases 3, 5 & 7 and additionally adjusted for the risk factor at the previous phase.

^c % attenuation in log (HR) = $100 \times (\beta_{\text{SES}} - \beta_{\text{SES+ risk factor s}}) / (\beta_{\text{SES}})$, where $\beta = \log(\text{HR})$.

^d Model 1: Adjusted for age, ethnicity and family history of type 2 diabetes.

^e Additional contribution of the risk factor to the model adjusted for all health behaviours and BMI (Model 3).

^f Cumulative exposure to high triglycerides was not assessed for the time period between Phase 1 and Phase 3, due to lack of data at Phase 1.

PART 2: ANALYSES USING EDUCATION AND INCOME AS ALTERNATIVE INDICATORS OF SES (Supplementary Tables E-F)

Supplementary Table E. Study Participant Characteristics at Phase 3 by Education and Income.

	Education			p^c	Income			p^c
	High	Mid	Low		High	Mid	Low	
N (%)	1947 (28.7)	1740 (25.7)	3095 (45.6)		5654 (78.9)	1148 (16.0)	364 (5.1)	
Type 2 diabetes incidence, N (% ^a)	189 (6.7)	207 (8.5)	382 (8.2)	<0.001	618 (7.7)	145 (9.2)	44 (7.8)	<0.001
Demographics								
Age, Mean (SD)	42.7 (5.8)	43.4 (5.6)	45.6 (6.0)	<0.001	44.2 (5.9)	43.6 (6.0)	45.4 (6.2)	<0.001
Men, N (%)	1547 (79.5)	1310 (75.3)	1904 (61.5)	<0.001	4208 (74.4)	636 (55.4)	158 (43.4)	<0.001
White ethnic group, N (%)	1786 (91.7)	1616 (92.9)	2839 (91.7)	=0.316	5230 (92.5)	1007 (87.7)	308 (84.6)	<0.001
Family history of T2D, N (%)	180 (9.2)	174 (10.0)	377 (12.2)	=0.002	588 (10.4)	133 (11.6)	56 (15.4)	=0.008
Health behaviours								
Smoking, N (% ^b)	144 (7.0)	218 (12.0)	518 (17.1)	<0.001	626 (10.9)	222 (19.8)	106 (28.6)	<0.001
Heavy Drinking, N (% ^b)	369 (18.7)	313 (16.2)	399 (13.6)	<0.001	896 (15.4)	182 (15.1)	47 (14.8)	=0.667
Unhealthy Diet, N (% ^b)	517 (26.4)	580 (32.1)	1160 (37.9)	<0.001	1825 (31.9)	412 (36.8)	154 (41.7)	<0.001
Physical Inactivity, N (% ^b)	311 (16.3)	291 (19.1)	705 (21.9)	<0.001	883 (16.3)	354 (30.8)	168 (45.2)	<0.001
Other metabolic risk factors								
Obesity, N (% ^b)	133 (7.0)	152 (8.7)	325 (10.5)	<0.001	453 (8.1)	136 (12.2)	62 (16.3)	<0.001
High Triglycerides (≥ 150 mg/dL), N (% ^b)	444 (24.2)	472 (26.0)	864 (27.9)	=0.005	1500 (26.7)	296 (25.9)	91 (25.0)	=0.388
Low HDL-cholesterol (<40/50 mg/dL in men/women), N (% ^b)	320 (16.2)	316 (18.3)	633 (20.5)	<0.001	1030 (18.3)	233 (19.8)	75 (21.3)	=0.084
High Systolic Blood Pressure (≥ 140 mmHg), N (% ^b)	129 (7.9)	134 (7.7)	248 (7.5)	=0.671	440 (7.9)	75 (7.3)	28 (6.7)	=0.258

HDL: High Density Lipoprotein; Mid: Intermediate; SD: Standard Deviation

^aAge, sex and ethnicity adjusted diabetes incidence rate per 1000 person-years

^bAge, sex and ethnicity adjusted prevalence

^c p for linear trend across socioeconomic categories

Note: Education is categorized as university, secondary and primary education. Income is a proxy measure composed of measures of car ownership and type of accommodation. The highest category represents participants owning a car and their house, the lowest represents participants not owning a car and living in rented accommodation. The intermediate category represents other combinations of car ownership and type of accommodation.

Supplementary Table F. Contribution of Repeatedly Measured Risk Factors/Markers^a in Explaining Social Inequalities in Type 2 Diabetes Incidence by education (N=6782, 778 incident diabetes cases) and income (N=7166, 808 incident diabetes cases).

	Education			Income		
	HR	95% CI	% Δ^b	HR	95% CI	% Δ^b
Lowest vs Highest SES						
Model 1^c	1.23	1.03, 1.46		1.30	1.01, 1.66	
Model 1 + smoking	1.19	1.00, 1.42	-13%	1.23	0.96, 1.58	20%
Model 1 + alcohol	1.22	1.02, 1.45	-4%	1.26	0.98, 1.62	-11%
Model 1 + diet	1.18	0.99, 1.41	-18%	1.24	0.97, 1.60	-16%
Model 1 + physical activity	1.22	1.03, 1.45	-2%	1.19	0.92, 1.53	-35%
Model 2: Model 1 + All health behaviours	1.16	0.97, 1.38	-28%	1.10	0.85, 1.42	-64%
Model 1 + BMI	1.12	0.94, 1.34	-43%	1.14	0.89, 1.47	-49%
Model 3: Model 2 (All health behaviours) + BMI	1.06	0.89, 1.27	-71%	1.00	0.77, 1.29	-100%
Model 3 + Triglyceride Level ^d	1.05	0.88, 1.26	-14%	1.00	0.77, 1.29	NA ^e
Model 3 + HDL-cholesterol ^d	1.05	0.87, 1.26	-25%	1.03	0.79, 1.35	NA ^e
Model 3 + Systolic Blood Pressure ^d	1.06	0.89, 1.27	-2%	0.99	0.76, 1.27	NA ^e
Model 4: All above risk factors	1.04	0.87, 1.26	-80%	1.02	0.78, 1.33	-93%

BMI: Body Mass Index; BP: Blood Pressure; CI: Confidence Interval; HR: Hazard Ratio; NA: Not Available; SES: Socioeconomic Status; Δ : Difference

^a Risk factors updated at Phases 3, 5 & 7 and additionally adjusted for the risk factor at the previous phase.

^b % attenuation in log (HR) = $100 \times (\beta_{SES} - \beta_{SES + risk\ factor(s)}) / (\beta_{SES})$, where $\beta = \log(HR)$.

^c Model 1: Adjusted for age, sex, ethnicity and family history of type 2 diabetes.

^d Additional contribution of the risk factor to the model adjusted for all health behaviours and BMI (Model 3).

^e Attenuation not calculated as Model 3 has a HR=1.00.

PART 3:EMPLOYMENT ENTERED GRADE AS A CONTINUOUS VARIABLE/ 6-LEVEL VARIABLE (Supplementary Table G)

Supplementary Table G. Contribution of Repeatedly Measured Risk Factors/Markers^a in Explaining Social Inequalities in Type 2 Diabetes Incidence: employment grade entered as a categorical variable (3 or 6 categories) vs. entered as a continuous 3 or 6-level variable.

Variable	N (Cases)	Model 1 ^b			Model 2 ^c			Model 3 ^d			Model 4 ^{ef}		
		HR	95% CI		HR	95% CI	% Δ ^g	HR	95% CI	% Δ ^g	HR	95% CI	% Δ ^g
SES 3 level variable													
Unified grade 1-7 (High)	2831 (243)	1.00	-	-									
Executive (Intermediate)	3292 (407)	1.47	1.25, 1.73	-	1.38	1.17, 1.63	-16%	1.31	1.11, 1.56	-29%	1.29	1.09, 1.54	-34%
Clerical and support (Low)	1114 (168)	1.80	1.43, 2.28	-	1.55	1.21, 1.97	-26%	1.35	1.06, 1.73	-49%	1.29	1.00, 1.66	-57%
Lowest versus highest		1.86	1.48, 2.32	-	1.60	1.26, 2.02	-24%	1.41	1.11, 1.78	-45%	1.35	1.05, 1.72	-52%
SES 6 level variable													
Unified grade 1-6	1279 (118)	1.00	-	-									
Unified grade 7	1550 (125)	0.96	0.75, 1.24	-	0.94	0.73, 1.21	35%	0.93	0.72, 1.19	50%	0.88	0.68, 1.15	69%
Senior executive officer	1049 (124)	1.43	1.11, 1.85	-	1.38	1.07, 1.78	-11%	1.31	1.01, 1.69	-25%	1.28	0.98, 1.67	-31%
Higher executive officer	1224 (158)	1.53	1.20, 1.95	-	1.40	1.10, 1.79	-21%	1.34	1.05, 1.71	-32%	1.28	0.99, 1.65	-41%
Executive officer	1014 (124)	1.33	1.02, 1.74	-	1.19	0.90, 1.56	-39%	1.09	0.83, 1.43	-71%	1.00	0.75, 1.33	-100%
Clerical and support	1109 (168)	1.74	1.32, 2.28	-	1.44	1.09, 1.92	-33%	1.24	0.93, 1.65	-61%	1.13	0.84, 1.52	-78%
Lowest versus highest		1.77	1.40, 2.25	-	1.49	1.16, 1.92	-30%	1.30	1.01, 1.68	-54%	1.21	0.93, 1.57	-67%

BMI: Body Mass Index; BP: Blood Pressure; CI: Confidence Interval; HR: Hazard Ratio; SES: Socioeconomic Status; Δ: Difference

^a Risk factors updated at Phases 3, 5 &7 and additionally adjusted for the risk factor at the previous phase.

^b Model 1:Adjusted for age, sex, ethnicity and family history of type 2 diabetes .

^c Model 2:Model 1 + all health behaviours (smoking, diet, alcohol consumption and physical activity).

^d Model 3:Model 1 + all health behaviours and BMI.

^e Model 4:Model 1 + all risk factors smoking, diet, alcohol consumption and physical activity, BMI, triglyceride level, HDL-cholesterol, systolic blood pressure).

^f Cumulative exposure to high triglycerides was not assessed for the time period between Phase1 and Phase3, due to lack of data at Phase 1.

^g % attenuation in log (HR)= 100 x (β_{SES} - β_{SES+ risk factor s})/ (β_{SES}), where β =log (HR).

PART 4:ANALYSES APPLYING INVERSE PROBABILITY WEIGHTING (Supplementary Table H)

Supplementary Table H. Contribution of Risk Factors/Markers in Explaining Social Inequalities in Type 2 Diabetes Incidence.

	Baseline assessment of risk factors			Longitudinal assessment of risk factors ^a			Longitudinal + long-term assessment of risk factors ^b		
	HR	95% CI	% Δ ^c	HR	95% CI	% Δ ^c	HR	95% CI	% Δ ^c
Lowest vs Highest SES									
Model 1^d	1.81	1.44, 2.26		1.81	1.44, 2.26		1.81	1.44, 2.26	
Model 1 + smoking	1.71	1.37, 2.14	-9%	1.76	1.40, 2.20	-4%	1.73	1.38, 2.17	-7%
Model 1 + alcohol	1.76	1.41, 2.21	-4%	1.79	1.43, 2.25	-1%	1.75	1.39, 2.19	-6%
Model 1 + diet	1.71	1.37, 2.15	-9%	1.72	1.37, 2.15	-8%	1.71	1.37, 2.14	-9%
Model 1 + physical activity	1.79	1.43, 2.25	-1%	1.73	1.38, 2.16	-7%	1.69	1.35, 2.11	-12%
Model 2: Model 1 + All health behaviours	1.62	1.28, 2.03	-19%	1.64	1.30, 2.06	-16%	1.54	1.23, 1.95	-26%
Model 1 + BMI	1.62	1.30, 2.04	-18%	1.59	1.26, 1.99	-22%	1.58	1.26, 1.97	-23%
Model 3: Model 2 All health behaviours) + BMI	1.47	1.17, 1.86	-35%	1.45	1.15, 1.82	-38%	1.37	1.08, 1.72	-47%
Model 3 + Triglyceride Level ^e	1.36	1.08, 1.73	-20%	1.39	1.00, 1.76	-11%	1.31	1.03, 1.66	-14%
Model 3 + HDL-cholesterol ^e	1.43	1.13, 1.81	-7%	1.40	1.11, 1.76	-9%	1.33	1.04, 1.70	-8%
Model 3 + Systolic Blood Pressure ^e	1.47	1.16, 1.86	0%	1.45	1.15, 1.84	2%	1.38	1.09, 1.74	3%
Model 4: All above risk factors	1.37	1.08, 1.74	-47%	1.37	1.08, 1.73	-47%	1.31	1.03, 1.67	-55%

BMI: Body Mass Index; BP: Blood Pressure; CI: Confidence Interval; HR: Hazard Ratio; SES: Socioeconomic Status; Δ: Difference

^a Risk factors updated at Phases 3, 5 & 7.

^b Risk factors updated at Phases 3, 5 & 7 and additionally adjusted for the risk factor at the previous phase. Cumulative exposure to high triglycerides was not assessed for the time period between Phase1 and Phase3, due to lack of data at Phase 1.

^c% attenuation in log (HR)= 100 x (β_{SES} - β_{SES+ risk factor s})/ β_{SES}), where β =log (HR).

^d Model 1:Adjusted for age, sex, ethnicity and family history of type 2 diabetes .

^e Additional contribution of the risk factor to the model adjusted for all health behaviours and BMI (Model 3).