

Supplementary Table 1. Baseline demographic and clinical characteristics in overweight/obese subsamples stratified by glycemia (HbA1c and 2-hr PG), diabetes status, and microvascular outcomes.

Outcome		HbA1c			2-hour Plasma Glucose		
		Normal	Prediabetes	Diabetes	NGT	IGT	Diabetes
Albuminuria	Total (Male/Female)	1324 (608/716)	131 (42/89)	8 (0/8)	1578 (727/851)	161 (52/109)	38 (11/27)
	Age (years)	11.9 (9.5-15.1)	13.6 (11.4-16.8)	11.4 (11.2-14.3)	12.6 (9.9-16.0)	14.9 (11.8-17.3)	13.8 (11.6-16.2)
	modified BMI (z score)	1.9 (1.6-2.3)	2.2 (1.8-2.4)	2.5 (2.3-2.7)	1.9 (1.5-2.3)	2.2 (1.8-2.4)	2.5 (2.2-2.7)
	BMI (percentile)	97.3 (94.3-98.9)	98.6 (96.5-99.3)	99.4 (98.7-99.7)	97.1 (93.8-98.8)	98.6 (96.8-99.2)	99.4 (98.7-99.6)
	Follow-up (years)	6.3 (3.4-11.0)	7.1 (3.0-11.3)	5.0 (3.5-7.0)	7.7 (3.9-13.0)	6.7 (4.0-11.5)	5.6 (3.1-11.3)
	age at onset	19.2 (14.4-23.7)	21.7 (18.2-25.6)	18.0 (14.7-20.0)	22.0 (16.0-28.5)	23.7 (20.0-31.5)	21.2 (16.3-27.7)
	HbA1c (%)	5.1 (4.9-5.3)	5.8 (5.7-5.9)	7.4 (6.8-8.7)	—	—	—
	FPG (mmol/L)	4.9 (4.7-5.2)	5.2 (5.0-5.6)	8.1 (7.6-12.0)	—	—	—
	2-hr PG (mmol/L)	5.8 (5.1-6.6)	6.9 (5.8-8.3)	15.6 (13.4-20.3)	5.7 (5.0-6.3)	8.5 (8.1-9.4)	13.5 (12.4-16.2)
	developed type 2 diabetes, n(%)	174 (13.1)	62 (47.3)	—	276 (17.5)	72 (44.7)	—
Incidence of type 2 diabetes	17.3 (14.8-20.0)	81.4 (62.4-104.3)	—	19.6 (17.3-22.0)	64.9 (50.8-81.8)	—	
Severe albuminuria	Total (Male/Female)	1457 (643/814)	140 (44/96)	12 (1/11)	1621 (709/912)	171 (52/119)	45 (13/32)
	Age (years)	11.8 (9.3-15.0)	13.2 (11.4-16.7)	11.5 (11.2-13.3)	12.5 (9.7-16.0)	14.9 (11.8-17.5)	13.0 (11.5-16.0)
	modified BMI (z score)	1.9 (1.6-2.3)	2.2 (1.8-2.5)	2.5 (2.3-2.7)	1.9 (1.5-2.3)	2.2 (1.8-2.4)	2.5 (2.2-2.7)
	BMI (percentile)	97.2 (94.0-98.8)	98.6 (96.6-99.3)	99.4 (98.7-99.7)	97.1 (93.6-98.8)	98.6 (96.4-99.2)	99.4 (98.4-99.6)
	Follow-up (years)	7.3 (3.9-11.7)	7.6 (4.4-12.3)	6.2 (3.8-8.3)	8.7 (4.3-13.9)	8.0 (4.5-14.8)	8.0 (3.7-13.0)
	age at onset	22.7 (13.6-26.1)	25.6 (24.9-27.0)	24.2 (-)	25.8 (19.0-32.8)	33.4 (27.0-37.8)	28.2 (24.2-32.6)
	HbA1c (%)	5.1 (4.9-5.3)	5.8 (5.7-5.9)	7.4 (6.8-10.0)	—	—	—
	FPG (mmol/L)	4.9 (4.7-5.2)	5.2 (5.0-5.6)	8.1 (7.8-15.5)	—	—	—
	2-hr PG (mmol/L)	5.7 (5.0-6.5)	6.9 (5.8-8.4)	16.4 (14.1-24.4)	5.7 (5.0-6.3)	8.5 (8.1-9.4)	13.7 (12.6-16.7)
	developed type 2 diabetes, n(%)	187 (12.8)	65 (46.4)	—	274 (16.9)	76 (44.4)	—
Incidence of type 2 diabetes	17.0 (14.7-19.6)	79.7 (61.5-101.5)	—	19.1 (16.9-21.5)	63.4 (50.0-79.4)	—	
Retinopathy	Total (Male/Female)	1249 (529/720)	129 (40/89)	8 (1/7)	1924 (866/1058)	188 (57/131)	31 (10/21)
	Age (years)	12.7 (10.2-16.0)	13.9 (11.9-16.9)	12.0 (11.2 - 14.0)	11.9 (9.6-15.0)	13.9 (11.9-16.4)	13.3 (11.6-17.7)
	modified BMI (z score)	1.9 (1.5-2.3)	2.2 (1.8-2.5)	2.5 (2.0 - 2.6)	1.9 (1.5-2.2)	2.1 (1.8-2.4)	2.4 (2.0-2.6)
	BMI (percentile)	97.2 (93.8, 98.8)	98.7 (96.4-99.3)	99.3 (97.5 - 99.6)	96.9 (93.2-98.8)	98.4 (96.1-99.2)	99.1 (97.9-99.5)
	Follow-up (years)	7.4 (3.9-12.2)	7.2 (3.6-11.9)	7.7 (3.8 - 10.4)	10.1 (4.9-18.1)	9.3 (4.5-18.9)	12.0 (3.0-17.7)
	age at onset	25.3 (22.9-29.0)	25.7 (23.6-30.7)	24.2 (-)	33.6 (28.5-38.8)	36.1 (30.4-39.2)	33.7 (23.5-37.5)
	HbA1c (%)	5.1 (4.9-5.3)	5.8 (5.7-5.9)	7.8 (7.1 - 10.7)	—	—	—
	FPG (mmol/L)	5.0 (4.7-5.2)	5.3 (5.1-5.7)	8.6 (7.6-16.3)	—	—	—
	2-hr PG (mmol/L)	5.8 (5.0-6.5)	6.9 (5.9-8.2)	304.5 (250.5 - 452.0)	5.7 (5.0-6.3)	8.4 (8.1-9.2)	15.4 (13.6-19.7)
	developed type 2 diabetes, n (%)	172 (13.8)	59 (45.7)	—	425 (22.1)	84 (44.7)	—
Incidence of type 2 diabetes	18.0 (15.4-20.9)	81.5 (62.0-105.1)	—	20.6 (18.7-22.7)	53.0 (42.3-65.6)	—	

Data are presented as n (%) or as median (interquartile range). Descriptive statistics presented under HbA1c columns were calculated on participants that were included in the three compiled “comparative” datasets. Descriptive statistics presented under 2-hour Plasma glucose columns were calculated on participants that were included in the three compiled “2-hr PG” datasets. HbA1c (%; mmol/mol) classified as normal ($\leq 5.6\%$; ≤ 38 mmol/mol), prediabetes (5.7-6.4%; 39-47 mmol/mol), and diabetes ($\geq 6.5\%$; ≥ 48 mmol/mol). 2-hr PG (mmol/l) classified as NGT (< 7.8 mmol/l; < 140 mg/dl), IGT (7.8-11.0 mmol/l; 140-199 mg/dl), and diabetes (≥ 11.1 mmol/l; ≥ 200 mg/dl). — indicates incomplete data on HbA1c and FPG measurements in 2-hr PG datasets. Calculations for age at onset were performed only on participants who developed the complication. Proportion of those who developed diabetes was only calculated on children without diabetes at baseline. Incidence of type 2 diabetes was only calculated on children without diabetes at baseline, follow up for diabetes started at baseline screening and rates are calculated per 1000 person-years.

Supplementary Table 2. Incidence rate of albuminuria, severe albuminuria, and retinopathy for HbA1c or 2-hour plasma glucose datasets stratified by sex and category.

Glycemic Measure	Outcome	Albuminuria (ACR \geq 30)			Severe Albuminuria (ACR \geq 300)			Retinopathy			
		Person-Years	No. Events	Rate (95% CI)	Person-Years	No. Events	Rate (95% CI)	Person-Years	No. Events	Rate (95% CI)	
HbA1c	Normal	boys	6,976	102	14.6 (12.1-17.7)	7,881	16	2.0 (1.2-3.3)	6,596	11	1.7 (0.9-3.0)
		girls	7,729	248	32.1 (28.4-36.3)	10,084	28	2.8 (1.9-4.0)	9,014	16	1.8 (1.1-2.9)
	Prediabetes	boys	392	10	25.5 (13.8-47.0)	424	0	0	355	1	2.8 (0.4-19.9)
		girls	751	24	32.0 (21.6-47.4)	902	5	5.5 (2.3-13.3)	768	7	9.1 (4.4-19.1)
	Diabetes	boys	0	0	0	2	0	0	17	0	0
		girls	43	8	186.0 (99.6-347.6)	73	1	13.7 (1.9-95.9)	47	1	21.3 (3.1-147.9)
2-hour plasma glucose	NGT	boys	11,204	173	15.4 (13.3-17.9)	11,538	21	1.8 (1.2-2.8)	18,195	43	2.4 (1.8-3.2)
		girls	12,178	329	27.0 (24.3-30.1)	14,603	41	2.8 (2.1-3.8)	23,620	54	2.3 (1.8-3.0)
	IGT	boys	479	13	27.1 (15.9-46.4)	523	4	7.7 (2.9-20.3)	765	6	7.8 (3.5-17.4)
		girls	1,118	45	40.3 (30.2-53.6)	1,420	7	4.9 (2.4-10.3)	1,880	16	8.5 (5.2-13.9)
	Diabetes	boys	97	10	103.1 (57.3-185.4)	139	3	21.6 (7.1-66.2)	118	3	25.4 (8.3-77.7)
		girls	178	16	89.9 (56.3-143.5)	252	7	27.8 (13.4-57.7)	224	7	31.3 (15.1-64.8)

Incidence rates are calculated as cases per 1000 person-years. HbA1c (%; mmol/mol) classified as normal (\leq 5.6%; \leq 38 mmol/mol), prediabetes (5.7-6.4%; 39-47 mmol/mol), and diabetes (\geq 6.5%; \geq 48 mmol/mol). 2-hr PG (mmol/l) classified as NGT ($<$ 7.8 mmol/l; $<$ 140 mg/dl), IGT (7.8-11.0 mmol/l; 140-199 mg/dl), and diabetes (\geq 11.1 mmol/l; \geq 200 mg/dl). Incidence rates presented for HbA1c were calculated on participants that were included in the three compiled “comparative” datasets. Incidence rates presented for 2-hour Plasma glucose were calculated on participants that were included in the three compiled “2-hr PG” datasets.

Supplementary Table 3. Incidence rate for albuminuria, severe albuminuria, and retinopathy using baseline 2-hr PG, and FPG measurements in “comparative” datasets.

Glycemic Measure	Outcome	Albuminuria (ACR ≥ 30)			Severe Albuminuria (ACR ≥ 300)			Retinopathy		
		Person-Years	No. Events	Rate (95% CI)	Person-Years	No. Events	Rate (95% CI)	Person-Years	No. Events	Rate (95% CI)
2-hour plasma glucose	Overall	15,891	392	24.7 (22.4-27.2)	19,367	50	2.6 (1.9-3.4)	16,797	36	2.1 (1.5-3.0)
	NGT	14,706	337	22.9 (20.6-25.5)	17,895	42	2.3 (1.7-3.2)	15,518	21	1.4 (0.9-2.1)
	IGT	1,029	38	36.9 (27.0-50.5)	1,234	4	3.2 (1.2-8.6)	1,076	10	9.3 (5.0-17.2)
	Diabetes	156	17	109.0 (69.6-170.7)	237	4	16.9 (6.4-44.6)	203	5	24.6 (10.3-58.4)
Fasting Plasma Glucose	Overall	15,891	392	24.7 (22.4-27.2)	19,367	50	2.6 (1.9-3.4)	16,797	36	2.1 (1.5-3.0)
	Normal	14,284	331	23.2 (20.8-25.8)	17,471	38	2.2 (1.6-3.0)	14,932	23	1.5 (1.0-2.3)
	Impaired	1,535	49	31.9 (24.2-42.0)	1,760	9	5.1 (2.7-9.8)	1,739	9	5.2 (2.7-9.9)
	Diabetes	71	12	169.0 (100.9-283.1)	135	3	22.2 (7.3-68.0)	125	4	32.0 (12.2-84.0)

Incidence rates are calculated as cases per 1000 person-years. HbA1c (%; mmol/mol) classified as normal ($\leq 5.6\%$; ≤ 38 mmol/mol), prediabetes ($5.7-6.4\%$; $39-47$ mmol/mol), and diabetes ($\geq 6.5\%$; ≥ 48 mmol/mol). 2-hr PG (mmol/l) classified as NGT (< 7.8 mmol/l; < 140 mg/dl), IGT ($7.8-11.0$ mmol/l; $140-199$ mg/dl), and diabetes (≥ 11.1 mmol/l; ≥ 200 mg/dl). Incidence rates presented for HbA1c were calculated on participants that were included in the three compiled “comparative” datasets. Incidence rates presented for 2-hour Plasma glucose were calculated on participants that were included in the three compiled “2-hr PG” datasets.

Supplementary Table 4. Cox hazard models for the risk of albuminuria, severe albuminuria, and retinopathy using baseline 2-hr PG and FPG in “comparative” datasets.

Sample	Outcome	2-hour Plasma Glucose		Fasting Plasma Glucose	
		Hazard Ratio (95% CI)	p-value	Hazard Ratio (95% CI)	p-value
Whole sample	Albuminuria (ACR \geq 30)	1.14 (1.10-1.19)	<0.001	1.25 (1.17-1.37)	<0.001
	Severe albuminuria (ACR \geq 300)	1.14 (1.05-1.25)	0.003	1.25 (1.05-1.50)	0.01
	Retinopathy	1.20 (1.12-1.28)	<0.001	1.25 (1.07-1.47)	0.01
Participants <i>without</i> diabetes at baseline	Albuminuria (ACR \geq 30)	1.08 (1.00-1.17)	0.05	1.18 (0.91-1.54)	0.21
	Severe albuminuria (ACR \geq 300)	1.01 (0.81-1.27)	0.9	1.63 (0.80-3.33)	0.18
	Retinopathy	1.37 (1.08-1.74)	0.01	1.98 (0.86-4.53)	0.11
Participants <i>with</i> diabetes at baseline	Albuminuria (ACR \geq 30)	1.10 (0.96-1.27)	0.17	1.15 (0.99-1.34)	0.07
	Severe albuminuria (ACR \geq 300)	1.09 (0.82-1.46)	0.56	1.03 (0.67-1.58)	0.91
	Retinopathy	1.45 (0.86-2.47)	0.17	1.57 (0.60-4.11)	0.36

Fasting and 2-hour plasma glucose measurements were run as continuous variables. Models were adjusted for age and sex. Hazard ratios are given per 1 mmol/L increase.

Supplementary Table 5. Areas under the ROC curve (AUCs) for prediction of albuminuria, severe albuminuria, and retinopathy using baseline HbA1c, 2-hr PG, and FPG measurements in “comparative” datasets.

			All participants				Participants with overweight/obesity			
			Whole Sample		Only participants without diabetes at baseline		Whole Sample		Only participants without diabetes at baseline	
			AUC	p-value	AUC	p-value	AUC	p-value	AUC	p-value
	Outcome	Test								
continuous	Albuminuria (ACR ≥ 30)	HbA1c	0.61		0.62		0.6		0.6	
		2hPG	0.63	0.12	0.62	0.91	0.63	0.14	0.61	0.51
		FG	0.62	0.2	0.62	0.98	0.62	0.24	0.61	0.55
	Severe Albuminuria (ACR ≥ 300)	HbA1c	0.6		0.58		0.65		0.63	
		2hPG	0.57	0.34	0.60	0.53	0.63	0.42	0.65	0.63
		FG	0.62	0.41	0.59	0.79	0.67	0.49	0.63	0.86
	Retinopathy	HbA1c	0.70		0.68		0.7		0.71	
		2hPG	0.70	0.97	0.63	0.18	0.71	0.74	0.66	0.18
		FG	0.68	0.35	0.64	0.19	0.69	0.56	0.66	0.13
categorical	Albuminuria (ACR ≥ 30)	HbA1c	0.62		0.62		0.62		0.61	
		2hPG	0.63	0.18	0.62	0.8	0.63	0.27	0.61	0.63
		FG	0.63	0.39	0.62	0.97	0.62	0.63	0.61	0.85
	Severe albuminuria (ACR ≥ 300)	HbA1c	0.6		0.60		0.66		0.65	
		2hPG	0.6	0.89	0.59	0.39	0.67	0.63	0.65	0.98
		FG	0.62	0.37	0.61	0.6	0.69	0.2	0.68	0.42
	Retinopathy	HbA1c	0.69		0.66		0.7		0.69	
		2hPG	0.73	0.046	0.69	0.22	0.75	0.06	0.72	0.31
		FG	0.69	0.95	0.69	0.22	0.71	0.77	0.68	0.53

Baseline HbA1c, 2-hr PG, and FPG measurements were run as continuous and categorical variables. P-value indicates differences between AUCs from 2-hr PG or FPG compared to AUC from HbA1c.

Supplementary Figure 1. A) ROC curve estimated at 7.5 years of follow-up for albuminuria for continuous values of glycemic measures. B) ROC curve estimated at 8.0 years of follow-up for severe albuminuria for continuous values of glycemic measures. C) ROC curve estimated at 12.3 years of follow-up for retinopathy for continuous values of glycemic measures. Plotted ROC curves were estimated at the median follow-up time in years using the recursive method in PROC PHREG. AUCs in figure are different to AUCs in Supplementary Table 5 because AUCs in Figure 1 were estimated at particular follow-up times, while those in Supplementary Table 5 are calculated overall.

