

Supplementary data to "Development and validation of the DIabetes Severity SCOr (DISSCO)". Zghebi et al.

Supplementary data

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Table S1 List of 34 severity domains

	Severity domain	Hierarchical domain	Binary domain
Diabetes-related complications and renal disease domains	1. Diabetic neuropathy	√	Combined with 2, 5, 8
	2. Foot ulcers and Charcot foot	√	Combined with 1, 5, 8
	3. Gangrene	√	√
	4. Amputation	√	√
	5. Diabetic retinopathy	√	Combined with 1, 2, 8
	6. Laser therapy (including laser photocoagulation)	√	√
	7. Low vision, blindness	√	√
	8. Diabetic nephropathy	√	Combined with 1,2, 5
	9. Albuminuria, proteinuria	√	√
	10. ESRD (end stage renal disease): kidney transplant and dialysis	√	√
	11. Hypoglycaemia	√	√
	12. Diabetic ketoacidosis (DKA)	√	√
	13. Hyperosmolar hyperglycaemic state (HHS)	√	√
Cerebrovascular and cardiovascular disease, risk factors and interventions domains	14. Hypertension	√	√
	15. Hyperlipidaemia	√	√
	16. Stable angina	√	√
	17. Myocardial infarction (MI), acute coronary syndrome (ACS), unstable angina	√	√
	18. Heart valve disease	√	√
	19. Heart valve interventions	√	√
	20. Endocarditis	√	√
	21. Coronary artery interventions (percutaneous coronary intervention (PCI)/ percutaneous transluminal coronary angioplasty (PTCA), coronary artery bypass graft (CABG)	√	Combined with 33
	22. Cardiac arrest (ventricular tachycardia/fibrillation (VT/VF), Asystole)	√	√
	23. Atrial fibrillation (AF), supraventricular tachycardia (SVT)	√	√
	24. Pacemaker	√	√
	25. Heart failure (HF)	√	√
	26. Defibrillator, implantable cardioverter defibrillator (ICD), Cardiac resynchronization therapy (CRT) use	√	√
	27. Peripheral vascular disease (PVD)	√	√
	28. Cardiomyopathy	√	√
	29. Pericardial disease	√	√
	30. Myocarditis	√	√
	31. Coronary heart disease (CHD)	√	√
	32. Transient ischemic attack (TIA)	√	Combined with 34
	33. Carotid artery events, stenting and bypass interventions	√	Combined with 21
	34. Stroke	√	Combined with 32

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S2 Assigned hierarchical weights

	Severity domain	Hierarchical weight
Diabetes-related complications and renal disease domains	1. Diabetic neuropathy	1
	2. Foot ulcers and Charcot foot	1
	3. Gangrene	2
	4. Amputation	3
	5. Diabetic retinopathy	1
	6. Laser therapy (including laser photocoagulation)	2
	7. Low vision, blindness	2
	8. Diabetic nephropathy	1
	9. Albuminuria, proteinuria	2
	10. ESRD (end stage renal disease): kidney transplant and dialysis	3
	11. Hypoglycaemia	1
	12. Diabetic ketoacidosis (DKA)	2
	13. Hyperosmolar hyperglycaemic state (HHS)	3
Cerebrovascular and cardiovascular disease, risk factors and interventions domains	14. Hypertension	0.5
	15. Hyperlipidaemia	0.5
	16. Stable angina	1
	17. Myocardial infarction (MI), acute coronary syndrome (ACS), unstable angina	2
	18. Heart valve disease	1
	19. Heart valve interventions	2
	20. Endocarditis	2
	21. Coronary artery interventions (percutaneous coronary intervention (PCI)/ percutaneous transluminal coronary angioplasty (PTCA), coronary artery bypass graft (CABG))	2
	22. Cardiac arrest (ventricular tachycardia/fibrillation (VT/VF), Asystole)	3
	23. Atrial fibrillation (AF), supraventricular tachycardia (SVT)	1
	24. Pacemaker	2
	25. Heart failure (HF)	3
	26. Use of defibrillator, implantable cardioverter defibrillator (ICD), Cardiac resynchronization therapy (CRT)	4
	27. Peripheral vascular disease (PVD)	1
	28. Cardiomyopathy	1
	29. Pericardial disease	1
	30. Myocarditis	1
	31. Coronary heart disease (CHD)	1
	32. Transient ischemic attack (TIA)	2
	33. Carotid artery events, stenting and bypass interventions	3
	34. Stroke	4

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S3 Number of type 2 diabetes cases (%) by annual bins with baseline HbA_{1c} recorded within one year before and six months post-index (training and validation datasets)

	Up to 03/2008	Up to 03/2009	Up to 03/2010	Up to 03/2011	Up to 03/2012	Up to 03/2013	Up to 03/2014	Up to 03/2015	Up to 03/2016	Up to 03/2017
Training dataset										
Total number of cases	56,101	60,459	65,141	69,259	72,740	76,391	79,395	80,433	80,485	79,649
Number (%) of cases with recorded HbA _{1c}	45,940 (82%)	50,445 (83%)	55,231 (85%)	59,485 (86%)	63,085 (87%)	66,989 (88%)	70,198 (88%)	71,554 (89%)	72,068 (90%)	71,551 (90%)
Validation dataset										
Total number of cases	14,021	15,064	16,270	17,287	18,172	19,213	19,893	20,075	20,110	19,917
Number (%) of cases with recorded HbA _{1c}	11,489 (82%)	12,586 (84%)	13,801 (85%)	14,845 (86%)	15,759 (87%)	16,834 (88%)	17,590 (88%)	17,832 (89%)	17,973 (89%)	17,870 (90%)

Rationale for the chosen window to measure baseline HbA_{1c}: The one year before and six months after index date window was decided after examining the longitudinal patterns of recorded HbA_{1c} data and the number of cases with missing HbA_{1c} data in different windows before and after index date. Given the relevance of HbA_{1c} to our developed severity measure, we refrained from assigning individuals with missing HbA_{1c} to an "Unknown" category and preferred to supplement missing HbA_{1c} data by extending to measurements recorded within 6 months of post-index window i.e. using the closest measure recorded within a limited interval (one year before and six months after index date) instead. This approach can be justified by available data indicating that HbA_{1c} is fairly stable in people with type 2 diabetes, and that some cases were not first diagnosed with type 2 diabetes as a result of an HbA_{1c} testing (especially for early year cases and before HbA_{1c} test was approved for diabetes diagnosis in 2011 (BMJ 2012;345:e729), cases diagnosed due to opportunistic screening or while managing another health condition. But we would expect HbA_{1c} tests to be recorded afterwards, ideally, within the first 3-6 months of diabetes diagnosis.

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S4 Cox models using pre-index scores. A total of 100 models fitted using pre-index windows for primary and secondary outcomes.

		All-cause death	Any cause hospitalisation	CV hospitalisation	Diabetes-related hospitalisation	Clustered CV- or Diabetes-related hospitalisation	Hypoglycaemia-related hospitalisation	CV procedure
	Model 1 (Age, gender, ethnicity, and IMD)	√	√	√	√	√	√	√
Model 2	CU score +model 1	√	√	√	√	√	√	√
	C10 score +model 1	√	√	√	√	√	√	√
	C5 score +model 1	√	√	√	√	√	√	√
	SWU score +model 1	√	√	√	√	√	√	√
	SW10 score +model 1	√	√	√	√	√	√	√
	SW5 score +model 1	√	√	√	√	√	√	√
	PW score +model 1	√	-	-	-	-	-	-
	Model 3 (Age, gender, ethnicity, and IMD, HbA _{1c})	√	√	√	√	√	√	√
Model 4	CU score +model 3	√	√	√	√	√	√	√
	C10 score +model 3	√	√	√	√	√	√	√
	C5 score +model 3	√	√	√	√	√	√	√
	SWU score +model 3	√	√	√	√	√	√	√
	SW10 score +model 3	√	√	√	√	√	√	√
	SW5 score +model 3	√	√	√	√	√	√	√
	PW score +model 3	√	-	-	-	-	-	-

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S5 Cox models using post-index scores. A total of 70 Cox models fitted using 1-5 year moving post-index windows for all-cause mortality. *models were limited to patients contributing to each post-index window i.e. not censored.

		Index+1 year	Index+2 years	Index+3 years	Index+4 years	Index+5 years
	Model 1 (Age, gender, ethnicity, and IMD)*	√	√	√	√	√
Model 2	+CU +model 1	√	√	√	√	√
	+C10+model 1	√	√	√	√	√
	+C5+model 1	√	√	√	√	√
	+SWU+model 1	√	√	√	√	√
	+SW10+model 1	√	√	√	√	√
	+SW5+model 1	√	√	√	√	√
	Model 3 (Age, gender, ethnicity, IMD, and HbA _{1c})*	√	√	√	√	√
Model 4	+CU +model 3	√	√	√	√	√
	+C10+model 3	√	√	√	√	√
	+C5+model 3	√	√	√	√	√
	+SWU+model 3	√	√	√	√	√
	+SW10+model 3	√	√	√	√	√
	+SW5+model 3	√	√	√	√	√

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S6 Baseline characteristics of the identified type 2 diabetes study cohort by categories of the 10-year simple count severity score (C10) - training dataset

	Severity score= 0	Severity score= 1	Severity score= 2	Severity score= 3	Severity score= 4	Severity score= 5	Severity score ≥6
Patient count N(%)	38,152 (34.1)	35,845 (32.1)	19,075 (17.1)	9,405 (8.4)	5,175 (4.6)	2,532 (2.3)	1,564 (1.4)
Age, (years)±SD	57.8 ±12.3	63.2 ±11.9	66.5 ±11.4	69.1±10.9	70.8 ±10.6	70.8±10.0	72.0 ±9.5
Gender (Female) N(%)	16,498 (43.2)	16,955 (47.3)	8,935 (46.8)	3,887 (41.3)	1,972 (38.1)	921 (36.4)	518 (34.1)
Number of general practices	397	393	398	383	369	354	329
Mean baseline HbA _{1c} (mmol/mol) ^a ±SD	68 ±25	61 ±21	58 ± 20	58 ±19	57± 18	57 ±18	58 ±18
N(%) with HbA _{1c} data	32,612 (86%)	31,573 (88%)	17,056 (89%)	8,312 (88%)	4,625 (89%)	2,270 (90%)	1,410 (90%)
Ethnicity, N(%)							
• White	30,077 (78.8)	29,526 (82.4)	16,386 (85.9)	8,518 (90.6)	4,783 (92.4)	2,391 (94.4)	1,476 (94.4)
• Non-White	3,790 (10)	2,826 (7.9)	1,265 (6.6)	532 (5.7)	257 (5.0)	98 (3.9)	74 (4.7)
• Unknown	4,285 (11.2)	3,493 (9.7)	1,424 (7.5)	355 (3.8)	135 (2.6)	43 (1.7)	14 (0.9)
IMD quintiles, N(%)							
• Q1 (Affluent)	7,400 (19.4)	7,115 (19.9)	3,635 (19.1)	1,678 (17.8)	930 (18.0)	444 (17.5)	235 (15.0)
• Q2	7,889 (20.7)	7,646 (21.3)	4,139 (21.7)	1,998 (21.2)	1,043 (20.1)	525 (20.7)	340 (21.7)
• Q3	8,039 (21.0)	7,736 (21.6)	4,010 (21.0)	2,022 (21.5)	1,043 (20.1)	549 (21.7)	343 (21.9)
• Q4	7,813 (20.5)	6,929 (19.3)	3,807 (20.0)	1,902 (20.2)	1,066 (20.6)	505 (19.9)	319 (20.4)
• Q5 (Deprived)	6,986 (18.3)	6,403 (17.9)	3,463 (18.1)	1,800 (19.1)	1,088 (21.0)	509 (20.1)	327 (20.9)
• Unknown	25 (0.1)	16 (0.0)	21 (0.10)	5 (0.1)	5 (0.1)	**	**
Mean follow-up (yrs)±SD	8.05±5.1	7.6±4.6	7.3±4.5	7.2±4.4	7.1±4.4	6.9±4.2	6.2±4.1
Severity domains, N(%)	0.0 (0)	4,607 (12.9)	7,521 (39.4)	3,381 (35.9)	2,528 (48.9)	1,338 (52.8)	989 (63.2)
1. Hyperlipidaemia							
2. Hypertension	0.0 (0)	25,574 (71.3)	14,715 (77)	6,674 (71.0)	4,225 (81.6)	1,970 (77.8)	1,272 (81.3)
3. Stable angina	0.0 (0)	0.0 (0)	979 (5.1)	2,466 (26.2)	2,351 (45.4)	1,499 (59.2)	1,075 (68.7)
4. Cardiac arrest	0.0 (0)	<5	15 (0.08)	30 (0.3)	51 (1.0)	37 (1.5)	119 (7.6)
5. AF/SVT	0.0 (0)	844 (2.4)	1,654 (8.7)	1,522 (16.2)	1,117 (21.6)	714 (28.2)	689 (44.1)
6. PVD	0.0 (0)	303 (0.9)	566 (3.0)	572 (6.1)	504 (9.7)	351 (13.9)	409 (26.2)
7. MI/ACS/unstable angina	0.0 (0)	0 (0.00)	712 (3.7)	1,429 (15.2)	1,539 (29.7)	1,169 (46.2)	907 (58.0)
8. CHD	0.0 (0)	1,792 (5.0)	6,908 (36.2)	6,887 (73.2)	4,596 (88.8)	2,424 (95.7)	1,529 (97.8)
9. Heart valve disease	0.0 (0)	5 (0.01)	14 (0.07)	20 (0.2)	31 (0.6)	16 (0.63)	24 (1.5)
10. Endocarditis	0.0 (0)	5 (0.01)	8 (0.04)	9 (0.1)	19 (0.4)	19 (0.75)	27 (1.7)
11. Myocarditis	0.0 (0)	<5	<5	<5	<5	<5	<5
12. Cardiomyopathy	0.0 (0)	19 (0.05)	45 (0.24)	87 (0.9)	85 (1.6)	63 (2.49)	53 (3.4)
13. Pericardial disease	0.0 (0)	22 (0.06)	22 (0.12)	30 (0.3)	22 (0.4)	17 (0.67)	19 (1.2)
14. Ventricular tachycardia/fibrillation	0.0 (0)	<5	10 (0.05)	15 (0.2)	30 (0.58)	23 (0.91)	88 (5.6)
15. CHF	0.0 (0)	265 (0.7)	662 (3.5)	893 (9.5)	876 (16.9)	699 (27.6)	734 (46.9)

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

	Severity score= 0	Severity score= 1	Severity score= 2	Severity score= 3	Severity score= 4	Severity score= 5	Severity score ≥6
16. CV procedures	0.0 (0)	9 (0.03)	260 (1.4)	968 (10.3)	1,239 (23.9)	1,043 (41.2)	807 (51.6)
17. TIA/Stroke	0.0 (0)	851 (2.4)	1,993 (10.4)	1,470 (15.6)	922 (17.8)	519 (20.5)	470 (30.1)
18. Pacemaker	0.0 (0)	79 (0.2)	162 (0.8)	173 (1.8)	167 (3.2)	164 (6.5)	221 (14.1)
19. Defibrillator use	0.0 (0)	0 (0.00)	<5	7 (0.07)	10 (0.2)	19 (0.8)	56 (3.6)
20. Proteinuria, albuminuria	0.0 (0)	244 (0.7)	598 (3.1)	453 (4.8)	264 (5.1)	164 (6.5)	178 (11.4)
21. ESRD	0.0 (0)	18 (0.05)	56 (0.3)	41 (0.4)	23 (0.4)	14 (0.6)	16 (1.0)
22. Microvascular complications	0.0 (0)	680 (1.9)	881 (4.6)	611 (6.5)	339 (6.6)	209 (8.3)	228 (14.6)
23. Blindness, low vision	0.0 (0)	302 (0.8)	405 (2.1)	310 (3.3)	210 (4.1)	118 (4.7)	124 (7.9)
24. Laser therapy	0.0 (0)	13 (0.04)	28 (0.2)	31 (0.3)	22 (0.4)	6 (0.2)	13 (0.8)
25. Gangrene	0.0 (0)	5 (0.01)	5 (0.03)	<5	7 (0.1)	<5	6 (0.4)
26. Amputation	0.0 (0)	82 (0.2)	67 (0.4)	52 (0.6)	50 (1.0)	25 (1.0)	56 (3.6)
27. Hypoglycemia	0.0 (0)	74 (0.2)	86 (0.5)	65 (0.7)	46 (0.89)	31 (1.2)	49 (3.1)
28. Hyperosmolar hyperglycaemic state	0.0 (0)	17 (0.05)	18 (0.1)	6 (0.06)	7 (0.1)	<5	0.0 (0)
29. Diabetic ketoacidosis	0.0 (0)	26 (0.07)	21 (0.1)	8 (0.09)	<5	<5	<5

C10 severity score categories (0 - ≥6) are based on the simple count of severity domains using 10-year look-back window. Cell counts of less than five individuals can not be disclosed and are presented as <5 throughout the table. *most recent HbA_{1c} measure within 1 year before or 6 months after index date. **counts are merged with the Q5 band as they were less than 5 individuals.

ACS: acute coronary syndrome; **AF**: atrial fibrillation; **CHD**: coronary heart disease; **CHF**: congestive heart failure; **ESRD**: end stage renal disease; **HbA_{1c}**: glycated haemoglobin. **IMD**: index of multiple deprivation; **MI**: myocardial infarction; **PVD**: peripheral vascular disease; **SD**: standard deviation; **SVT**: supraventricular tachycardia; **TIA**: transient ischemic attack.

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S7 Descriptive statistics of the measured severity scores at baseline (index date) and 1-5 years after diabetes diagnosis [Mean±SD (Range)] - Training dataset

	Simple count (C) score						Severity-weighted (SW) score						Proximity-weighted score
	Index date	Index+1 year	Index+2 years	Index+3 years	Index+4 years	Index+5 years	Index date	Index+1 year	Index+2 years	Index+3 years	Index+4 years	Index+5 years	Index date
CU/ SWU	1.5±1.6 (0-15)	1.7±1.6 (0-17)	1.8±1.7 (0-17)	2.0±1.7 (0-17)	2.1±1.8 (0-14)	2.2±1.8 (0-14)	1.6±2.3 (0-27.5)	1.8±2.4 (0-28)	2.0±2.6 (0-28)	2.1±2.6 (0-28)	2.3±2.7 (0-26)	2.4±2.8 (0-28)	NA
C10/ SW10	1.3±1.4 (0-12)	1.4±1.4 (0-14)	1.6±1.5 (0-14)	1.7±1.5 (0-13)	1.8±1.5 (0-13)	1.9±1.6 (0-13)	1.3±2.0 (0-22)	1.5±2.1 (0-24)	1.7±2.2 (0-24)	1.8±2.3 (0-26)	1.9±2.3 (0-22)	2.0±2.4 (0-26.5)	NA
C5/ SW5/ PW	1.0±1.2 (0-11)	1.1±1.2 (0-13)	1.3±1.3 (0-13)	1.3±1.3 (0-12)	1.4±1.3 (0-11)	1.4±1.3 (0-12)	1.1±1.7 (0-21.5)	1.2±1.8 (0-23.5)	1.3±1.8 (0-23.5)	1.4±1.9 (0-21.5)	1.5±1.9 (0-19.5)	1.5±2.0 (0-22.5)	0.60±0.77 (0-7.6)

Simple count (C) score measured using unlimited (CU), 10-year (C10), and 5-year (C5) look-back windows. Severity-weighted (SW) score measured using unlimited (SWU), 10-year (SW10), and 5-year (SW5) windows

Supplementary data to "Development and validation of the Diabetes Severity SCORE (DISSCO)". Zghebi et al.

Table S8 Hazard ratios (95% CI) for risk of all-cause mortality associated with simple count and severity-weighted scores estimated at three baseline windows

Model	Predictors	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) • Indian • Unknown	1.10 (1.10 to 1.10) 0.78 (0.76 to 0.80) 1.52 (1.45 to 1.58) 0.70 (0.61 to 0.80) 0.92 (0.87 to 0.98)	0.7528	-	
Model 2 (unlimited)	Severity score (CU / SWU) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) • Indian • Unknown	1.14 (1.13 to 1.15) 1.09 (1.09 to 1.09) 0.81 (0.79 to 0.83) 1.47 (1.40 to 1.53) 0.70 (0.60 to 0.80) 0.99 (0.93 to 1.06)	0.7570	1.10 (1.10 to 1.11) 1.09 (1.09 to 1.09) 0.83 (0.81 to 0.85) 1.46 (1.39 to 1.52) 0.70 (0.60 to 0.80) 1.01 (0.95 to 1.07)	0.7556
Model 2 (10-year)	Severity score (C10/SW10) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) • Indian • Unknown	1.14 (1.13 to 1.15) 1.09 (1.09 to 1.09) 0.80 (0.79 to 0.82) 1.47 (1.41 to 1.53) 0.70 (0.60 to 0.80) 0.98 (0.92 to 1.04)	0.7563	1.11 (1.10 to 1.11) 1.09 (1.09 to 1.09) 0.82 (0.79 to 0.84) 1.46 (1.40 to 1.52) 0.70 (0.60 to 0.80) 1.00 (0.94 to 1.06)	0.7553
Model 2 (5-year)	Severity score (C10/SW10) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) • Indian • Unknown	1.13 (1.12 to 1.14) 1.09 (1.09 to 1.10) 0.79 (0.77 to 0.81) 1.48 (1.42 to 1.54) 0.70 (0.60 to 0.80) 0.96 (0.91 to 1.03)	0.7553	1.11 (1.11 to 1.12) 1.09 (1.09 to 1.09) 0.81 (0.78 to 0.83) 1.47 (1.41 to 1.54) 0.70 (0.61 to 0.80) 0.98 (0.92 to 1.04)	0.7548
Model 3	Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) • Indian • Unknown Baseline HbA _{1c}	1.10 (1.10 to 1.10) 0.77 (0.75 to 0.79) 1.52 (1.45 to 1.60) 0.70 (0.60 to 0.82) 0.89 (0.83 to 0.95) 1.04 (1.03 to 1.04)	0.7529	-	
Model 4 (unlimited)	Severity score (CU / SWU) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) • Indian • Unknown Baseline HbA _{1c}	1.15 (1.14 to 1.16) 1.09 (1.09 to 1.09) 0.81 (0.78 to 0.83) 1.46 (1.39 to 1.53) 0.70 (0.59 to 0.81) 0.96 (0.90 to 1.03) 1.05 (1.04 to 1.06)	0.7570	1.10 (1.10 to 1.11) 1.09 (1.09 to 1.09) 0.83 (0.80 to 0.85) 1.45 (1.38 to 1.52) 0.70 (0.59 to 0.81) 0.97 (0.91 to 1.04) 1.05 (1.04 to 1.05)	0.7554
Model 4 (10-year)	Severity score (C10/SW10) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) • Indian • Unknown Baseline HbA _{1c}	1.14 (1.13 to 1.15) 1.09 (1.09 to 1.10) 0.79 (0.77 to 0.82) 1.46 (1.39 to 1.53) 0.70 (0.59 to 0.81) 0.95 (0.88 to 1.01) 1.05 (1.04 to 1.05)	0.7563	1.11 (1.10 to 1.11) 1.09 (1.09 to 1.09) 0.81 (0.79 to 0.84) 1.45 (1.38 to 1.52) 0.70 (0.59 to 0.82) 0.96 (0.90 to 1.03) 1.04 (1.04 to 1.05)	0.7552
Model 4 (5-year)	Severity score (C5/SW5) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) • Indian • Unknown Baseline HbA _{1c}	1.13 (1.12 to 1.15) 1.10 (1.09 to 1.10) 0.79 (0.76 to 0.81) 1.47 (1.40 to 1.55) 0.70 (0.60 to 0.82) 0.93 (0.87 to 1.00) 1.04 (1.04 to 1.05)	0.7553	1.11 (1.11 to 1.12) 1.09 (1.09 to 1.10) 0.80 (0.78 to 0.82) 1.47 (1.40 to 1.54) 0.70 (0.60 to 0.82) 0.95 (0.89 to 1.02) 1.04 (1.04 to 1.05)	0.7547

AUROC: area under the Receiver Operating Characteristics curve; **HbA_{1c}:** glycated haemoglobin. Simple count (C) or severity-weighted (SW) score measured using unlimited (CU/SWU), 10-year (C10/ SW10), and 5-year (C5/SW5) look-back windows, respectively.

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S9 Adjusted hazard ratios (95% CI) for all-cause mortality associated with simple count estimated at baseline and 1-5 years moving post-index windows

	Predictor(s)	Index date	Index+1 year	Index+2 years	Index+3 years	Index+4 years	Index+5 years
Model 1	Age*	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)
	Gender (F)	0.78 (0.76 to 0.80)	0.78 (0.76 to 0.80)	0.78 (0.76 to 0.80)	0.77 (0.75 to 0.80)	0.77 (0.75 to 0.80)	0.77 (0.75 to 0.80)
	Deprivation (Q5 vs. Q1)	1.52 (1.45 to 1.58)	1.52 (1.45 to 1.58)	1.52 (1.45 to 1.59)	1.52 (1.45 to 1.59)	1.53 (1.46 to 1.61)	1.53 (1.46 to 1.61)
	Ethnicity (Indian vs. White)	0.70 (0.61 to 0.80)	0.70 (0.61 to 0.80)	0.71 (0.61 to 0.81)	0.69 (0.60 to 0.80)	0.70 (0.60 to 0.82)	0.63 (0.53 to 0.75)
	AUROC	0.7528	0.7528	0.7523	0.7518	0.7500	0.7484
Model 2 (unlimited)	CU score	1.14 (1.14 to 1.15)	1.14 (1.14 to 1.15)	1.15 (1.14 to 1.16)	1.15 (1.15 to 1.16)	1.16 (1.15 to 1.17)	1.16 (1.15 to 1.17)
	Age*	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)
	Gender (F)	0.81 (0.79 to 0.83)	0.81 (0.79 to 0.83)	0.81 (0.79 to 0.84)	0.81 (0.79 to 0.84)	0.82 (0.79 to 0.84)	0.82 (0.80 to 0.85)
	Deprivation (Q5 vs. Q1)	1.47 (1.40 to 1.53)	1.46 (1.40 to 1.53)	1.45 (1.39 to 1.52)	1.45 (1.38 to 1.52)	1.46 (1.39 to 1.53)	1.46 (1.38 to 1.53)
	Ethnicity (Indian vs. White)	0.70 (0.60 to 0.80)	0.70 (0.61 to 0.80)	0.71 (0.61 to 0.81)	0.69 (0.59 to 0.80)	0.71 (0.60 to 0.82)	0.64 (0.54 to 0.75)
	AUROC	0.7570	0.7573	0.7572	0.7572	0.7557	0.7546
Model 2 (10-year)	C10 score	1.14 (1.13 to 1.15)	1.14 (1.13 to 1.15)	1.15 (1.14 to 1.16)	1.15 (1.14 to 1.16)	1.16 (1.15 to 1.17)	1.16 (1.15 to 1.17)
	Age*	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)
	Gender (F)	0.80 (0.79 to 0.82)	0.80 (0.78 to 0.82)	0.80 (0.78 to 0.83)	0.80 (0.78 to 0.82)	0.80 (0.78 to 0.83)	0.80 (0.78 to 0.83)
	Deprivation (Q5 vs. Q1)	1.47 (1.41 to 1.53)	1.47 (1.40 to 1.53)	1.46 (1.40 to 1.53)	1.45 (1.39 to 1.52)	1.46 (1.40 to 1.54)	1.46 (1.39 to 1.54)
	Ethnicity (Indian vs. White)	0.70 (0.61 to 0.80)	0.70 (0.61 to 0.80)	0.71 (0.61 to 0.81)	0.69 (0.59 to 0.80)	0.70 (0.60 to 0.82)	0.64 (0.54 to 0.75)
	AUROC	0.7563	0.7565	0.7563	0.7561	0.7546	0.7532
Model 2 (5-year)	C5 score	1.13 (1.12 to 1.14)	1.14 (1.13 to 1.15)	1.14 (1.13 to 1.15)	1.14 (1.13 to 1.15)	1.15 (1.14 to 1.16)	1.15 (1.14 to 1.17)
	Age*	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.09)	1.10 (1.09 to 1.10)	1.10 (1.09 to 1.10)	1.10 (1.09 to 1.10)	1.09 (1.09 to 1.10)
	Gender (F)	0.79 (0.77 to 0.81)	0.80 (0.78 to 0.82)	0.79 (0.77 to 0.81)	0.79 (0.77 to 0.81)	0.79 (0.77 to 0.82)	0.79 (0.77 to 0.82)
	Deprivation (Q5 vs. Q1)	1.48 (1.42 to 1.54)	1.47 (1.40 to 1.53)	1.47 (1.41 to 1.54)	1.47 (1.40 to 1.54)	1.48 (1.41 to 1.56)	1.48 (1.41 to 1.56)
	Ethnicity (Indian vs. White)	0.70 (0.60 to 0.80)	0.70 (0.61 to 0.80)	0.69 (0.60 to 0.81)	0.69 (0.60 to 0.81)	0.71 (0.61 to 0.83)	0.64 (0.54 to 0.76)
	AUROC	0.7529	0.7555	0.7546	0.7547	0.7530	0.7516
Model 3	Age*	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)
	Gender (F)	0.77 (0.75 to 0.79)	0.77 (0.75 to 0.79)	0.77 (0.75 to 0.79)	0.77 (0.74 to 0.79)	0.77 (0.74 to 0.79)	0.77 (0.74 to 0.79)

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

	Predictor(s)	Index date	Index+1 year	Index+2 years	Index+3 years	Index+4 years	Index+5 years
Model 4 (unlimited)	Deprivation (Q5 vs. Q1)	1.52 (1.45 to 1.60)	1.52 (1.45 to 1.60)	1.52 (1.45 to 1.60)	1.52 (1.44 to 1.60)	1.54 (1.46 to 1.63)	1.54 (1.46 to 1.63)
	Ethnicity (Indian vs. White)	0.70 (0.60 to 0.82)	0.70 (0.60 to 0.82)	0.71 (0.60 to 0.83)	0.70 (0.59 to 0.82)	0.72 (0.60 to 0.85)	0.64 (0.53 to 0.77)
	HbA _{1c} ^a	1.04 (1.03 to 1.04)	1.04 (1.03 to 1.04)	1.03 (1.03 to 1.04)	1.03 (1.02 to 1.04)	1.03 (1.02 to 1.04)	1.03 (1.02 to 1.04)
	AUROC	0.7570	0.7529	0.7524	0.7520	0.7505	0.7493
	CU score	1.15 (1.14 to 1.16)	1.15 (1.14 to 1.16)	1.15 (1.14 to 1.16)	1.15 (1.14 to 1.16)	1.16 (1.15 to 1.17)	1.16 (1.15 to 1.17)
	Age [*]	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)
	Gender (F)	0.81 (0.78 to 0.83)	0.81 (0.78 to 0.83)	0.81 (0.78 to 0.83)	0.81 (0.78 to 0.83)	0.81 (0.79 to 0.84)	0.82 (0.79 to 0.85)
	Deprivation (Q5 vs. Q1)	1.46 (1.39 to 1.53)	1.45 (1.39 to 1.53)	1.45 (1.38 to 1.52)	1.44 (1.37 to 1.52)	1.46 (1.38 to 1.54)	1.45 (1.37 to 1.54)
Model 4 (10-year)	Ethnicity (Indian vs. White)	0.70 (0.59 to 0.81)	0.70 (0.60 to 0.82)	0.70 (0.60 to 0.83)	0.69 (0.59 to 0.82)	0.72 (0.61 to 0.86)	0.64 (0.53 to 0.78)
	HbA _{1c} ^a	1.05 (1.04 to 1.05)	1.05 (1.04 to 1.05)	1.04 (1.04 to 1.05)	1.04 (1.03 to 1.05)	1.04 (1.03 to 1.05)	1.04 (1.03 to 1.05)
	AUROC	0.7563	0.7572	0.7571	0.7570	0.7559	0.7550
	C10 score	1.14 (1.13 to 1.15)	1.14 (1.13 to 1.15)	1.15 (1.14 to 1.16)	1.15 (1.14 to 1.16)	1.16 (1.15 to 1.17)	1.16 (1.15 to 1.17)
	Age [*]	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)
	Gender (F)	0.79 (0.77 to 0.82)	0.79 (0.77 to 0.82)	0.80 (0.77 to 0.82)	0.79 (0.77 to 0.82)	0.80 (0.77 to 0.82)	0.80 (0.77 to 0.83)
	Deprivation (Q5 vs. Q1)	1.46 (1.39 to 1.53)	1.46 (1.39 to 1.53)	1.46 (1.39 to 1.53)	1.45 (1.38 to 1.53)	1.47 (1.39 to 1.55)	1.47 (1.39 to 1.55)
	Ethnicity (Indian vs. White)	0.70 (0.59 to 0.81)	0.70 (0.60 to 0.82)	0.71 (0.60 to 0.83)	0.69 (0.59 to 0.82)	0.72 (0.60 to 0.86)	0.65 (0.53 to 0.78)
Model 4 (5-year)	HbA _{1c} ^a	1.05 (1.04 to 1.05)	1.05 (1.04 to 1.05)	1.04 (1.04 to 1.05)	1.04 (1.03 to 1.05)	1.04 (1.03 to 1.05)	1.04 (1.03 to 1.05)
	AUROC	0.7563	0.7565	0.7562	0.7561	0.7548	0.7538
	C5 score	1.13 (1.12 to 1.15)	1.14 (1.13 to 1.15)	1.14 (1.13 to 1.15)	1.14 (1.13 to 1.15)	1.15 (1.14 to 1.16)	1.16 (1.14 to 1.17)
	Age [*]	1.10 (1.09 to 1.10)	1.10 (1.09 to 1.10)	1.10 (1.09 to 1.10)	1.10 (1.09 to 1.10)	1.10 (1.09 to 1.10)	1.10 (1.09 to 1.10)
	Gender (F)	0.79 (0.76 to 0.81)	0.79 (0.76 to 0.81)	0.78 (0.76 to 0.81)	0.78 (0.76 to 0.81)	0.79 (0.76 to 0.81)	0.79 (0.76 to 0.82)
	Deprivation (Q5 vs. Q1)	1.47 (1.40 to 1.55)	1.47 (1.40 to 1.55)	1.47 (1.40 to 1.55)	1.47 (1.40 to 1.55)	1.49 (1.41 to 1.57)	1.49 (1.41 to 1.58)
	Ethnicity (Indian vs. White)	0.70 (0.60 to 0.82)	0.70 (0.60 to 0.82)	0.70 (0.59 to 0.83)	0.70 (0.59 to 0.83)	0.73 (0.62 to 0.87)	0.65 (0.54 to 0.79)
	HbA _{1c} ^a	1.04 (1.04 to 1.05)	1.04 (1.04 to 1.05)	1.04 (1.03 to 1.05)	1.04 (1.03 to 1.04)	1.04 (1.03 to 1.04)	1.03 (1.03 to 1.04)
	AUROC	0.7553	0.7555	0.7546	0.7547	0.7534	0.7523

Simple count (C) score measured using unlimited (CU), 10-year (C10), and 5-year (C5) look-back windows. ^aAge at index date. ^{*}baseline, most recent measure within 1year before or 6months after. **AUROC**: area under the Receiver Operating Characteristics curve; **HbA_{1c}**: glycated haemoglobin.

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S10 Adjusted hazard ratios (95% CI) for all-cause mortality associated with severity-weighted score estimated at baseline and 1-5 years moving post-index windows

	Predictor(s)	Index date	Index+1 year	Index+2 years	Index+3 years	Index+4 years	Index+5 years
Model 1	Age*	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)
	Gender (F)	0.78 (0.76 to 0.80)	0.78 (0.76 to 0.80)	0.78 (0.76 to 0.80)	0.77 (0.75 to 0.80)	0.77 (0.75 to 0.80)	0.77 (0.75 to 0.80)
	Deprivation (Q5 vs. Q1)	1.52 (1.45 to 1.58)	1.52 (1.45 to 1.58)	1.52 (1.45 to 1.59)	1.52 (1.45 to 1.59)	1.53 (1.46 to 1.61)	1.53 (1.46 to 1.61)
	Ethnicity (Indian vs. White)	0.70 (0.61 to 0.80)	0.70 (0.61 to 0.80)	0.71 (0.61 to 0.81)	0.69 (0.60 to 0.80)	0.70 (0.60 to 0.82)	0.63 (0.53 to 0.75)
	AUROC	0.7528	0.7528	0.7523	0.7518	0.7500	0.7484
	CU score	1.10 (1.10 to 1.11)	1.10 (1.10 to 1.11)	1.11 (1.10 to 1.11)	1.11 (1.10 to 1.11)	1.12 (1.11 to 1.13)	1.11 (1.11 to 1.13)
Model 2 (unlimited)	Age*	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.09)
	Gender (F)	0.83 (0.81 to 0.85)	0.83 (0.81 to 0.86)	0.84 (0.81 to 0.86)	0.84 (0.81 to 0.86)	0.80 (0.79 to 0.83)	0.85 (0.82 to 0.87)
	Deprivation (Q5 vs. Q1)	1.46 (1.39 to 1.52)	1.45 (1.39 to 1.52)	1.45 (1.38 to 1.51)	1.44 (1.37 to 1.51)	1.46 (1.39 to 1.54)	1.45 (1.38 to 1.52)
	Ethnicity (Indian vs. White)	0.70 (0.60 to 0.80)	0.70 (0.61 to 0.80)	0.70 (0.61 to 0.80)	0.69 (0.59 to 0.80)	0.70 (0.59 to 0.83)	0.64 (0.54 to 0.75)
	AUROC	0.7556	0.7559	0.7558	0.7556	0.7542	0.7531
	C10 score	1.11 (1.10 to 1.11)	1.11 (1.10 to 1.12)	1.11 (1.11 to 1.12)	1.11 (1.11 to 1.12)	1.12 (1.11 to 1.12)	1.12 (1.11 to 1.12)
Model 2 (10-year)	Age*	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)
	Gender (F)	0.82 (0.79 to 0.84)	0.82 (0.80 to 0.84)	0.82 (0.80 to 0.85)	0.82 (0.80 to 0.84)	0.82 (0.80 to 0.85)	0.83 (0.80 to 0.85)
	Deprivation (Q5 vs. Q1)	1.46 (1.40 to 1.52)	1.46 (1.40 to 1.52)	1.45 (1.39 to 1.52)	1.44 (1.38 to 1.51)	1.46 (1.39 to 1.53)	1.46 (1.39 to 1.54)
	Ethnicity (Indian vs. White)	0.70 (0.60 to 0.80)	0.70 (0.61 to 0.80)	0.70 (0.61 to 0.81)	0.69 (0.59 to 0.80)	0.71 (0.61 to 0.82)	0.64 (0.54 to 0.75)
	AUROC	0.7553	0.7556	0.7554	0.7552	0.7536	0.7525
	C5 score	1.11 (1.11 to 1.12)	1.11 (1.11 to 1.12)	1.12 (1.11 to 1.12)	1.12 (1.11 to 1.13)	1.12 (1.12 to 1.13)	1.13 (1.12 to 1.13)
Model 2 (5-year)	Age*	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)
	Gender (F)	0.81 (0.78 to 0.83)	0.81 (0.79 to 0.83)	0.81 (0.78 to 0.83)	0.81 (0.79 to 0.83)	0.81 (0.79 to 0.84)	0.81 (0.79 to 0.84)
	Deprivation (Q5 vs. Q1)	1.47 (1.41 to 1.54)	1.47 (1.41 to 1.53)	1.46 (1.40 to 1.53)	1.46 (1.39 to 1.53)	1.47 (1.40 to 1.55)	1.47 (1.40 to 1.55)
	Ethnicity (Indian vs. White)	0.70 (0.61 to 0.80)	0.70 (0.61 to 0.80)	0.69 (0.60 to 0.80)	0.69 (0.60 to 0.80)	0.71 (0.61 to 0.83)	0.64 (0.54 to 0.76)
	AUROC	0.7548	0.7551	0.7542	0.7545	0.7527	0.7513
	Age*	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)	1.10 (1.10 to 1.10)
Model 3	Gender (F)	0.77 (0.75 to 0.79)	0.77 (0.75 to 0.79)	0.77 (0.75 to 0.79)	0.77 (0.74 to 0.79)	0.77 (0.74 to 0.79)	0.77 (0.74 to 0.79)

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

	Predictor(s)	Index date	Index+1 year	Index+2 years	Index+3 years	Index+4 years	Index+5 years
Model 4 (unlimited)	Deprivation (Q5 vs. Q1)	1.52 (1.45 to 1.60)	1.52 (1.45 to 1.60)	1.52 (1.45 to 1.60)	1.52 (1.44 to 1.60)	1.54 (1.46 to 1.63)	1.54 (1.46 to 1.63)
	Ethnicity (Indian vs. White)	0.70 (0.60 to 0.82)	0.70 (0.60 to 0.82)	0.71 (0.60 to 0.83)	0.70 (0.59 to 0.82)	0.72 (0.60 to 0.85)	0.64 (0.53 to 0.77)
	HbA _{1c} ^a	1.04 (1.03 to 1.04)	1.04 (1.03 to 1.04)	1.03 (1.03 to 1.04)	1.03 (1.02 to 1.04)	1.03 (1.02 to 1.04)	1.03 (1.02 to 1.04)
	AUROC	0.7529	0.7529	0.7524	0.7520	0.7505	0.7493
	C5 score	1.10 (1.10 to 1.11)	1.11 (1.10 to 1.11)	1.11 (1.10 to 1.11)	1.11 (1.10 to 1.11)	1.11 (1.10 to 1.11)	1.11 (1.10 to 1.11)
	Age [*]	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)
	Gender (F)	0.83 (0.80 to 0.85)	0.83 (0.80 to 0.85)	0.83 (0.81 to 0.86)	0.83 (0.81 to 0.86)	0.84 (0.81 to 0.87)	0.84 (0.81 to 0.87)
	Deprivation (Q5 vs. Q1)	1.45 (1.38 to 1.52)	1.45 (1.38 to 1.52)	1.44 (1.37 to 1.51)	1.44 (1.36 to 1.51)	1.45 (1.37 to 1.53)	1.45 (1.36 to 1.53)
Model 4 (10-year)	Ethnicity (Indian vs. White)	0.70 (0.59 to 0.81)	0.70 (0.60 to 0.82)	0.70 (0.60 to 0.82)	0.69 (0.59 to 0.82)	0.72 (0.61 to 0.86)	0.64 (0.53 to 0.78)
	HbA _{1c} ^a	1.05 (1.04 to 1.05)	1.05 (1.04 to 1.05)	1.04 (1.04 to 1.05)	1.04 (1.03 to 1.04)	1.04 (1.03 to 1.05)	1.04 (1.03 to 1.05)
	AUROC	0.7554	0.7557	0.7555	0.7554	0.7543	0.7535
	C10 score	1.11 (1.10 to 1.11)	1.10 (1.10 to 1.12)	1.11 (1.11 to 1.12)	1.11 (1.11 to 1.12)	1.12 (1.11 to 1.12)	1.12 (1.11 to 1.12)
	Age [*]	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)	1.09 (1.09 to 1.09)
	Gender (F)	0.81 (0.79 to 0.84)	0.81 (0.79 to 0.84)	0.82 (0.79 to 0.84)	0.82 (0.79 to 0.84)	0.82 (0.79 to 0.85)	0.82 (0.79 to 0.85)
	Deprivation (Q5 vs. Q1)	1.45 (1.38 to 1.52)	1.45 (1.38 to 1.52)	1.45 (1.38 to 1.52)	1.44 (1.37 to 1.52)	1.46 (1.38 to 1.54)	1.46 (1.38 to 1.55)
	Ethnicity (Indian vs. White)	0.70 (0.59 to 0.82)	0.70 (0.60 to 0.82)	0.70 (0.60 to 0.83)	0.69 (0.59 to 0.82)	0.73 (0.61 to 0.86)	0.65 (0.53 to 0.78)
Model 4 (5-year)	HbA _{1c} ^a	1.04 (1.04 to 1.05)	1.04 (1.04 to 1.05)	1.04 (1.03 to 1.05)	1.04 (1.03 to 1.04)	1.04 (1.03 to 1.04)	1.04 (1.03 to 1.04)
	AUROC	0.7552	0.7555	0.7553	0.7551	0.7539	0.7530
	C5 score	1.11 (1.11 to 1.12)	1.11 (1.11 to 1.12)	1.12 (1.11 to 1.13)	1.12 (1.11 to 1.13)	1.12 (1.12 to 1.13)	1.13 (1.12 to 1.13)
	Age [*]	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)	1.09 (1.09 to 1.10)
	Gender (F)	0.80 (0.78 to 0.82)	0.80 (0.78 to 0.83)	0.80 (0.78 to 0.83)	0.80 (0.78 to 0.83)	0.81 (0.78 to 0.84)	0.81 (0.78 to 0.84)
	Deprivation (Q5 vs. Q1)	1.47 (1.40 to 1.54)	1.47 (1.40 to 1.54)	1.47 (1.39 to 1.54)	1.46 (1.39 to 1.54)	1.48 (1.40 to 1.56)	1.48 (1.40 to 1.57)
	Ethnicity (Indian vs. White)	0.70 (0.60 to 0.82)	0.70 (0.60 to 0.82)	0.70 (0.59 to 0.83)	0.70 (0.59 to 0.83)	0.74 (0.62 to 0.87)	0.65 (0.54 to 0.79)
	HbA _{1c} ^a	1.04 (1.04 to 1.05)	1.04 (1.04 to 1.05)	1.04 (1.03 to 1.04)	1.03 (1.03 to 1.04)	1.03 (1.03 to 1.04)	1.03 (1.02 to 1.04)
	AUROC	0.7547	0.7550	0.7542	0.7545	0.7532	0.7520

Severity-weighted (SW) score measured using unlimited (SWU), 10-year (SW10), and 5-year (SW5) windows. *Age at index date. ^abaseline, most recent measure within 1 year before or 6months after. **AUROC**: area under the Receiver Operating Characteristics curve; **HbA_{1c}**: glycated haemoglobin.

Supplementary data to "Development and validation of the Diabetes Severity SCORE (DISSCO)". Zghebi et al.

Table S11 Hazard ratios (95% CI) for risk of all-cause hospitalisation associated with simple count and severity-weighted scores estimated at three windows - Training data

Model	Predictor(s)	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown	1.02 (1.02 to 1.02) 1.01 (0.99 to 1.02) 1.21 (1.18 to 1.24) 1.00 (0.95 to 1.05) 0.20 (0.19 to 0.21)	0.6231	-	
Model 2 (unlimited)	Severity score (CU / SWU) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown	1.09 (1.09 to 1.10) 1.02 (1.02 to 1.02) 1.03 (1.02 to 1.05) 1.19 (1.16 to 1.22) 1.00 (0.95 to 1.05) 0.20 (0.19 to 0.21)	0.6298	1.07 (1.06 to 1.07) 1.02 (1.02 to 1.02) 1.04 (1.03 to 1.06) 1.19 (1.16 to 1.22) 1.00 (0.95 to 1.06) 0.20 (0.19 to 0.21)	0.6299
Model 2 (10-year)	Severity score (C10/SW10) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown	1.09 (1.09 to 1.10) 1.02 (1.02 to 1.02) 1.03 (1.01 to 1.04) 1.19 (1.16 to 1.22) 1.00 (0.95 to 1.05) 0.20 (0.19 to 0.21)	0.6288	1.07 (1.07 to 1.07) 1.02 (1.02 to 1.02) 1.04 (1.02 to 1.05) 1.19 (1.16 to 1.22) 1.00 (0.95 to 1.05) 0.20 (0.19 to 0.21)	0.6291
Model 2 (5-year)	Severity score (C10/SW10) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown	1.09 (1.09 to 1.10) 1.02 (1.02 to 1.02) 1.02 (1.01 to 1.03) 1.20 (1.17 to 1.22) 1.00 (0.96 to 1.06) 0.20 (0.19 to 0.21)	0.6274	1.07 (1.06 to 1.08) 1.03 (1.01 to 1.04) 1.04 (1.03 to 1.06) 1.19 (1.17 to 1.22) 1.01 (0.96 to 1.06) 0.20 (0.19 to 0.21)	0.6280
Model 3	Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown Baseline HbA_{1c}	1.02 (1.02 to 1.02) 1.00 (0.98 to 1.01) 1.21 (1.18 to 1.24) 1.00 (0.93 to 1.04) 0.19 (0.18 to 0.20) 0.99 (0.99 to 1.00)	0.6230	-	
Model 4 (unlimited)	Severity score (CU / SWU) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown Baseline HbA_{1c}	1.09 (1.08 to 1.09) 1.02 (1.02 to 1.02) 1.02 (1.01 to 1.04) 1.19 (1.16 to 1.21) 0.99 (0.93 to 1.04) 0.19 (0.18 to 0.20) 1.00 (1.00 to 1.00)	0.6293	1.06 (1.06 to 1.07) 1.02 (1.02 to 1.02) 1.03 (1.02 to 1.05) 1.18 (1.15 to 1.21) 0.99 (0.93 to 1.04) 0.19 (0.19 to 0.20) 1.00 (0.99 to 1.00)	0.6293
Model 4 (10-year)	Severity score (C10/SW10) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown Baseline HbA_{1c}	1.09 (1.08 to 1.09) 1.02 (1.02 to 1.02) 1.02 (1.00 to 1.03) 1.19 (1.16 to 1.21) 0.98 (0.93 to 1.04) 0.19 (0.18 to 0.20) 1.00 (1.00 to 1.00)	0.6283	1.07 (1.06 to 1.07) 1.02 (1.02 to 1.02) 1.03 (1.01 to 1.04) 1.18 (1.16 to 1.21) 0.99 (0.93 to 1.04) 0.19 (0.19 to 0.20) 1.00 (0.99 to 1.00)	0.6286
Model 4 (5-year)	Severity score (C5/SW5) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown Baseline HbA_{1c}	1.09 (1.08 to 1.10) 1.02 (1.02 to 1.02) 1.00 (1.00 to 1.02) 1.19 (1.16 to 1.22) 0.99 (0.93 to 1.04) 0.19 (0.18 to 0.20) 1.00 (0.99 to 1.00)	0.6270	1.07 (1.07 to 1.08) 1.02 (1.02 to 1.02) 1.02 (1.00 to 1.03) 1.19 (1.16 to 1.22) 0.99 (0.93 to 1.04) 0.19 (0.18 to 0.20) 1.00 (0.99 to 1.00)	0.6276

AUROC: area under the Receiver Operating Characteristics curve; **HbA_{1c}:** glycated haemoglobin. Simple count (C) or severity-weighted (SW) score measured using unlimited (CU/SWU), 10-year (C10/ SW10), and 5-year (C5/SW5) look-back windows, respectively.

Supplementary data to "Development and validation of the Diabetes Severity SCOR (DISSCO)". Zghebi et al.

Table S12 Hazard ratios (95% CI) for risk of CV-related hospitalisation associated with simple count and severity-weighted scores estimated at three windows

Model	Predictors	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown	1.06 (1.06 to 1.06) 0.71 (0.69 to 0.72) 1.42 (1.38 to 1.47) 0.96 (0.88 to 1.04) 0.19 (0.17 to 0.20)	0.7033	-	
Model 2 (unlimited)	Severity score (CU / SWU) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown	1.42 (1.41 to 1.43) 1.04 (1.04 to 1.04) 0.79 (0.76 to 0.81) 1.34 (1.29 to 1.38) 0.95 (0.88 to 1.03) 0.21 (0.20 to 0.23)	0.7281	1.22 (1.22 to 1.22) 1.04 (1.04 to 1.04) 0.81 (0.79 to 0.82) 1.35 (1.30 to 1.39) 0.96 (0.88 to 1.04) 0.21 (0.20 to 0.23)	0.7169
Model 2 (10-year)	Severity score (C10/SW10) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown	1.44 (1.43 to 1.45) 1.04 (1.04 to 1.05) 0.77 (0.75 to 0.79) 1.33 (1.29 to 1.37) 0.95 (0.87 to 1.03) 0.21 (0.20 to 0.23)	0.7267	1.24 (1.23 to 1.24) 1.05 (1.04 to 1.06) 0.78 (0.77 to 0.80) 1.34 (1.30 to 1.39) 0.96 (0.88 to 1.04) 0.21 (0.20 to 0.23)	0.7162
Model 2 (5-year)	Severity score (C10/SW10) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown	1.45 (1.45 to 1.47) 1.05 (1.05 to 1.05) 0.75 (0.73 to 0.77) 1.34 (1.30 to 1.39) 0.96 (0.88 to 1.04) 0.21 (0.19 to 0.22)	0.7226	1.26 (1.25 to 1.26) 1.05 (1.05 to 1.05) 0.77 (0.75 to 0.78) 1.36 (1.31 to 1.40) 0.96 (0.89 to 1.05) 0.21 (0.19 to 0.23)	0.7138
Model 3	Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown Baseline HbA_{1c}	1.06 (1.06 to 1.06) 0.70 (0.69 to 0.72) 1.42 (1.37 to 1.47) 0.93 (0.85 to 1.02) 0.18 (0.16 to 0.19) 1.00 (0.99 to 1.00)	0.7057	-	
Model 4 (unlimited)	Severity score (CU / SWU) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown Baseline HbA_{1c}	1.42 (1.42 to 1.43) 1.04 (1.04 to 1.04) 0.79 (0.77 to 0.81) 1.32 (1.27 to 1.36) 0.91 (0.83 to 1.00) 0.20 (0.19 to 0.22) 1.03 (1.02 to 1.03)	0.7298	1.22 (1.22 to 1.22) 1.04 (1.04 to 1.05) 0.80 (0.79 to 0.82) 1.32 (1.28 to 1.38) 0.92 (0.84 to 1.01) 0.20 (0.19 to 0.22) 1.01 (1.01 to 1.01)	0.7185
Model 4 (10-year)	Severity score (C10/SW10) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown Baseline HbA_{1c}	1.45 (1.43 to 1.46) 1.05 (1.04 to 1.05) 0.77 (0.75 to 0.79) 1.31 (1.26 to 1.35) 0.91 (0.83 to 1.00) 0.20 (0.18 to 0.22) 1.02 (1.02 to 1.03)	0.7288	1.24 (1.23 to 1.24) 1.05 (1.05 to 1.05) 0.78 (0.76 to 0.80) 1.32 (1.28 to 1.37) 0.92 (0.84 to 1.01) 0.20 (0.18 to 0.22) 1.01 (1.01 to 1.02)	0.7179
Model 4 (5-year)	Severity score (C5/SW5) Age Gender (F) Deprivation (Q5 vs. Q1) Ethnicity (vs. White) - Indian - Unknown Baseline HbA_{1c}	1.47 (1.46 to 1.48) 1.05 (1.05 to 1.05) 0.75 (0.73 to 0.77) 1.32 (1.28 to 1.37) 0.92 (0.84 to 1.01) 0.20 (0.18 to 0.21) 1.02 (1.02 to 1.03)	0.7247	1.26 (1.25 to 1.26) 1.05 (1.05 to 1.05) 0.76 (0.75 to 0.78) 1.34 (1.29 to 1.39) 0.93 (0.85 to 1.02) 0.20 (0.18 to 0.22) 1.01 (1.01 to 1.02)	0.7156

AUROC: area under the Receiver Operating Characteristics curve; **HbA_{1c}:** glycated haemoglobin. Simple count (C) or severity-weighted (SW) score measured using unlimited (CU/SWU), 10-year (C10/ SW10), and 5-year (C5/SW5) look-back windows, respectively.

Supplementary data to "Development and validation of the Diabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S13 Hazard ratios for risk of diabetes-related hospitalisation associated with simple count and severity-weighted scores estimated at three baseline windows - Training dataset

Model	Predictor(s)	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age	1.02 (1.02 to 1.02)	0.6249		
	Gender (F)	0.99 (0.97 to 1.00)			
	Deprivation (Q5 vs. Q1)	1.29 (1.26 to 1.32)			
	Ethnicity (vs. White)				
	• Indian	0.95 (0.90 to 1.01)			
Model 2 (unlimited)	• Unknown	0.19 (0.18 to 0.20)	0.6324		0.6323
	Severity score (CU/SWU)	1.10 (1.09 to 1.10)		1.07 (1.07 to 1.07)	
	Age	1.01 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.01 (1.01 to 1.03)		1.02 (1.01 to 1.04)	
	Deprivation (Q5 vs. Q1)	1.27 (1.24 to 1.30)		1.26 (1.23 to 1.30)	
	Ethnicity (vs. White)				
	• Indian	0.95 (0.90 to 1.00)		0.95 (0.90 to 1.00)	
Model 2 (10-year)	• Unknown	0.20 (0.19 to 0.21)	0.6312	0.20 (0.19 to 0.21)	0.6315
	Severity score (C10/SW10)	1.10 (1.09 to 1.11)		1.07 (1.07 to 1.08)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.00 (0.99 to 1.02)		1.01 (1.00 to 1.03)	
	Deprivation (Q5 vs. Q1)	1.27 (1.24 to 1.30)		1.27 (1.24 to 1.30)	
	Ethnicity (vs. White)				
	• Indian	0.95 (0.90 to 1.00)		0.95 (0.90 to 1.00)	
Model 2 (5-year)	• Unknown	0.20 (0.19 to 0.21)	0.6297	0.20 (0.19 to 0.21)	0.6302
	Severity score (C5/SW5)	1.10 (1.09 to 1.11)		1.08 (1.07 to 1.08)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.00 (0.98 to 1.01)		1.01 (0.99 to 1.02)	
	Deprivation (Q5 vs. Q1)	1.27 (1.24 to 1.30)		1.27 (1.24 to 1.30)	
	Ethnicity (vs. White)				
	• Indian	0.95 (0.90 to 1.01)		0.95 (0.90 to 1.01)	
Model 3	• Unknown	0.19 (0.18 to 0.20)	0.6254	0.20 (0.19 to 0.21)	
	Age	1.02 (1.02 to 1.02)			
	Gender (F)	0.98 (0.97 to 1.00)			
	Deprivation (Q5 vs. Q1)	1.28 (1.25 to 1.32)			
	Ethnicity (vs. White)				
	• Indian	0.93 (0.88 to 0.99)			
	• Unknown	0.18 (0.17 to 0.19)			
Model 4 (unlimited)	Baseline HbA _{1c}	1.01 (1.01 to 1.02)	0.6327		0.6325
	Severity score (CU/SWU)	1.10 (1.09 to 1.10)		1.07 (1.06 to 1.07)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.01 (0.99 to 1.03)		1.00 (1.00 to 1.04)	
	Deprivation (Q5 vs. Q1)	1.26 (1.23 to 1.29)		1.26 (1.22 to 1.29)	
	Ethnicity (vs. White)				
	• Indian	0.93 (0.87 to 0.98)		0.93 (0.87 to 0.98)	
Model 4 (10-year)	• Unknown	0.18 (0.17 to 0.20)	0.6316	0.19 (0.18 to 0.20)	0.6317
	Baseline HbA _{1c}	1.02 (1.02 to 1.03)		1.02 (1.02 to 1.02)	
	Severity score (C10/SW10)	1.10 (1.09 to 1.10)		1.07 (1.07 to 1.08)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.00 (0.99 to 1.02)		1.01 (0.99 to 1.03)	
	Deprivation (Q5 vs. Q1)	1.26 (1.23 to 1.29)		1.26 (1.23 to 1.29)	
	Ethnicity (vs. White)				
Model 4 (5-year)	• Indian	0.92 (0.87 to 0.98)	0.6302	0.92 (0.87 to 0.98)	0.6306
	• Unknown	0.20 (0.19 to 0.21)		0.19 (0.18 to 0.20)	
	Baseline HbA _{1c}	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Severity score (C5/SW5)	1.10 (1.09 to 1.11)		1.08 (1.07 to 1.08)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.00 (0.98 to 1.01)		1.00 (0.99 to 1.02)	
	Deprivation (Q5 vs. Q1)	1.27 (1.23 to 1.30)		1.26 (1.23 to 1.30)	
	Ethnicity (vs. White)				
	• Indian	0.93 (0.87 to 0.99)		0.93 (0.87 to 0.98)	
	• Unknown	0.18 (0.17 to 0.19)		0.18 (0.17 to 0.19)	
	Baseline HbA _{1c}	1.02 (1.02 to 1.02)		1.02 (1.01 to 1.02)	

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S14 Hazard ratios (95% CI) for risk of hospitalisation due to hypoglycaemia associated with simple count and severity-weighted scores estimated at three baseline windows (secondary outcome) - Training dataset

Model	Predictor(s)	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age	1.05 (1.05 to 1.06)	0.6997	-	
	Gender (F)	1.01 (0.94 to 1.08)			
	Deprivation (Q5 vs. Q1)	1.83 (1.64 to 2.06)			
	Ethnicity (vs. White)				
	• Indian	0.70 (0.52 to 0.95)			
Model 2 (unlimited)	• Unknown	0.19 (0.14 to 0.26)	0.7052	1.10 (1.08 to 1.11)	0.7056
	Severity score (CU/SWU)	1.13 (1.10 to 1.15)			
	Age	1.05 (1.05 to 1.05)			
	Gender (F)	1.04 (0.97 to 1.12)			
	Deprivation (Q5 vs. Q1)	1.78 (1.59 to 2.00)			
	Ethnicity (vs. White)				
	• Indian	0.70 (0.51 to 0.95)			
Model 2 (10-year)	• Unknown	0.20 (0.14 to 0.27)	0.7042	0.70 (0.51 to 0.95)	0.7047
	Severity score (C10/SW10)	1.13 (1.10 to 1.15)			
	Age	1.05 (1.05 to 1.05)			
	Gender (F)	1.03 (0.96 to 1.11)			
	Deprivation (Q5 vs. Q1)	1.78 (1.59 to 2.00)			
	Ethnicity (vs. White)				
	• Indian	0.70 (0.51 to 0.95)			
Model 2 (5-year)	• Unknown	0.20 (0.14 to 0.27)	0.7026	0.70 (0.51 to 0.95)	0.7036
	Severity score (C5/SW5)	1.12 (1.09 to 1.15)			
	Age	1.05 (1.05 to 1.05)			
	Gender (F)	1.02 (0.95 to 1.10)			
	Deprivation (Q5 vs. Q1)	1.79 (1.60 to 2.01)			
	Ethnicity (vs. White)				
	• Indian	0.70 (0.51 to 0.95)			
Model 3	• Unknown	0.19 (0.14 to 0.27)	0.7104	0.20 (0.14 to 0.27)	
	Age	1.06 (1.05 to 1.06)			
	Gender (F)	0.98 (0.90 to 1.06)			
	Deprivation (Q5 vs. Q1)	1.88 (1.65 to 2.14)			
	Ethnicity (vs. White)				
	• Indian	0.68 (0.47 to 0.97)			
	• Unknown	0.19 (0.14 to 0.27)			
Model 4 (unlimited)	Baseline HbA _{1c}	1.17 (1.15 to 1.18)	0.7162	1.11 (1.09 to 1.13)	0.7163
	Severity score (CU/SWU)	1.15 (1.12 to 1.18)			
	Age	1.05 (1.05 to 1.06)			
	Gender (F)	1.02 (0.94 to 1.10)			
	Deprivation (Q5 vs. Q1)	1.80 (1.58 to 2.05)			
	Ethnicity (vs. White)				
	• Indian	0.66 (0.47 to 0.95)			
Model 4 (10-year)	• Unknown	0.21 (0.15 to 0.29)	0.7151	0.67 (0.47 to 0.95)	0.7155
	Baseline HbA _{1c}	1.18 (1.16 to 1.20)			
	Severity score (C10/SW10)	1.15 (1.12 to 1.18)			
	Age	1.05 (1.05 to 1.06)			
	Gender (F)	1.01 (0.93 to 1.09)			
	Deprivation (Q5 vs. Q1)	1.81 (1.59 to 2.06)			
	Ethnicity (vs. White)				
Model 4 (5-year)	• Indian	0.66 (0.46 to 0.95)	0.7136	0.66 (0.47 to 0.95)	0.7144
	• Unknown	0.21 (0.14 to 0.29)			
	Baseline HbA _{1c}	1.18 (1.16 to 1.19)			
	Severity score (C5/SW5)	1.14 (1.11 to 1.18)			
	Age	1.06 (1.05 to 1.06)			
	Gender (F)	1.00 (0.92 to 1.08)			
	Deprivation (Q5 vs. Q1)	1.83 (1.60 to 2.08)			
	Ethnicity (vs. White)			1.81 (1.59 to 2.06)	
	• Indian	0.67 (0.47 to 0.95)			
	• Unknown	0.20 (0.14 to 0.29)			
	Baseline HbA _{1c}	1.18 (1.16 to 1.19)			

Supplementary data to "Development and validation of the Diabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S15 Hazard ratios (95% CI) for risk of clustered CV- and diabetes-related hospitalisation (without hypoglycemia) associated with simple count and severity-weighted scores estimated at three baseline windows - Training dataset

Model	Predictor(s)	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age	1.03 (1.03 to 1.03)	0.6329	-	
	Gender (F)	0.96 (0.95 to 0.98)			
	Deprivation (Q5 vs. Q1)	1.29 (1.26 to 1.32)			
	Ethnicity (vs. White)				
	• Indian	0.97 (0.91 to 1.02)			
	• Unknown	0.19 (0.18 to 0.20)			
Model 2 (unlimited)	Severity score (CU/SWU)	1.14 (1.13 to 1.14)	0.6445	1.09 (1.09 to 1.10)	0.6433
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.00 (0.98 to 1.01)		1.01 (1.00 to 1.03)	
	Deprivation (Q5 vs. Q1)	1.26 (1.23 to 1.29)		1.26 (1.23 to 1.29)	
	Ethnicity (vs. White)				
	• Indian	0.97 (0.92 to 1.02)		0.97 (0.91 to 1.02)	
Model 2 (10-year)	Severity score (C10/SW10)	1.14 (1.13 to 1.14)	0.6427	1.10 (1.09 to 1.10)	0.6422
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	0.99 (0.97 to 1.00)		1.00 (0.99 to 1.02)	
	Deprivation (Q5 vs. Q1)	1.26 (1.23 to 1.29)		1.26 (1.23 to 1.29)	
	Ethnicity (vs. White)				
	• Indian	0.96 (0.91 to 1.02)		0.96 (0.91 to 1.02)	
Model 2 (5-year)	Severity score (C5/SW5)	1.14 (1.13 to 1.15)	0.6404	1.11 (1.10 to 1.11)	0.6404
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	0.98 (0.97 to 1.00)		0.99 (0.98 to 1.01)	
	Deprivation (Q5 vs. Q1)	1.27 (1.24 to 1.30)		1.27 (1.24 to 1.30)	
	Ethnicity (vs. White)				
	• Indian	0.97 (0.92 to 1.02)		0.97 (0.92 to 1.02)	
Model 3	Age	1.03 (1.03 to 1.03)	0.6329	-	
	Gender (F)	0.96 (0.95 to 0.98)			
	Deprivation (Q5 vs. Q1)	1.29 (1.25 to 1.32)			
	Ethnicity (vs. White)				
	• Indian	0.94 (0.89 to 1.00)			
	• Unknown	0.18 (0.17 to 0.19)			
Model 4 (unlimited)	Baseline HbA_{1c}	1.01 (1.00 to 1.01)	0.6442		
	Severity score (CU/SWU)	1.13 (1.13 to 1.14)		1.09 (1.09 to 1.09)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.00 (0.98 to 1.01)		1.01 (0.99 to 1.03)	
	Deprivation (Q5 vs. Q1)	1.25 (1.22 to 1.29)		1.25 (1.22 to 1.29)	
	Ethnicity (vs. White)				
Model 4 (10-year)	Baseline HbA_{1c}	1.02 (1.01 to 1.02)	0.6425		
	Severity score (C10/SW10)	1.14 (1.13 to 1.14)		1.10 (1.09 to 1.10)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.00 (0.97 to 1.00)		1.00 (0.98 to 1.02)	
	Deprivation (Q5 vs. Q1)	1.25 (1.22 to 1.29)		1.25 (1.22 to 1.29)	
	Ethnicity (vs. White)				
Model 4 (5-year)	Baseline HbA_{1c}	1.02 (1.01 to 1.02)	0.6404		
	Severity score (C5/SW5)	1.14 (1.13 to 1.15)		1.10 (1.10 to 1.11)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	0.98 (0.96 to 1.00)		0.99 (0.97 to 1.01)	
	Deprivation (Q5 vs. Q1)	1.26 (1.22 to 1.29)		1.26 (1.23 to 1.29)	
	Ethnicity (vs. White)				
Model 4 (5-year)	Baseline HbA_{1c}	1.01 (1.01 to 1.02)	0.6404		
	Severity score (C5/SW5)	1.14 (1.13 to 1.15)		1.10 (1.10 to 1.11)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	0.98 (0.96 to 1.00)		0.99 (0.97 to 1.01)	
	Deprivation (Q5 vs. Q1)	1.26 (1.22 to 1.29)		1.26 (1.23 to 1.29)	
	Ethnicity (vs. White)				
Model 4 (5-year)	Baseline HbA_{1c}	1.01 (1.01 to 1.02)	0.6404		
	Severity score (C5/SW5)	1.14 (1.13 to 1.15)		1.10 (1.10 to 1.11)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	0.98 (0.96 to 1.00)		0.99 (0.97 to 1.01)	
	Deprivation (Q5 vs. Q1)	1.26 (1.22 to 1.29)		1.26 (1.23 to 1.29)	
	Ethnicity (vs. White)				
Model 4 (5-year)	Baseline HbA_{1c}	1.01 (1.01 to 1.02)	0.6404		
	Severity score (C5/SW5)	1.14 (1.13 to 1.15)		1.10 (1.10 to 1.11)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	0.98 (0.96 to 1.00)		0.99 (0.97 to 1.01)	
	Deprivation (Q5 vs. Q1)	1.26 (1.22 to 1.29)		1.26 (1.23 to 1.29)	
	Ethnicity (vs. White)				
Model 4 (5-year)	Baseline HbA_{1c}	1.01 (1.01 to 1.02)	0.6404		
	Severity score (C5/SW5)	1.14 (1.13 to 1.15)		1.10 (1.10 to 1.11)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	0.98 (0.96 to 1.00)		0.99 (0.97 to 1.01)	
	Deprivation (Q5 vs. Q1)	1.26 (1.22 to 1.29)		1.26 (1.23 to 1.29)	
	Ethnicity (vs. White)				
Model 4 (5-year)	Baseline HbA_{1c}	1.01 (1.01 to 1.02)	0.6404		
	Severity score (C5/SW5)	1.14 (1.13 to 1.15)		1.10 (1.10 to 1.11)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	0.98 (0.96 to 1.00)		0.99 (0.97 to 1.01)	
	Deprivation (Q5 vs. Q1)	1.26 (1.22 to 1.29)		1.26 (1.23 to 1.29)	
	Ethnicity (vs. White)				

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S16 Hazard ratios (95% CI) for risk of cardiovascular interventions (OPCS) associated with simple count and severity-weighted scores estimated at three baseline windows - Training dataset

Model	Predictor(s)	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age	1.02 (1.02 to 1.02)	0.6665	-	
	Gender (F)	0.46 (0.44 to 0.49)			
	Deprivation (Q5 vs. Q1)	1.23 (1.13 to 1.34)			
	Ethnicity (vs. White)				
	• Indian	1.09 (0.91 to 1.31)			
Model 2 (unlimited)	• Unknown	0.13 (0.10 to 0.16)	0.6858	1.16 (1.15 to 1.17)	0.6778
	Severity score (CU/SWU)	1.30 (1.28 to 1.32)			
	Age	1.01 (1.01 to 1.01)			
	Gender (F)	0.51 (0.48 to 0.54)			
	Deprivation (Q5 vs. Q1)	1.15 (1.05 to 1.25)			
	Ethnicity (vs. White)				
	• Indian	1.07 (0.89 to 1.29)			
Model 2 (10-year)	• Unknown	0.15 (0.11 to 0.19)	0.6850	1.08 (0.90 to 1.30)	0.6773
	Severity score (C10/SW10)	1.32 (1.30 to 1.34)			
	Age	1.01 (1.01 to 1.01)			
	Gender (F)	0.50 (0.47 to 0.53)			
	Deprivation (Q5 vs. Q1)	1.14 (1.05 to 1.25)			
	Ethnicity (vs. White)				
	• Indian	1.07 (0.89 to 1.29)			
Model 2 (5-year)	• Unknown	0.14 (0.12 to 0.19)	0.6833	1.19 (1.18 to 1.21)	0.6759
	Severity score (C5/SW5)	1.35 (1.33 to 1.38)			
	Age	1.01 (1.01 to 1.02)			
	Gender (F)	0.49 (0.46 to 0.52)			
	Deprivation (Q5 vs. Q1)	1.15 (1.05 to 1.25)			
	Ethnicity (vs. White)				
	• Indian	1.08 (0.90 to 1.29)			
Model 3	• Unknown	0.14 (0.11 to 0.18)	0.6723	1.08 (0.90 to 1.30)	-
	Age	1.02 (1.02 to 1.02)			
	Gender (F)	0.45 (0.42 to 0.48)			
	Deprivation (Q5 vs. Q1)	1.20 (1.09 to 1.32)			
	Ethnicity (vs. White)				
	• Indian	1.06 (0.86 to 1.21)			
	• Unknown	0.12 (0.10 to 0.16)			
Model 4 (unlimited)	Baseline HbA _{1c}	1.02 (1.01 to 1.04)	0.6903	1.16 (1.15 to 1.17)	0.6825
	Severity score (CU/SWU)	1.31 (1.29 to 1.33)			
	Age	1.01 (1.01 to 1.01)			
	Gender (F)	0.50 (0.47 to 0.54)			
	Deprivation (Q5 vs. Q1)	1.10 (1.00 to 1.22)			
	Ethnicity (vs. White)				
	• Indian	1.04 (0.85 to 1.29)			
Model 4 (10-year)	• Unknown	0.14 (0.11 to 0.19)	0.6901	1.05 (0.85 to 1.30)	0.6823
	Baseline HbA _{1c}	1.05 (1.03 to 1.06)			
	Severity score (C10/SW10)	1.33 (1.31 to 1.35)			
	Age	1.01 (1.01 to 1.02)			
	Gender (F)	0.49 (0.46 to 0.53)			
	Deprivation (Q5 vs. Q1)	1.10 (1.00 to 1.21)			
	Ethnicity (vs. White)				
Model 4 (5-year)	• Indian	1.04 (0.85 to 1.29)	0.6885	1.19 (1.18 to 1.21)	0.6809
	• Unknown	0.14 (0.10 to 0.19)			
	Baseline HbA _{1c}	1.05 (1.03 to 1.06)			
	Severity score (C5/SW5)	1.36 (1.34 to 1.39)			
	Age	1.02 (1.01 to 1.02)			
	Gender (F)	0.48 (0.45 to 0.52)			
	Deprivation (Q5 vs. Q1)	1.11 (1.01 to 1.22)			
	Ethnicity (vs. White)			1.06 (0.86 to 1.31)	
	• Indian	1.05 (0.85 to 1.30)			
	• Unknown	0.14 (0.10 to 0.18)			
	Baseline HbA _{1c}	1.04 (1.03 to 1.06)			

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S17: Calibration test for simple count and severity-weighted scores in training and validation datasets using Somer’s D

Somer’s D	Training dataset						Validation dataset					
	CU	SWU	C10	SW10	C5	SW5	CU	SWU	C10	SW10	C5	SW5
All-cause mortality	0.2079	0.1770	0.1852	0.1598	0.1528	0.1350	0.2197	0.1841	0.1959	0.1677	0.1656	0.1427
Any cause hospitalisation	0.1229	0.1080	0.1128	0.0996	0.0957	0.0857	0.1279	0.1110	0.1172	0.1024	0.1019	0.0899
CV-related hospitalisation	0.3090	0.2349	0.2903	0.2175	0.2559	0.1888	0.3069	0.2322	0.2895	0.2162	0.2571	0.1858
Diabetes-related hospitalisation	0.1261	0.1104	0.1153	0.1017	0.0980	0.0876	0.1247	0.1093	0.1135	0.1012	0.0978	0.0888
CV/DM hosp	0.1534	0.1321	0.1402	0.1213	0.1201	0.1047	0.1554	0.1330	0.1423	0.1231	0.1238	0.1075
Hypoglycaemia-hospitalisation	0.1677	0.1518	0.1514	0.1375	0.1243	0.1168	0.1757	0.1569	0.1606	0.1463	0.1397	0.1282

Simple count (C) score measured using unlimited (CU), 10-yr (C10), and 5-yr (C5) look-back windows.
Severity-weighted (SW) score measured using unlimited (SWU), 10-yr (SW10), and 5-yr (SW5) look-back windows.

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S18 Hazard ratios (95% CI) for risk of all-cause mortality associated with simple count and severity-weighted scores estimated at three baseline windows - validation dataset

Model	Predictor(s)	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age	1.10 (1.10 to 1.10)	0.7586	-	
	Gender (F)	0.76 (0.72 to 0.80)			
	Deprivation (Q5 vs. Q1)	1.13 (1.03 to 1.23)			
	Ethnicity (vs. White)				
	• Indian	0.72 (0.55 to 0.95)			
Model 2 (unlimited)	• Unknown	0.93 (0.82 to 1.06)	0.7638	1.11 (1.10 to 1.12)	0.7622
	Severity score (CU/SWU)	1.16 (1.14 to 1.18)			
	Age	1.09 (1.09 to 1.10)			
	Gender (F)	0.79 (0.75 to 0.84)			
	Deprivation (Q5 vs. Q1)	1.42 (1.29 to 1.55)			
	Ethnicity (vs. White)				
	• Indian	0.70 (0.53 to 0.92)			
Model 2 (10-year)	• Unknown	1.01 (0.89 to 1.14)	0.7633	1.12 (1.11 to 1.13)	0.7622
	Severity score (C10/SW10)	1.16 (1.14 to 1.18)			
	Age	1.10 (1.09 to 1.10)			
	Gender (F)	0.79 (0.74 to 0.83)			
	Deprivation (Q5 vs. Q1)	1.42 (1.30 to 1.55)			
	Ethnicity (vs. White)				
	• Indian	0.71 (0.54 to 0.93)			
Model 2 (5-year)	• Unknown	1.00 (0.88 to 1.13)	0.7618	1.13 (1.11 to 1.14)	0.7611
	Severity score (C5/SW5)	1.16 (1.13 to 1.18)			
	Age	1.10 (1.09 to 1.10)			
	Gender (F)	0.78 (0.73 to 0.82)			
	Deprivation (Q5 vs. Q1)	1.42 (1.30 to 1.55)			
	Ethnicity (vs. White)				
	• Indian	0.72 (0.55 to 0.95)			
Model 3	• Unknown	0.98 (0.86 to 1.11)	0.7574	0.72 (0.55 to 0.95)	0.7604
	Age	1.10 (1.10 to 1.10)			
	Gender (F)	0.74 (0.70 to 0.79)			
	Deprivation (Q5 vs. Q1)	1.47 (1.33 to 1.63)			
	Ethnicity (vs. White)				
	• Indian	0.64 (0.46 to 0.89)			
	• Unknown	0.86 (0.75 to 0.99)			
Model 4 (unlimited)	Baseline HbA _{1c}	1.02 (1.01 to 1.04)	0.7620	0.99 (0.88 to 1.13)	0.7606
	Severity score (CU/SWU)	1.16 (1.14 to 1.18)			
	Age	1.09 (1.09 to 1.10)			
	Gender (F)	0.78 (0.73 to 0.83)			
	Deprivation (Q5 vs. Q1)	1.43 (1.30 to 1.58)			
	Ethnicity (vs. White)				
	• Indian	0.62 (0.45 to 0.87)			
Model 4 (10-year)	• Unknown	0.93 (0.81 to 1.07)	0.7617	0.62 (0.44 to 0.87)	0.7597
	Baseline HbA _{1c}	1.04 (1.02 to 1.05)			
	Severity score (C10/SW10)	1.16 (1.14 to 1.18)			
	Age	1.10 (1.09 to 1.10)			
	Gender (F)	0.77 (0.73 to 0.82)			
	Deprivation (Q5 vs. Q1)	1.44 (1.30 to 1.58)			
	Ethnicity (vs. White)				
Model 4 (5-year)	• Indian	0.63 (0.45 to 0.88)	0.7604	0.63 (0.45 to 0.87)	0.7597
	• Unknown	0.92 (0.80 to 1.06)			
	Baseline HbA _{1c}	1.04 (1.02 to 1.05)			
	Severity score (C5/SW5)	1.16 (1.13 to 1.18)			
	Age	1.10 (1.09 to 1.10)			
	Gender (F)	0.76 (0.71 to 0.81)			
	Deprivation (Q5 vs. Q1)	1.43 (1.30 to 1.58)			
Model 4 (5-year)	Ethnicity (vs. White)		0.7604	1.43 (1.30 to 1.58)	0.7597
	• Indian	0.64 (0.46 to 0.89)			
	• Unknown	0.91 (0.79 to 1.04)			
	Baseline HbA _{1c}	1.03 (1.02 to 1.05)			

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S19 Hazard ratios (95% CI) for risk of all-cause hospitalisation associated with simple count and severity-weighted scores estimated at three baseline windows - validation dataset

Model	Predictor(s)	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age	1.02 (1.02 to 1.03)	0.6248		-
	Gender (F)	1.00 (0.98 to 1.03)			
	Deprivation (Q5 vs. Q1)	1.17 (1.12 to 1.22)			
	Ethnicity (vs. White)				
	• Indian	1.05 (0.96 to 1.16)			
	• Unknown	0.21 (0.19 to 0.23)			
Model 2 (unlimited)	Severity score (CU/SWU)	1.10 (1.09 to 1.11)	0.6323	1.07 (1.06 to 1.08)	0.6323
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.03 (1.00 to 1.06)		1.04 (1.01 to 1.07)	
	Deprivation (Q5 vs. Q1)	1.15 (1.10 to 1.20)		1.15 (1.10 to 1.20)	
	Ethnicity (vs. White)				
	• Indian	1.06 (0.96 to 1.16)		1.06 (0.96 to 1.16)	
	• Unknown	0.21 (0.20 to 0.23)		0.21 (0.20 to 0.23)	
	Baseline HbA_{1c}	1.00 (0.99 to 1.01)		1.00 (0.99 to 1.00)	
Model 2 (10-year)	Severity score (C10/SW10)	1.10 (1.09 to 1.11)	0.6312	1.07 (1.07 to 1.08)	0.6315
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.02 (0.99 to 1.05)		1.03 (1.01 to 1.06)	
	Deprivation (Q5 vs. Q1)	1.15 (1.10 to 1.21)		1.15 (1.10 to 1.20)	
	Ethnicity (vs. White)				
	• Indian	1.06 (0.96 to 1.16)		1.06 (0.96 to 1.16)	
	• Unknown	0.21 (0.20 to 0.23)		0.21 (0.20 to 0.23)	
	Baseline HbA_{1c}	1.00 (0.99 to 1.01)		1.00 (0.99 to 1.00)	
Model 2 (5-year)	Severity score (C5/SW5)	1.10 (1.09 to 1.11)	0.6297	1.08 (1.07 to 1.09)	0.6305
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.02 (0.99 to 1.05)		1.03 (1.00 to 1.06)	
	Deprivation (Q5 vs. Q1)	1.16 (1.10 to 1.21)		1.15 (1.10 to 1.21)	
	Ethnicity (vs. White)				
	• Indian	1.06 (0.96 to 1.16)		1.06 (0.96 to 1.16)	
	• Unknown	0.21 (0.19 to 0.23)		0.21 (0.20 to 0.23)	
	Baseline HbA_{1c}	1.00 (0.99 to 1.01)		1.00 (0.99 to 1.00)	
Model 3	Age	1.02 (1.02 to 1.03)	0.6261		-
	Gender (F)	1.01 (0.97 to 1.03)			
	Deprivation (Q5 vs. Q1)	1.19 (1.13 to 1.24)			
	Ethnicity (vs. White)				
	• Indian	1.07 (0.96 to 1.19)			
	• Unknown	0.20 (0.18 to 0.22)			
	Baseline HbA_{1c}	0.99 (0.99 to 1.00)			
	Baseline HbA_{1c}	1.00 (0.99 to 1.01)			
Model 4 (unlimited)	Severity score (CU/SWU)	1.09 (1.08 to 1.10)	0.6330	1.07 (1.06 to 1.07)	0.6330
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.03 (1.00 to 1.06)		1.04 (1.01 to 1.07)	
	Deprivation (Q5 vs. Q1)	1.16 (1.10 to 1.22)		1.16 (1.10 to 1.22)	
	Ethnicity (vs. White)				
	• Indian	1.07 (0.96 to 1.19)		1.06 (0.96 to 1.19)	
	• Unknown	0.21 (0.19 to 0.23)		0.21 (0.19 to 0.23)	
	Baseline HbA_{1c}	1.00 (0.99 to 1.01)		1.00 (0.99 to 1.00)	
Model 4 (10-year)	Severity score (C10/SW10)	1.09 (1.08 to 1.11)	0.6320	1.07 (1.06 to 1.08)	0.6323
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.02 (0.99 to 1.05)		1.03 (1.00 to 1.06)	
	Deprivation (Q5 vs. Q1)	1.16 (1.10 to 1.22)		1.16 (1.10 to 1.22)	
	Ethnicity (vs. White)				
	• Indian	1.07 (0.96 to 1.19)		1.07 (0.96 to 1.19)	
	• Unknown	0.21 (0.19 to 0.22)		0.21 (0.19 to 0.23)	
	Baseline HbA_{1c}	1.00 (0.99 to 1.01)		1.00 (0.99 to 1.00)	
Model 4 (5-year)	Severity score (C5/SW5)	1.10 (1.08 to 1.11)	0.6307	1.08 (1.07 to 1.09)	0.6315
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.01 (0.98 to 1.05)		1.02 (0.99 to 1.06)	
	Deprivation (Q5 vs. Q1)	1.16 (1.11 to 1.22)		1.16 (1.11 to 1.22)	
	Ethnicity (vs. White)				
	• Indian	1.06 (0.95 to 1.19)		1.06 (0.95 to 1.19)	
	• Unknown	0.20 (0.19 to 0.22)		0.21 (0.19 to 0.22)	
	Baseline HbA_{1c}	1.00 (0.99 to 1.00)		1.00 (0.99 to 1.03)	

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S20 Hazard ratios (95% CI) for risk of cardiovascular-related hospitalisation associated with simple count and severity-weighted scores estimated at three baseline windows- validation dataset

Model	Predictor(s)	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age	1.06 (1.06 to 1.06)	0.7063		-
	Gender (F)	0.70 (0.67 to 0.73)			
	Deprivation (Q5 vs. Q1)	1.45 (1.36 to 1.55)			
	Ethnicity (vs. White)				
	• Indian	1.02 (0.87 to 1.19)			
	• Unknown	0.19 (0.17 to 0.23)			
Model 2 (unlimited)	Severity score (CU/SWU)	1.41 (1.40 to 1.43)	0.7317	1.22 (1.21 to 1.22)	0.7212
	Age	1.04 (1.04 to 1.05)		1.05 (1.04 to 1.05)	
	Gender (F)	0.79 (0.75 to 0.82)		0.80 (0.77 to 0.84)	
	Deprivation (Q5 vs. Q1)	1.35 (1.27 to 1.45)		1.35 (1.27 to 1.45)	
	Ethnicity (vs. White)				
	• Indian	1.03 (0.88 to 1.20)		1.04 (0.89 to 1.21)	
	• Unknown	0.22 (0.19 to 0.26)		0.22 (0.18 to 0.26)	
	Baseline HbA_{1c}				
Model 2 (10-year)	Severity score (C10/SW10)	1.44 (1.42 to 1.46)	0.7309	1.23 (1.23 to 1.24)	0.7207
	Age	1.05 (1.05 to 1.05)		1.05 (1.05 to 1.05)	
	Gender (F)	0.76 (0.73 to 0.80)		0.78 (0.75 to 0.82)	
	Deprivation (Q5 vs. Q1)	1.35 (1.26 to 1.44)		1.36 (1.27 to 1.45)	
	Ethnicity (vs. White)				
	• Indian	1.04 (0.89 to 1.21)		1.05 (0.90 to 1.23)	
	• Unknown	0.22 (0.19 to 0.26)		0.22 (0.19 to 0.26)	
	Baseline HbA_{1c}				
Model 2 (5-year)	Severity score (C5/SW5)	1.46 (1.44 to 1.48)	0.7267	1.25 (1.24 to 1.26)	0.7177
	Age	1.05 (1.05 to 1.05)		1.05 (1.05 to 1.05)	
	Gender (F)	0.74 (0.71 to 0.77)		0.76 (0.73 to 0.79)	
	Deprivation (Q5 vs. Q1)	1.37 (1.28 to 1.46)		1.38 (1.29 to 1.48)	
	Ethnicity (vs. White)				
	• Indian	1.04 (0.89 to 1.22)		1.05 (0.90 to 1.22)	
	• Unknown	0.21 (0.18 to 0.25)		0.21 (0.18 to 0.25)	
	Baseline HbA_{1c}				
Model 3	Age	1.06 (1.06 to 1.06)	0.7093		-
	Gender (F)	0.70 (0.66 to 0.73)			
	Deprivation (Q5 vs. Q1)	1.47 (1.37 to 1.58)			
	Ethnicity (vs. White)				
	• Indian	1.05 (0.88 to 1.25)			
	• Unknown	0.18 (0.15 to 0.22)			
	Baseline HbA_{1c}	0.98 (0.97 to 0.99)			
	Baseline HbA_{1c}				
Model 4 (unlimited)	Severity score (CU/SWU)	1.41 (1.39 to 1.43)	0.7335	1.21 (1.21 to 1.22)	0.7232
	Age	1.04 (1.04 to 1.05)		1.05 (1.04 to 1.05)	
	Gender (F)	0.79 (0.76 to 0.83)		0.80 (0.77 to 0.84)	
	Deprivation (Q5 vs. Q1)	1.36 (1.26 to 2.88)		1.36 (1.26 to 1.46)	
	Ethnicity (vs. White)				
	• Indian	1.06 (0.89 to 1.26)		1.07 (0.90 to 1.27)	
	• Unknown	0.21 (0.17 to 0.25)		0.20 (0.17 to 0.24)	
	Baseline HbA_{1c}	1.01 (1.00 to 1.02)		1.00 (0.99 to 1.01)	
Model 4 (10-year)	Severity score (C10/SW10)	1.44 (1.42 to 1.46)	0.7326	1.23 (1.22 to 1.24)	0.7227
	Age	1.05 (1.05 to 1.05)		1.05 (1.05 to 1.05)	
	Gender (F)	0.77 (0.73 to 0.80)		0.78 (0.75 to 0.82)	
	Deprivation (Q5 vs. Q1)	1.35 (1.26 to 1.46)		1.37 (1.27 to 1.47)	
	Ethnicity (vs. White)				
	• Indian	1.06 (0.89 to 1.26)		1.08 (0.90 to 1.28)	
	• Unknown	0.21 (0.17 to 0.25)		0.21 (0.17 to 0.25)	
	Baseline HbA_{1c}	1.01 (1.00 to 1.02)		1.00 (0.99 to 1.01)	
Model 4 (5-year)	Severity score (C5/SW5)	1.46 (1.44 to 1.48)	0.7290	1.25 (1.24 to 1.26)	0.7201
	Age	1.05 (1.05 to 1.05)		1.05 (1.05 to 1.05)	
	Gender (F)	0.74 (0.71 to 0.78)		0.76 (0.72 to 0.79)	
	Deprivation (Q5 vs. Q1)	1.37 (1.27 to 1.47)		1.39 (1.29 to 1.49)	
	Ethnicity (vs. White)				
	• Indian	1.06 (0.89 to 1.26)		1.08 (0.90 to 1.28)	
	• Unknown	0.20 (0.17 to 0.24)		0.20 (0.17 to 0.24)	
	Baseline HbA_{1c}	1.01 (1.00 to 1.02)		1.00 (0.99 to 1.01)	

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Table S21 Hazard ratios (95% CI) for risk of diabetes-related hospitalisation associated with simple count and severity-weighted scores estimated at three baseline windows- validation dataset

Model	Predictor(s)	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age	1.02 (1.02 to 1.03)	0.6244		
	Gender (F)	1.00 (0.97 to 1.03)			
	Deprivation (Q5 vs. Q1)	1.23 (1.17 to 1.29)			
	Ethnicity (vs. White)				
	• Indian	0.98 (0.89 to 1.09)			
Model 2 (unlimited)	Severity score (CU/SWU)	1.10 (1.09 to 1.11)	0.6316	1.07 (1.06 to 1.08)	0.6318
	Age	1.02 (1.02 to 1.03)		1.02 (1.02 to 1.02)	
	Gender (F)	1.02 (1.00 to 1.06)		1.04 (1.01 to 1.07)	
	Deprivation (Q5 vs. Q1)	1.20 (1.14 to 1.26)		1.20 (1.14 to 1.26)	
	Ethnicity (vs. White)				
	• Indian	0.98 (0.88 to 1.09)		0.98 (0.88 to 1.09)	
	• Unknown	0.21 (0.19 to 0.23)		0.21 (0.19 to 0.23)	
Model 2 (10-year)	Severity score (C10/SW10)	1.10 (1.08 to 1.11)	0.6305	1.07 (1.06 to 1.08)	0.6312
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.02 (0.99 to 1.05)		1.03 (1.00 to 1.07)	
	Deprivation (Q5 vs. Q1)	1.20 (1.14 to 1.26)		1.20 (1.14 to 1.26)	
	Ethnicity (vs. White)				
	• Indian	0.98 (0.88 to 1.09)		0.98 (0.88 to 1.09)	
	• Unknown	0.21 (0.19 to 0.23)		0.21 (0.19 to 0.23)	
Model 2 (5-year)	Severity score (C5/SW5)	1.10 (1.08 to 1.11)	0.6290	1.08 (1.07 to 1.09)	0.6300
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.02 (0.99 to 1.05)		1.03 (1.00 to 1.06)	
	Deprivation (Q5 vs. Q1)	1.21 (1.15 to 1.27)		1.20 (1.15 to 1.27)	
	Ethnicity (vs. White)				
	• Indian	0.98 (0.89 to 1.09)		0.99 (0.89 to 1.10)	
	• Unknown	0.21 (0.19 to 0.23)		0.21 (0.19 to 0.23)	
Model 3	Age	1.02 (1.02 to 1.03)	0.6251		
	Gender (F)	1.01 (0.97 to 1.04)			
	Deprivation (Q5 vs. Q1)	1.25 (1.18 to 1.32)			
	Ethnicity (vs. White)				
	• Indian	1.03 (0.92 to 1.16)			
	• Unknown	0.20 (0.18 to 0.22)			
	Baseline HbA _{1c}	1.01 (1.01 to 1.02)			
Model 4 (unlimited)	Severity score (CU/SWU)	1.09 (1.08 to 1.11)	0.6320	1.07 (1.06 to 1.07)	0.6322
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.03 (1.00 to 1.07)		1.04 (1.01 to 1.08)	
	Deprivation (Q5 vs. Q1)	1.22 (1.16 to 1.28)		1.22 (1.15 to 1.28)	
	Ethnicity (vs. White)				
	• Indian	1.03 (0.91 to 1.16)		1.03 (0.91 to 1.15)	
	• Unknown	0.20 (0.18 to 0.22)		0.20 (0.18 to 0.22)	
Model 4 (10-year)	Baseline HbA_{1c}	1.02 (1.01 to 1.03)	0.6311	1.02 (1.01 to 1.02)	0.6316
	Severity score (C10/SW10)	1.10 (1.08 to 1.11)		1.07 (1.06 to 1.08)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.03 (0.99 to 1.06)		1.04 (1.00 to 1.07)	
	Deprivation (Q5 vs. Q1)	1.22 (1.16 to 1.29)		1.22 (1.16 to 1.29)	
	Ethnicity (vs. White)				
	• Indian	1.03 (0.91 to 1.16)		1.03 (0.91 to 1.15)	
Model 4 (5-year)	Baseline HbA_{1c}	1.02 (1.01 to 1.03)	0.6297	1.02 (1.01 to 1.02)	0.6306
	Severity score (C5/SW5)	1.10 (1.08 to 1.11)		1.08 (1.07 to 1.09)	
	Age	1.02 (1.02 to 1.02)		1.02 (1.02 to 1.02)	
	Gender (F)	1.02 (0.99 to 1.05)		1.03 (1.00 to 1.06)	
	Deprivation (Q5 vs. Q1)	1.22 (1.16 to 1.29)		1.22 (1.16 to 1.29)	
	Ethnicity (vs. White)				
	• Indian	1.03 (0.91 to 1.16)		1.03 (0.92 to 1.16)	
	• Unknown	0.20 (0.18 to 0.22)		0.20 (0.18 to 0.22)	
	Baseline HbA _{1c}	1.02 (1.01 to 1.02)		1.02 (1.01 to 1.02)	

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S22 Hazard ratios (95% CI) for risk of hospitalisation due to hypoglycaemia associated with simple count and severity-weighted scores estimated at three baseline windows (secondary outcome) - validation dataset

Model	Predictor(s)	Simple count (C) score		Severity-weighted (SW) score	
		HR (95% CI)	AUROC	HR (95% CI)	AUROC
Model 1	Age	1.05 (1.05 to 1.06)	0.7038		
	Gender (F)	1.03 (0.90 to 1.19)			
	Deprivation (Q5 vs. Q1)	1.86 (1.48 to 2.33)			
	Ethnicity (vs. White)				
	• Indian	1.15 (0.72 to 1.84)			
	• Unknown	0.18 (0.09 to 0.35)			
Model 2 (unlimited)	Severity score (CU/SWU)	1.14 (1.09 to 1.19)	0.7106	1.11 (1.08 to 1.14)	0.7113
	Age	1.05 (1.04 to 1.05)		1.05 (1.04 to 1.05)	
	Gender (F)	1.07 (0.93 to 1.23)		1.10 (0.96 to 1.27)	
	Deprivation (Q5 vs. Q1)	1.81 (1.45 to 2.27)		1.80 (1.43 to 2.25)	
	Ethnicity (vs. White)				
	• Indian	1.12 (0.70 to 1.79)		1.12 (0.70 to 1.79)	
Model 2 (10-year)	Severity score (C10/SW10)	1.15 (1.10 to 1.20)	0.7098	1.12 (1.09 to 1.15)	0.7109
	Age	1.05 (1.04 to 1.06)		1.05 (1.04 to 1.05)	
	Gender (F)	1.06 (0.93 to 1.22)		1.09 (0.95 to 1.26)	
	Deprivation (Q5 vs. Q1)	1.81 (1.45 to 2.27)		1.79 (1.43 to 2.25)	
	Ethnicity (vs. White)				
	• Indian	1.12 (0.70 to 1.80)		1.12 (0.70 to 1.79)	
Model 2 (5-year)	Severity score (C5/SW5)	1.15 (1.10 to 1.21)	0.7080	1.13 (1.10 to 1.17)	0.7093
	Age	1.05 (1.04 to 1.06)		1.05 (1.04 to 1.06)	
	Gender (F)	1.05 (0.92 to 1.21)		1.08 (0.93 to 1.24)	
	Deprivation (Q5 vs. Q1)	1.81 (1.45 to 2.27)		1.80 (1.44 to 2.25)	
	Ethnicity (vs. White)				
	• Indian	1.15 (0.72 to 1.83)		1.14 (0.71 to 1.83)	
Model 3	Age	1.06 (1.05 to 1.06)	0.7159	0.19 (0.10 to 0.37)	
	Gender (F)	1.02 (0.87 to 1.19)			
	Deprivation (Q5 vs. Q1)	1.95 (1.51 to 2.52)			
	Ethnicity (vs. White)				
	• Indian	1.38 (0.81 to 2.36)			
	• Unknown	0.16 (0.08 to 0.35)			
Model 4 (unlimited)	Baseline HbA_{1c}	1.16 (1.13 to 1.19)	0.7232		0.7236
	Severity score (CU/SWU)	1.17 (1.12 to 1.22)		1.12 (1.09 to 1.15)	
	Age	1.05 (1.04 to 1.06)		1.05 (1.04 to 1.06)	
	Gender (F)	1.07 (0.91 to 1.24)		1.10 (0.94 to 1.29)	
	Deprivation (Q5 vs. Q1)	1.88 (1.45 to 2.43)		1.85 (1.43 to 2.40)	
	Ethnicity (vs. White)				
Model 4 (10-year)	• Indian	1.33 (0.78 to 2.26)	0.7225	1.33 (0.78 to 2.26)	0.7233
	• Unknown	0.18 (0.08 to 0.37)		0.18 (0.08 to 0.37)	
	Baseline HbA_{1c}	1.18 (1.14 to 1.21)		1.17 (1.14 to 1.21)	
	Severity score (C10/SW5)	1.18 (1.12 to 1.24)		1.13 (1.10 to 1.17)	
	Age	1.05 (1.04 to 1.06)		1.05 (1.04 to 1.06)	
	Gender (F)	1.06 (0.91 to 1.24)		1.09 (0.93 to 1.27)	
Model 4 (5-year)	Deprivation (Q5 vs. Q1)	1.88 (1.45 to 2.43)	0.7209	1.86 (1.44 to 2.41)	0.7218
	Ethnicity (vs. White)				
	• Indian	1.34 (0.78 to 2.28)		1.34 (0.78 to 2.28)	
	• Unknown	0.17 (0.08 to 0.37)		0.18 (0.08 to 0.37)	
	Baseline HbA_{1c}	1.17 (1.14 to 1.21)		1.17 (1.14 to 1.21)	
	Severity score (C5/SW5)	1.19 (1.12 to 1.26)		1.15 (1.11 to 1.19)	
	Age	1.05 (1.04 to 1.06)		1.05 (1.04 to 1.06)	
	Gender (F)	1.05 (0.90 to 1.23)		1.08 (0.92 to 1.25)	
	Deprivation (Q5 vs. Q1)	1.88 (1.45 to 2.43)		1.87 (1.44 to 2.42)	
	Ethnicity (vs. White)				
	• Indian	1.36 (0.80 to 2.31)		1.36 (0.80 to 2.31)	
	• Unknown	0.17 (0.08 to 0.36)		0.18 (0.08 to 0.37)	
	Baseline HbA_{1c}	1.17 (1.14 to 1.21)		1.17 (1.14 to 1.20)	

Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Table S23: Illustrative paper-based version of simple count DISSCO calculation

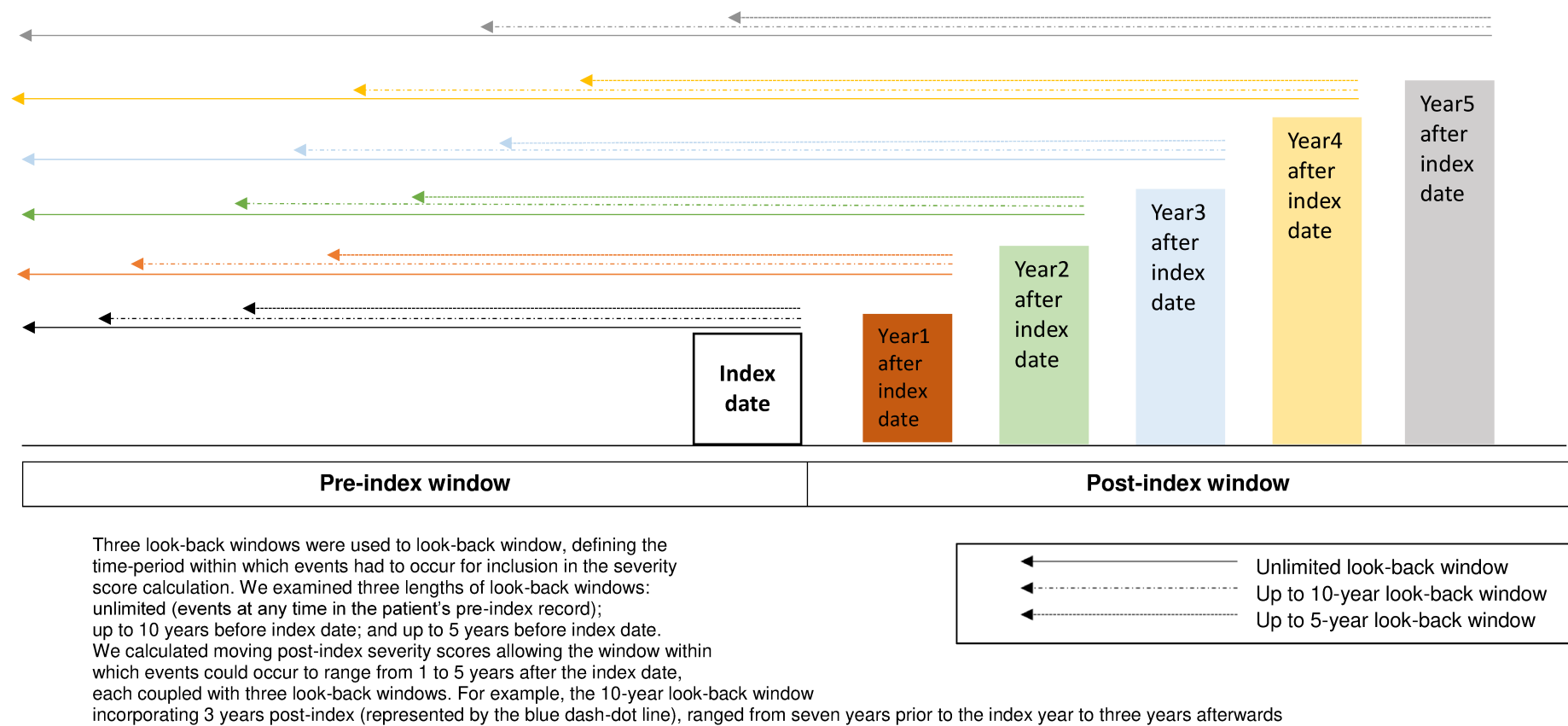
Patient number	Index date (T2DM diagnosis)	Severity domain	Domain eligible for baseline look-back window?			Baseline severity score at			Domain eligible for 3-year post-index window?			Post-index severity score at 3-year post-index +		
			5-yr window	10-yr window	Unlimited window	5-yr look-back	10-yr look-back	Unlimited window	+5-yr look-back window*	+10-yr look-back window &	+Unlimited look-back window \$	5- yr look-back window	10- yr look-back window	Unlimited look-back window
01	01/03/2008	MI 03/09/1994	No	No	Yes	1	2	4	No	No	Yes	2	3	5
		TIA 17/08/1995	No	No	Yes				No	No	Yes			
		Stroke 02/05/2002	No	Yes	Yes				No	Yes	Yes			
		PCI 22/11/2006	Yes	Yes	Yes				Yes	Yes	Yes			
		CABG 26/07/2010	-	-	-				Yes	Yes	Yes			
02	15/07/2010	PVD 17/04/2013	-	-	-	0	0	0	Yes	Yes	Yes	1	1	1
03	21/10/2011	AF 31/05/2000	No	No	Yes	0	0	1	No	No	Yes			
		Stroke 06/12/2012	-	-	-				Yes	Yes	Yes	1	1	2

AF: Atrial fibrillation; **CABG:** coronary artery bypass graft; **MI:** myocardial infarction; **PCI:** percutaneous coronary intervention; **PVD:** peripheral vascular disease; **T2DM:** type 2 diabetes mellitus; **TIA:** transient ischemic attack.

*the presented data are for illustrative purpose only based on fictional patient IDs

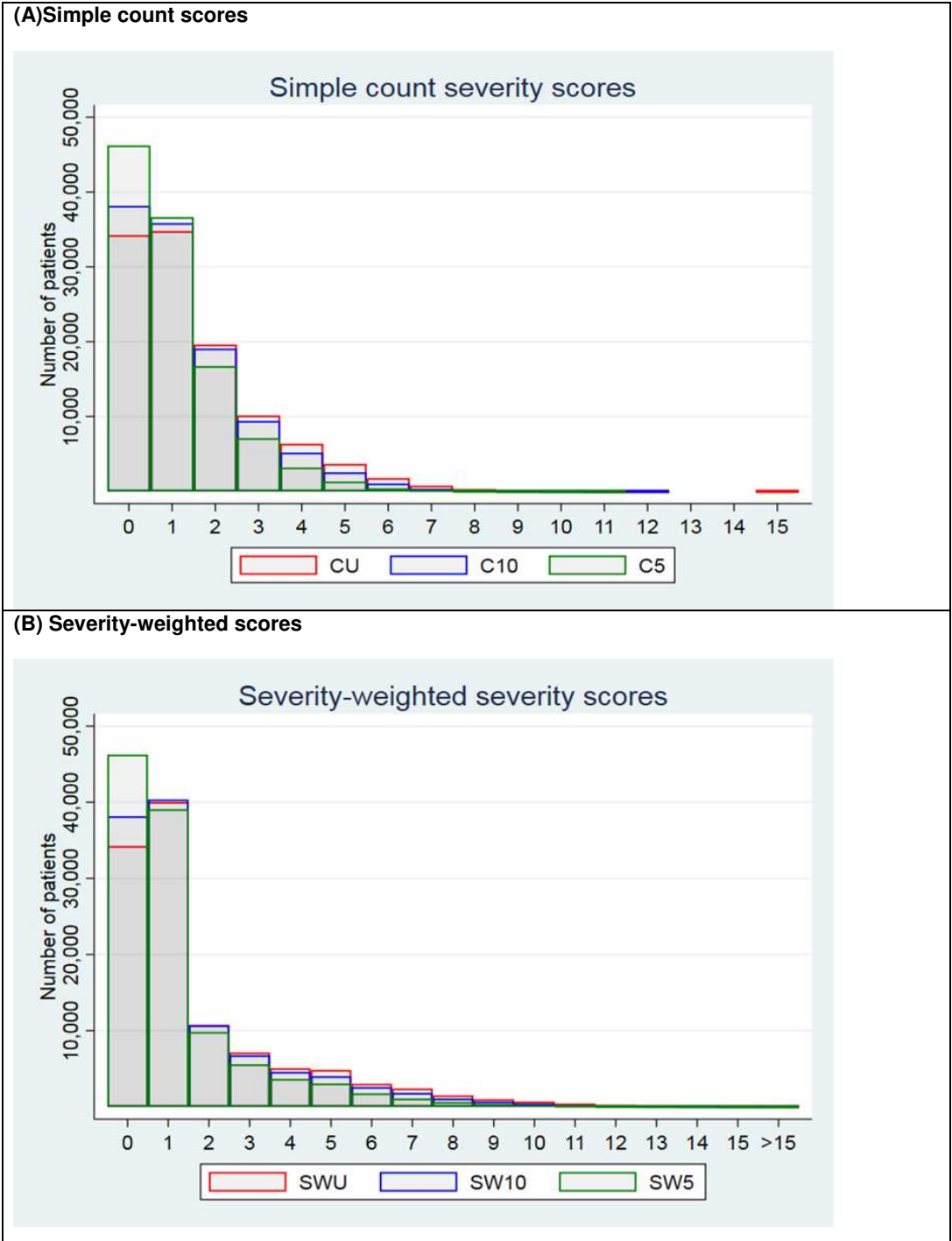
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Figure S1 Diagram of the look-back windows of pre-index and moving post-index time points



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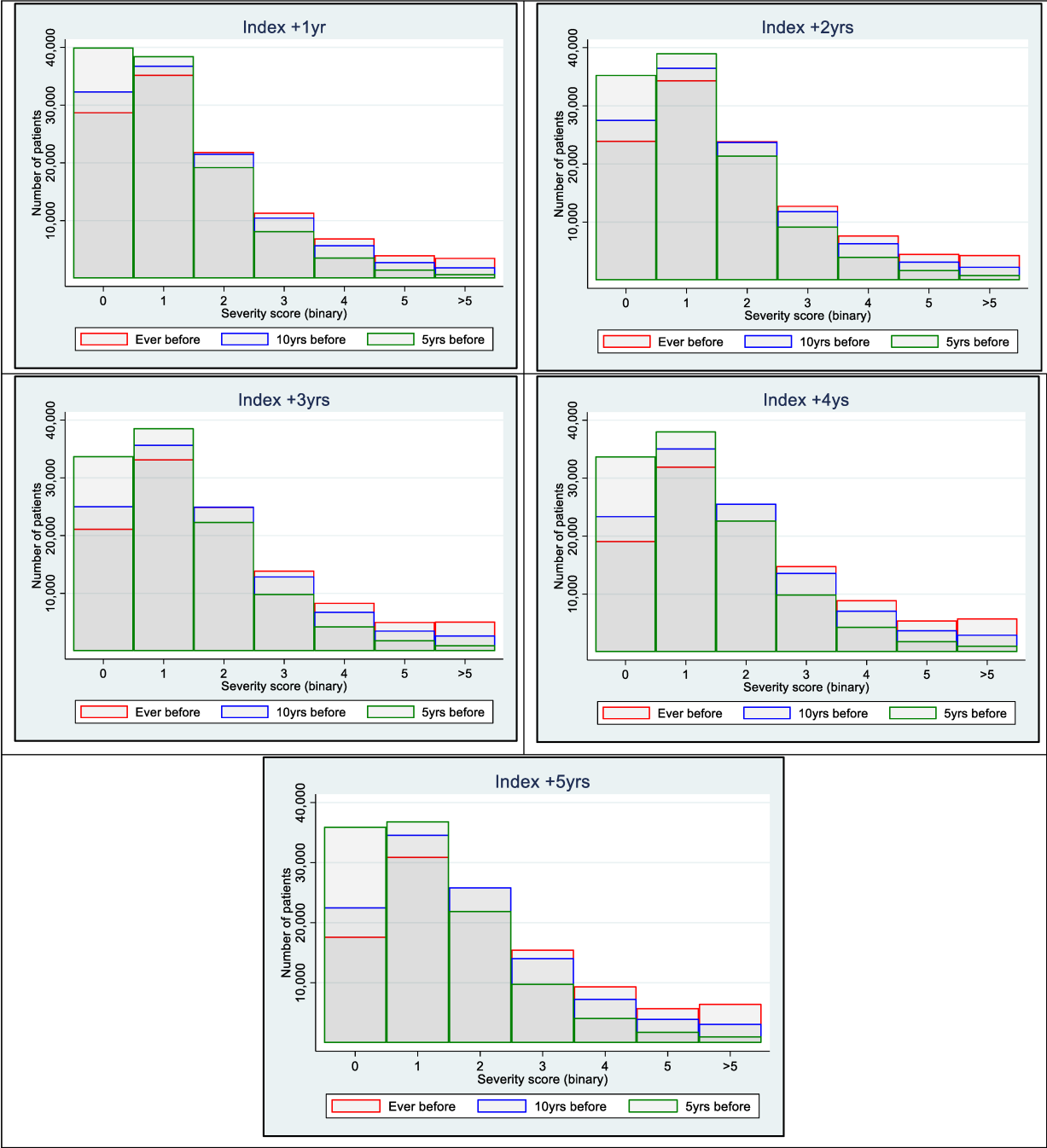
Figure S2. Patients count by (A) simple count and (B) severity-weighted scores at three look-back time windows (training dataset)



Simple count (C) or severity-weighted (SW) score measured using unlimited (CU/SWU), 10-year (C10/SW10), and 5-year (C5/SW5) look-back pre-index windows, respectively. Simple count: equals the total severity domains by assigning equal weighting (weight=1) to all domains in the overall score. Severity-weighted score: by assigning a weight to each of the severity domains according to a hierarchy of increased severity based on clinical judgement.

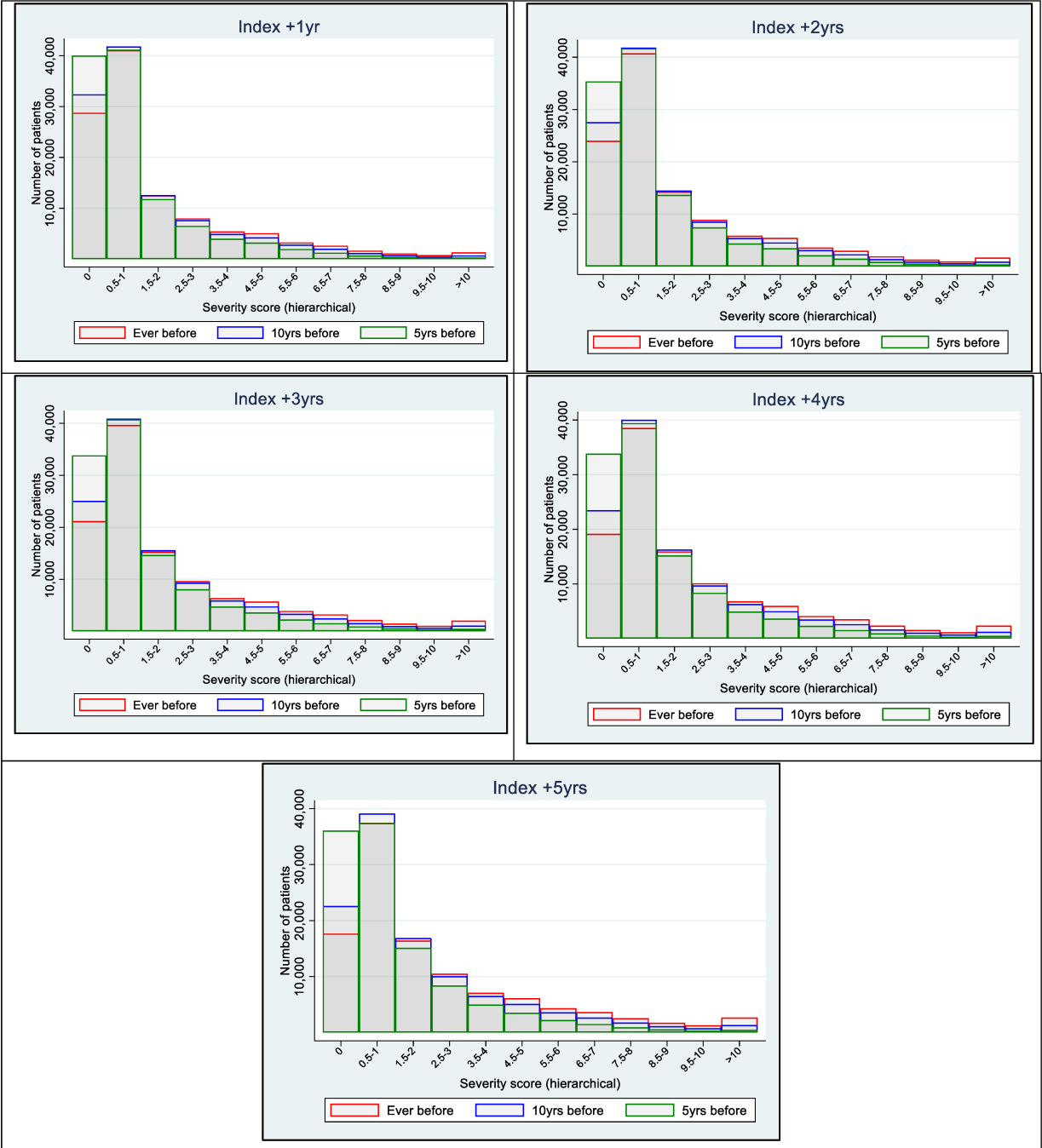
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Figure S3 Count of patients by simple count severity score at moving post-index windows (training dataset)



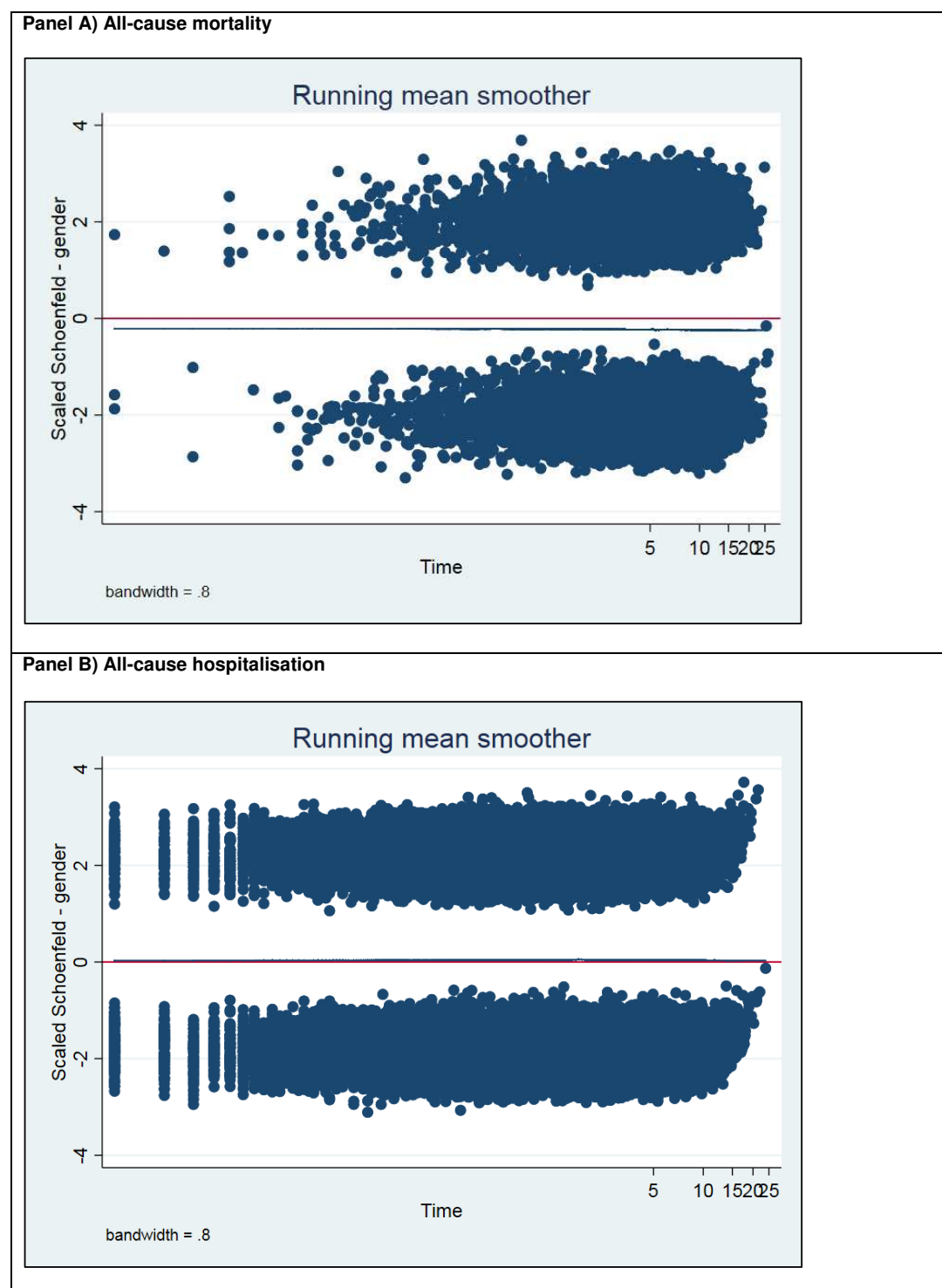
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Figure S4 Count of patients by severity-weighted severity score at moving post-index windows (training dataset)

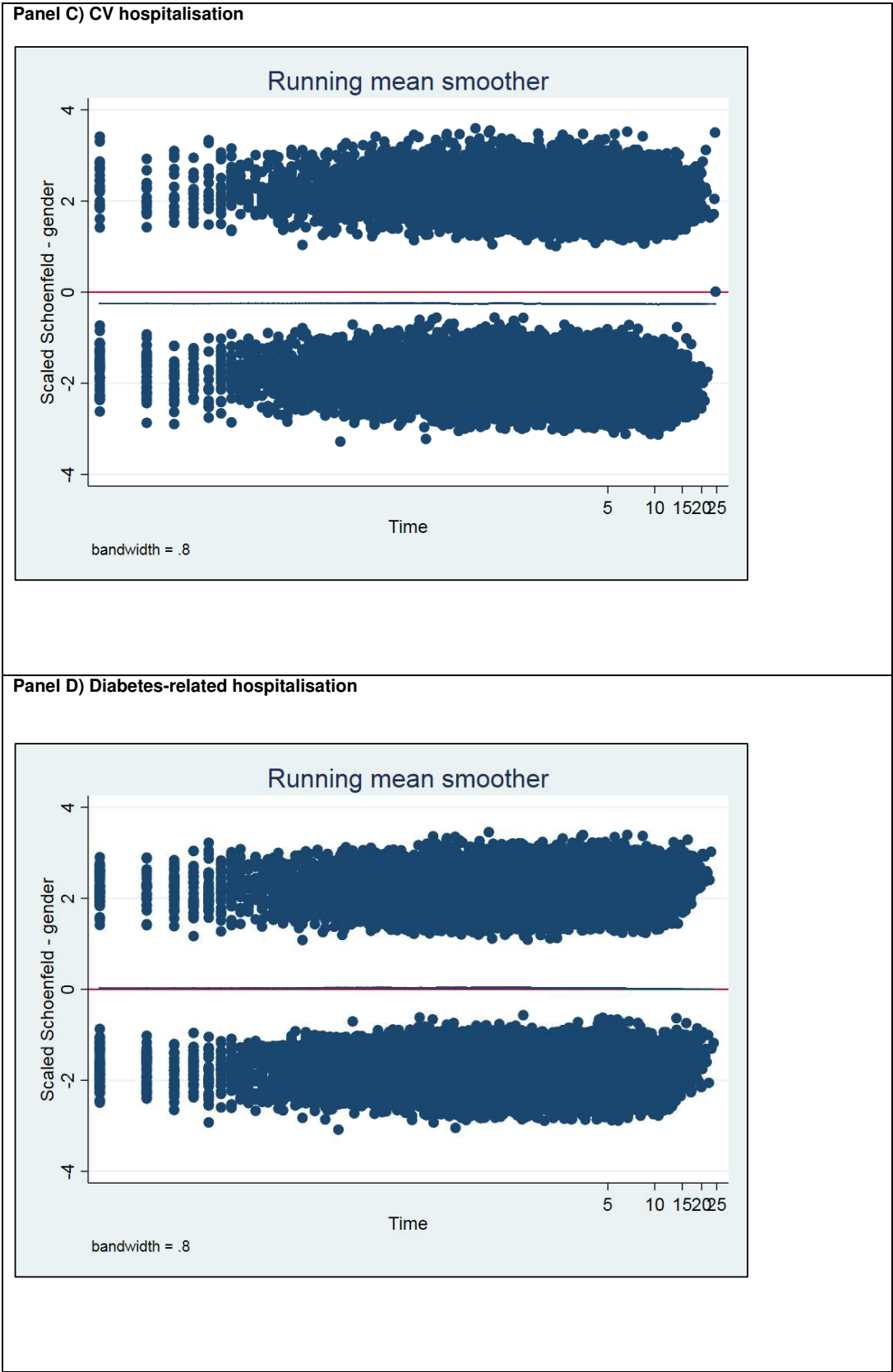


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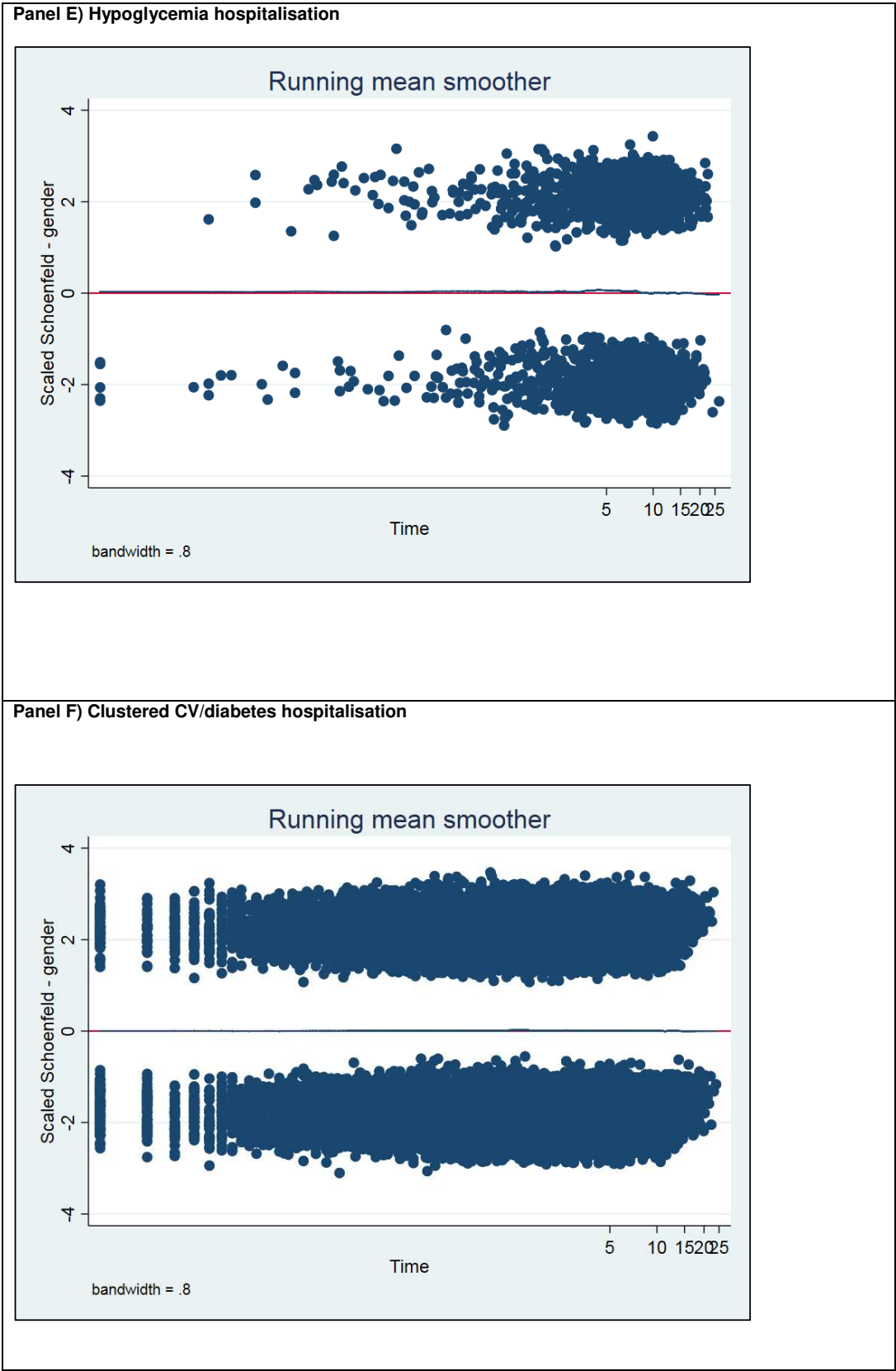
Figure S5 Schoenfeld residuals for testing proportional hazards of fitted survival models using C10 severity score (by gender) – training dataset



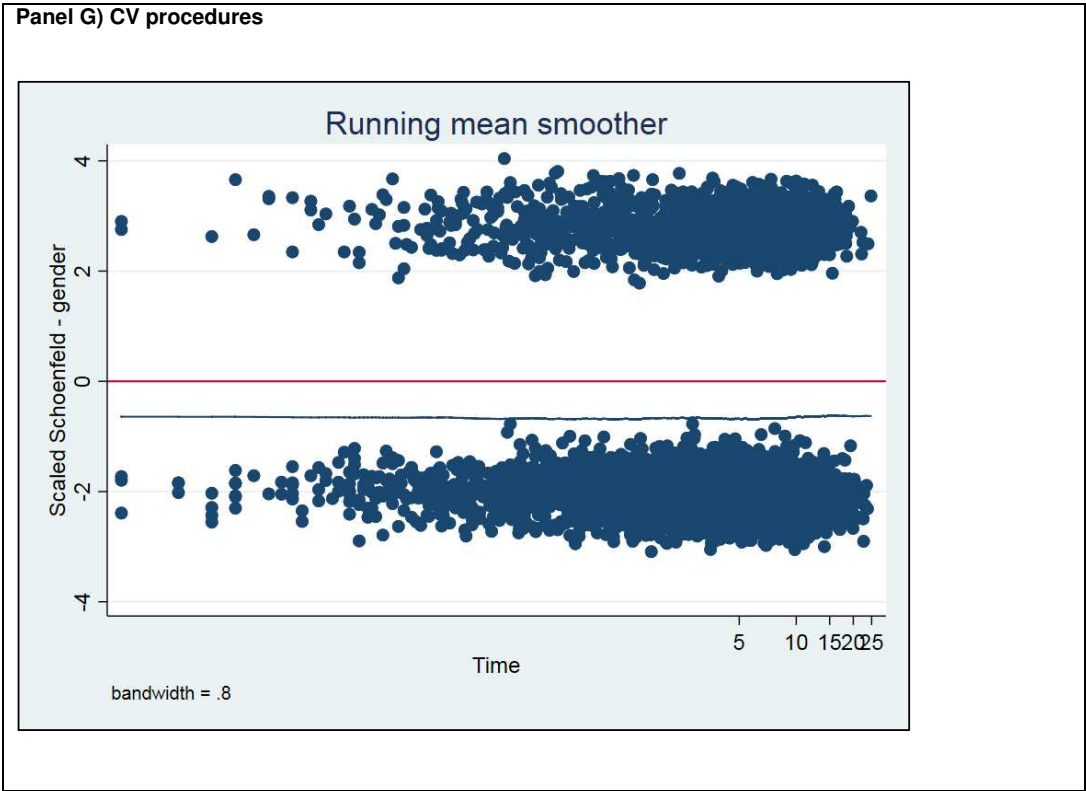
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Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

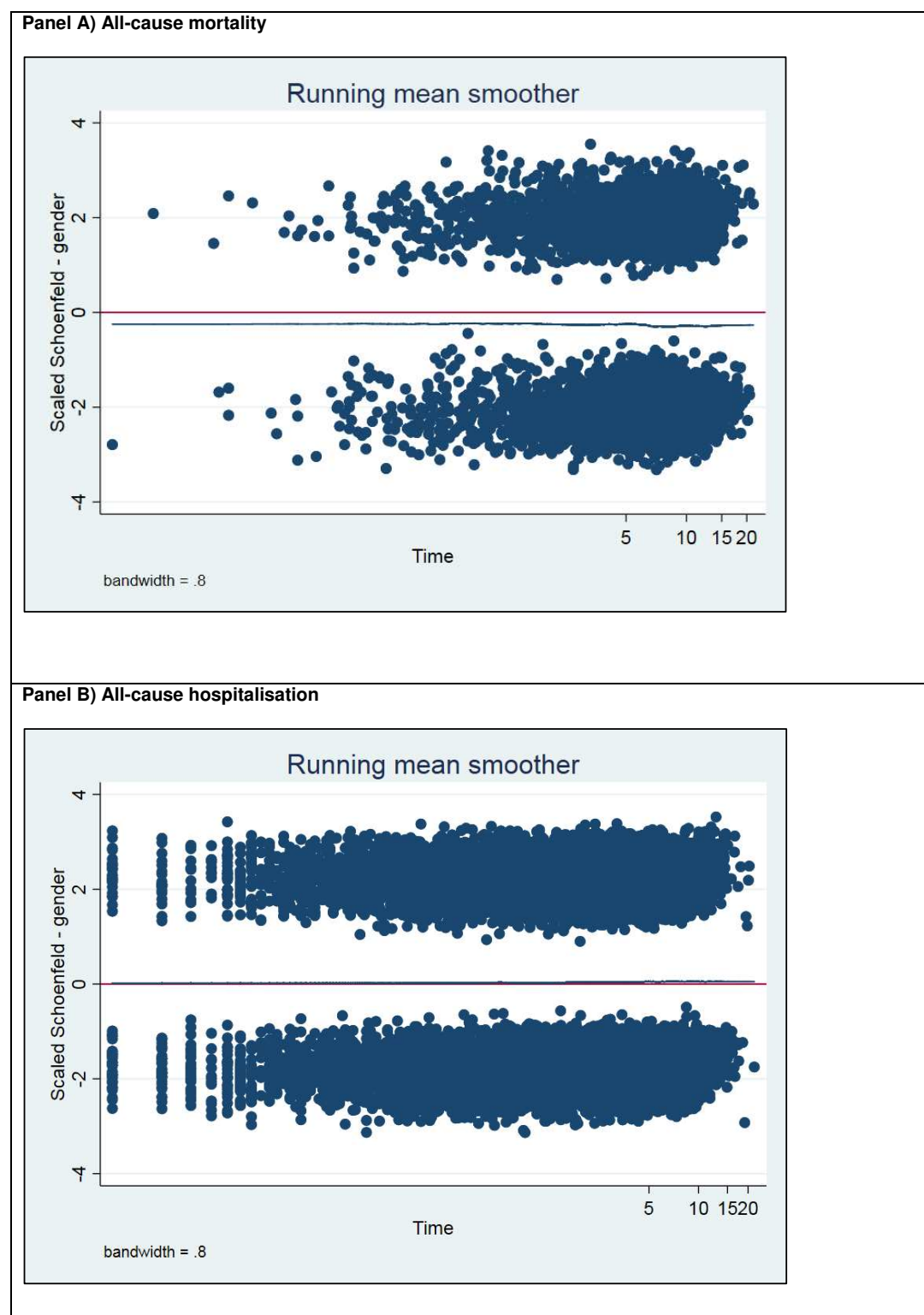


Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

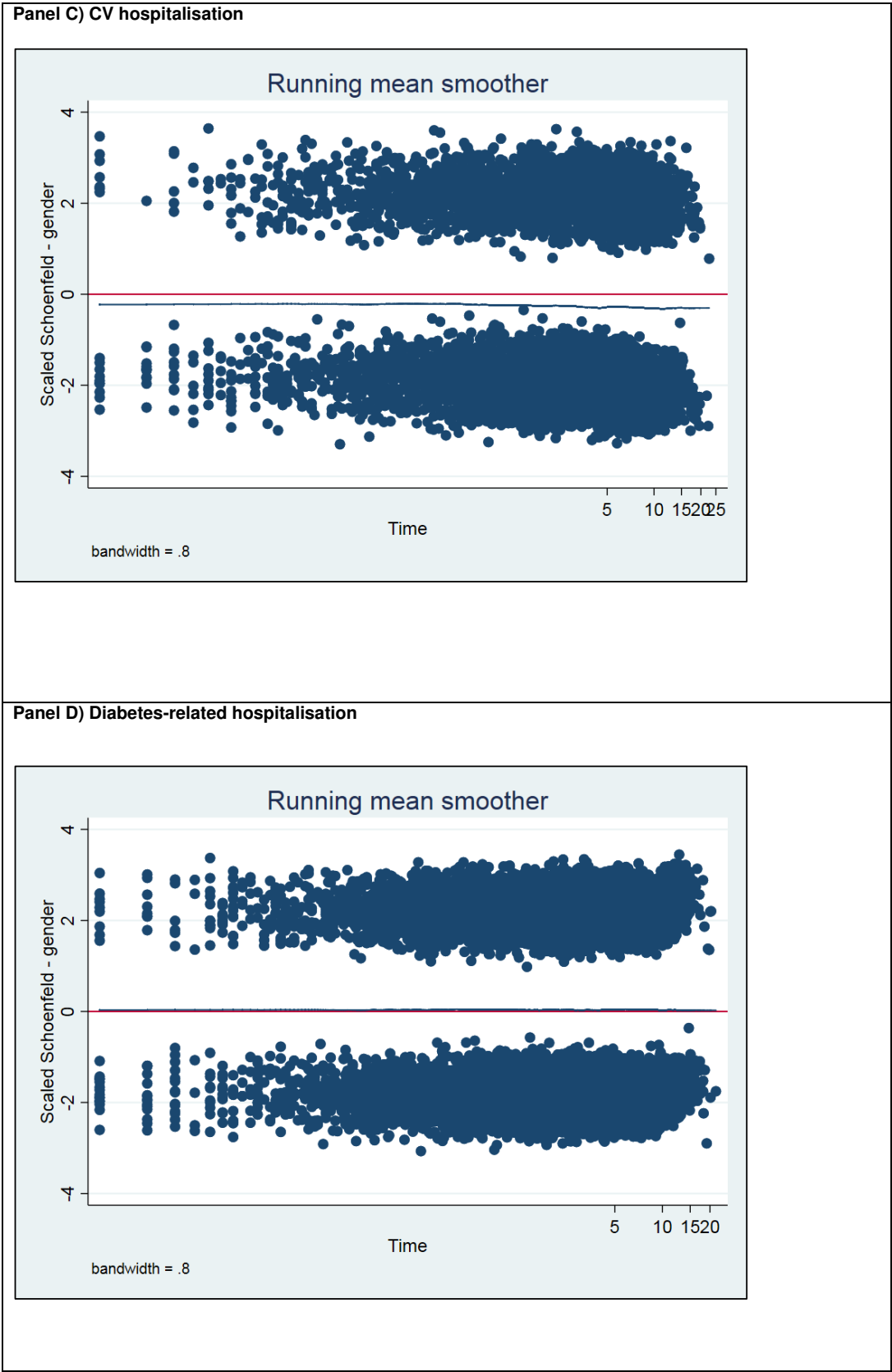


Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

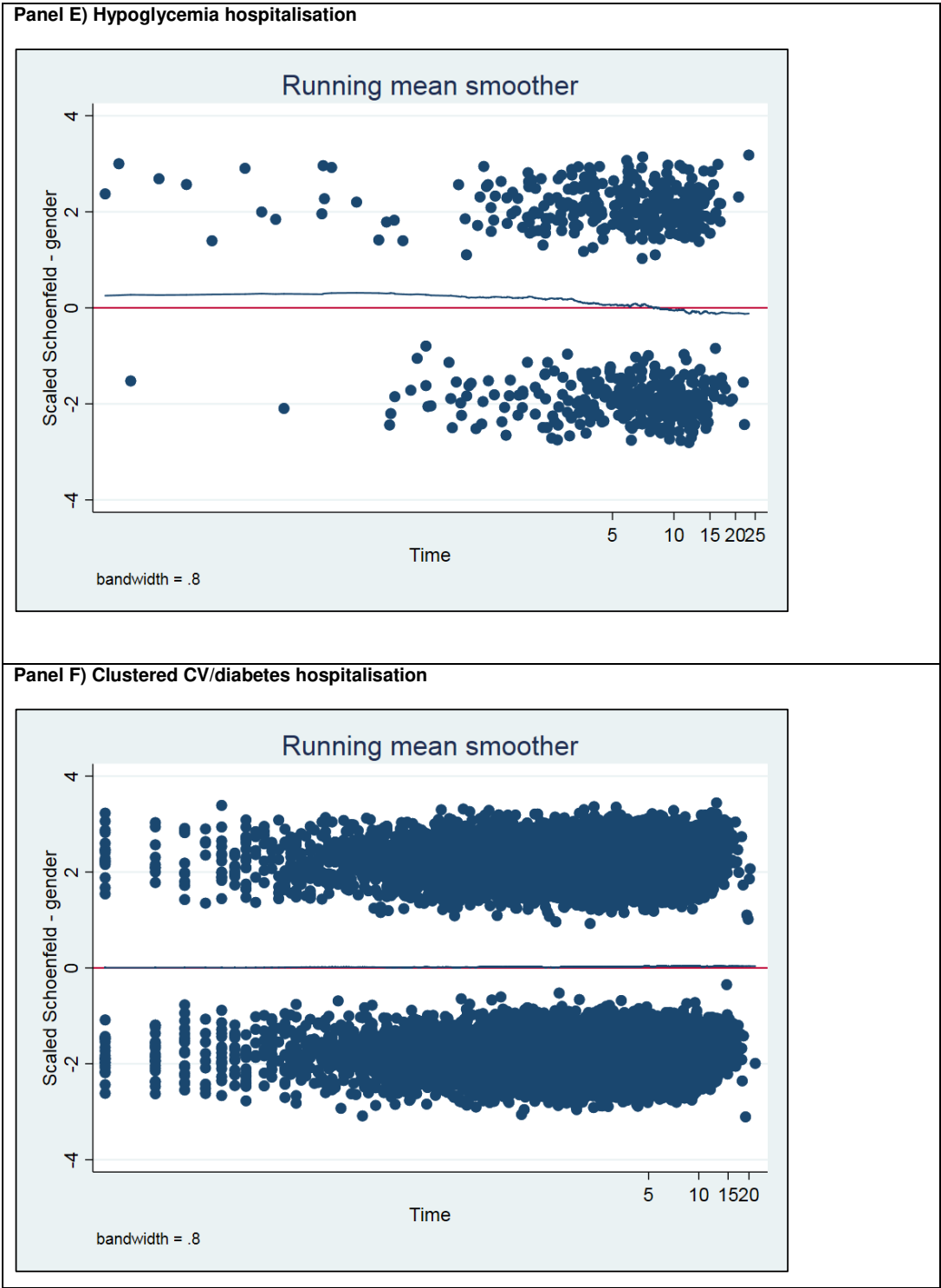
Figure S6 Schoenfeld residuals for testing proportional hazards of fitted survival models using C10 severity score (by gender) – validation dataset



Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

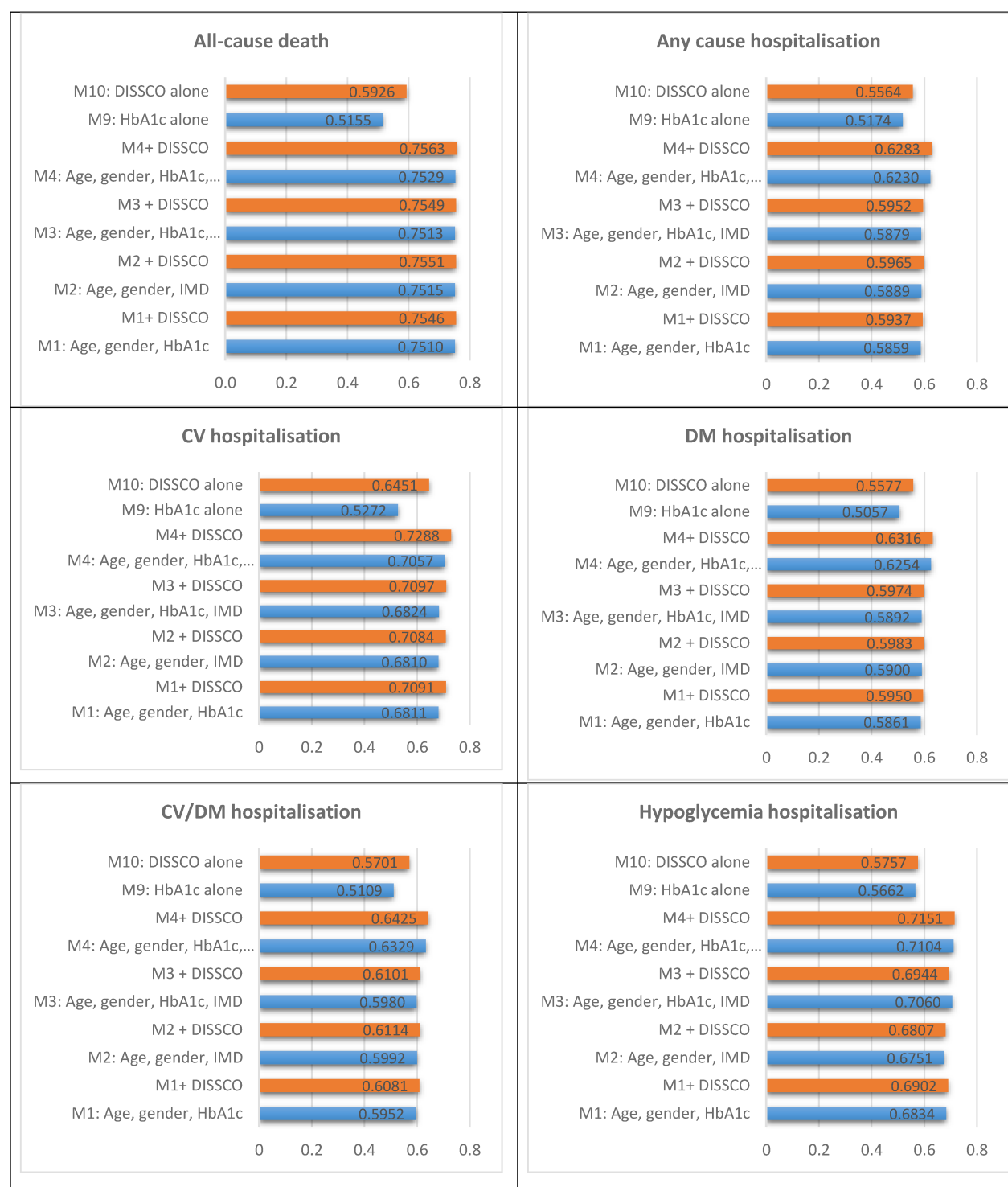


Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

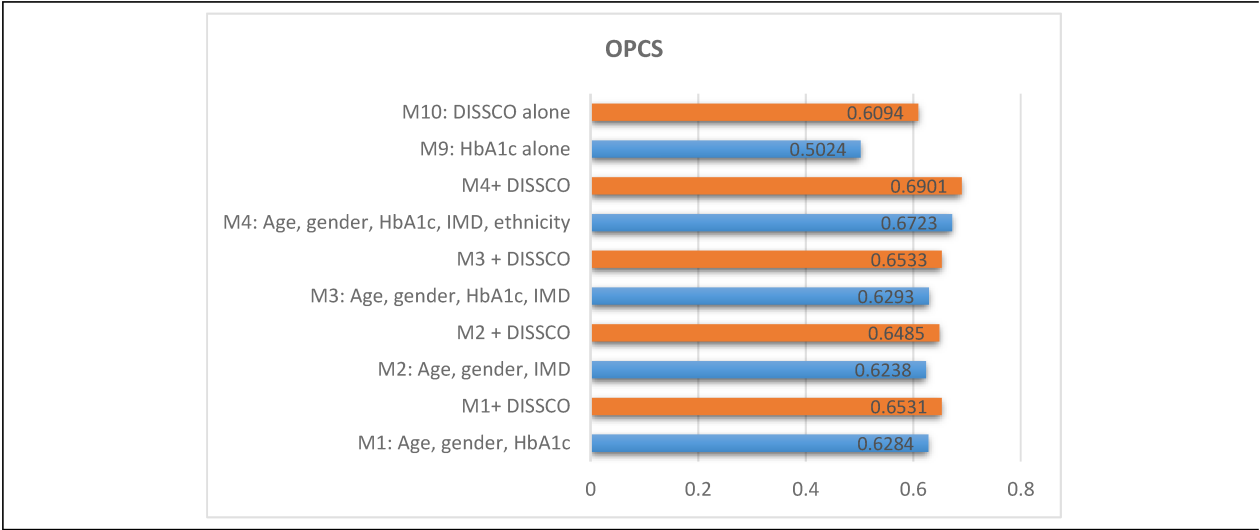


Supplementary data to "Development and validation of the Diabetes Severity SCOr (DISSCO)". Zghebi et al.

Figure S7 Bar charts of estimated AUROC for survival models including HbA_{1c} and sociodemographics variables with and without DISSCO

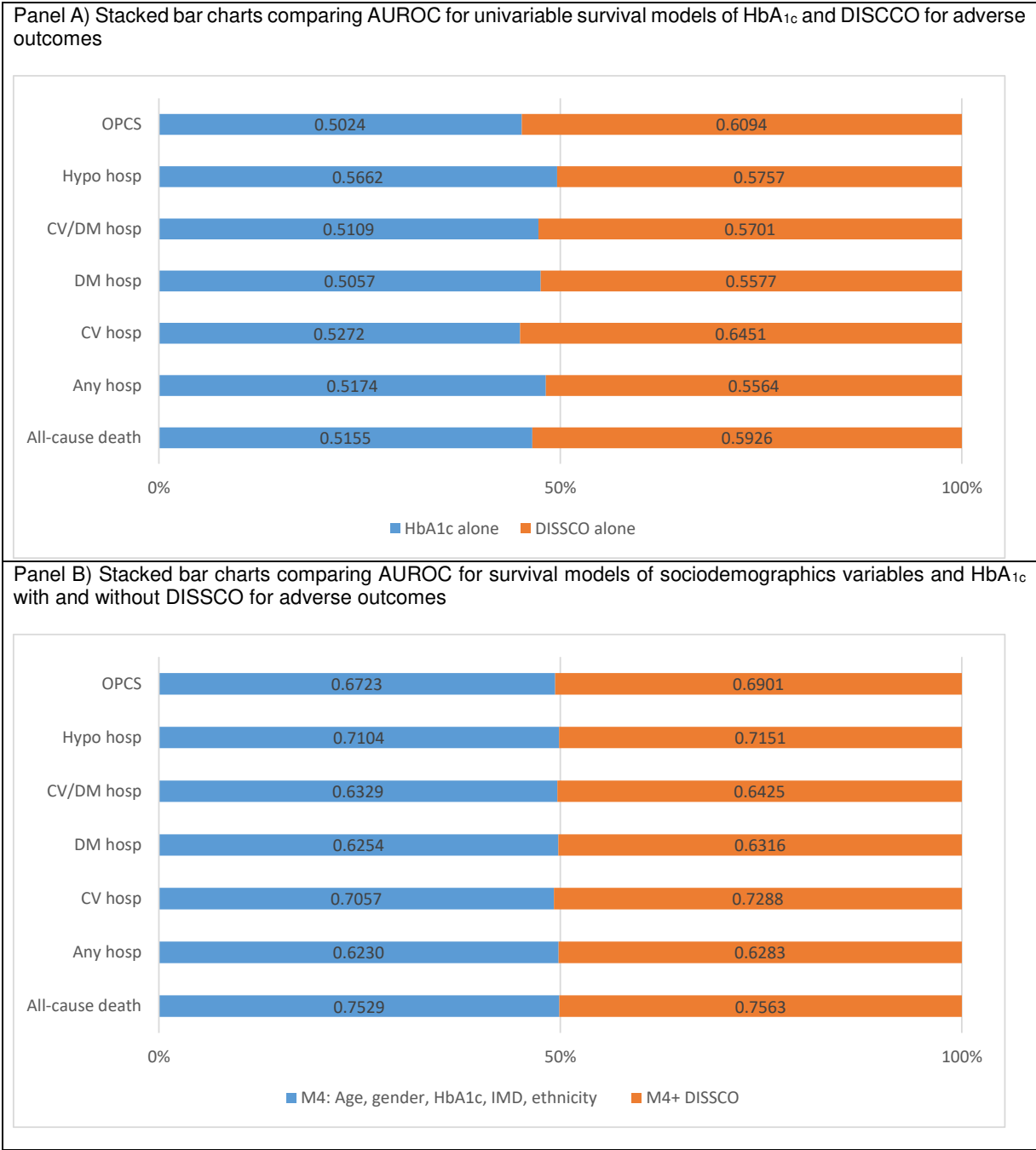


Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.



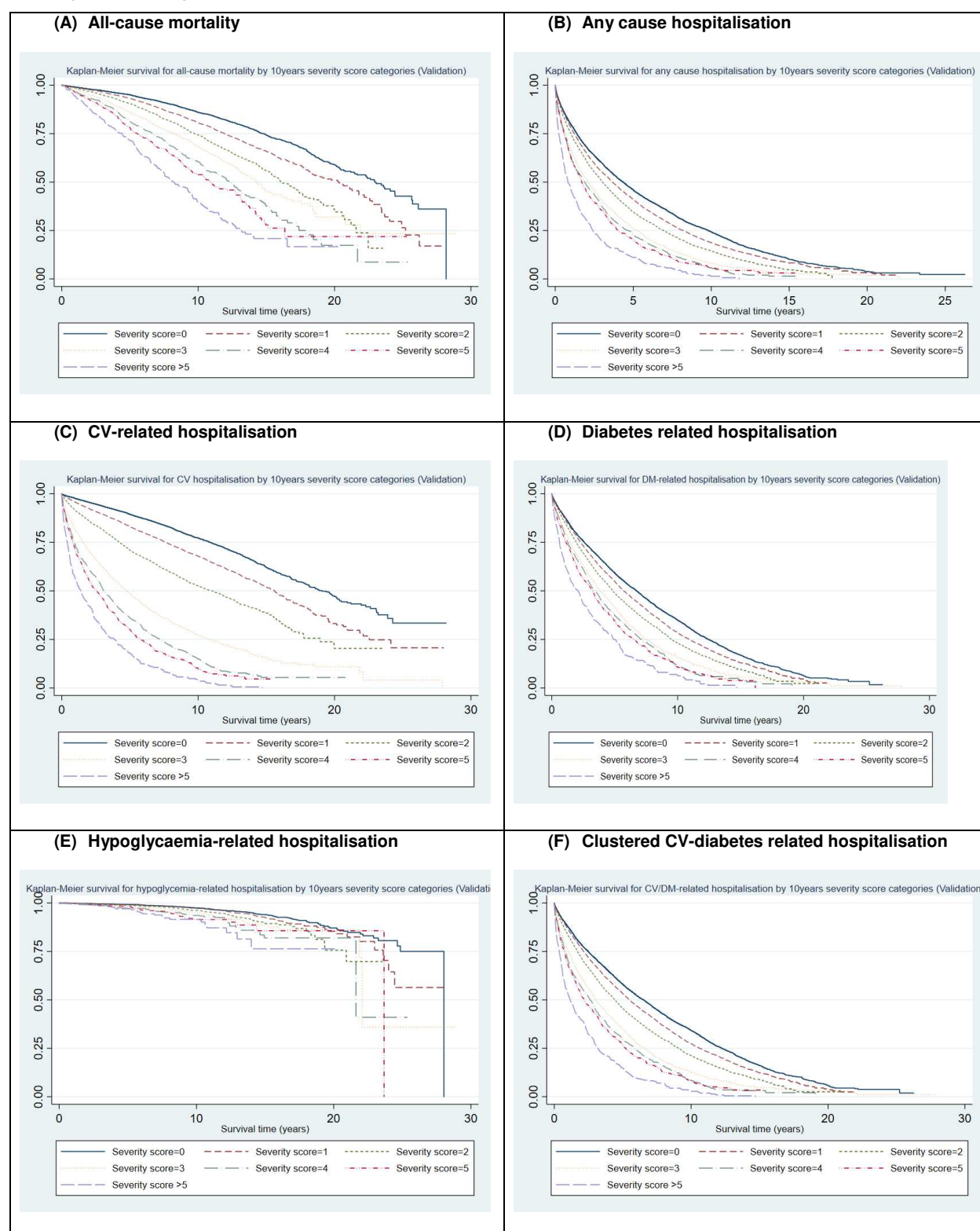
Supplementary data to "Development and validation of the DIabetes Severity SCOrE (DISSCO)". Zghebi et al.

Figure S8 100% Stacked bar charts of estimated AUROC for survival models including HbA_{1c} and sociodemographics variables with and without DISSCO



Supplementary data to "Development and validation of the Diabetes Severity SCOrE (DISSCO)". Zghebi et al.

Figure S9 Kaplan-Meier plots for risk of adverse outcomes associated with 10-year (C10) severity score categories - Validation dataset



Supplementary data to "Development and validation of the Diabetes Severity SCOrE (DISSCO)". Zghebi et al.

Figure S10 Calibration test by prediction of population-averaged survival probabilities for simple count scores for all-cause mortality

