

Supplemental material

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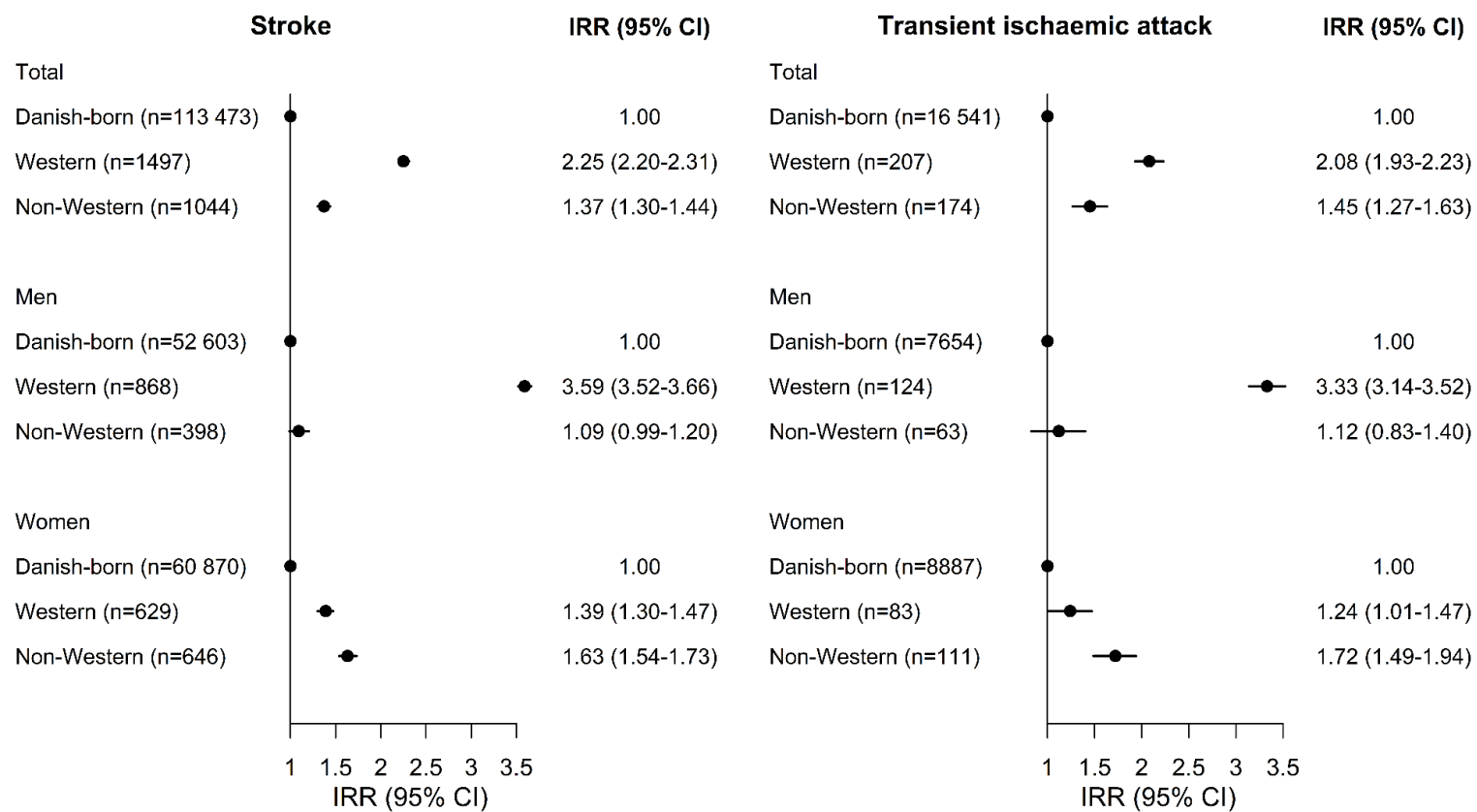


Figure S1. Incidence rate ratio (IRR) of stroke and transient ischaemic attack by country classification.

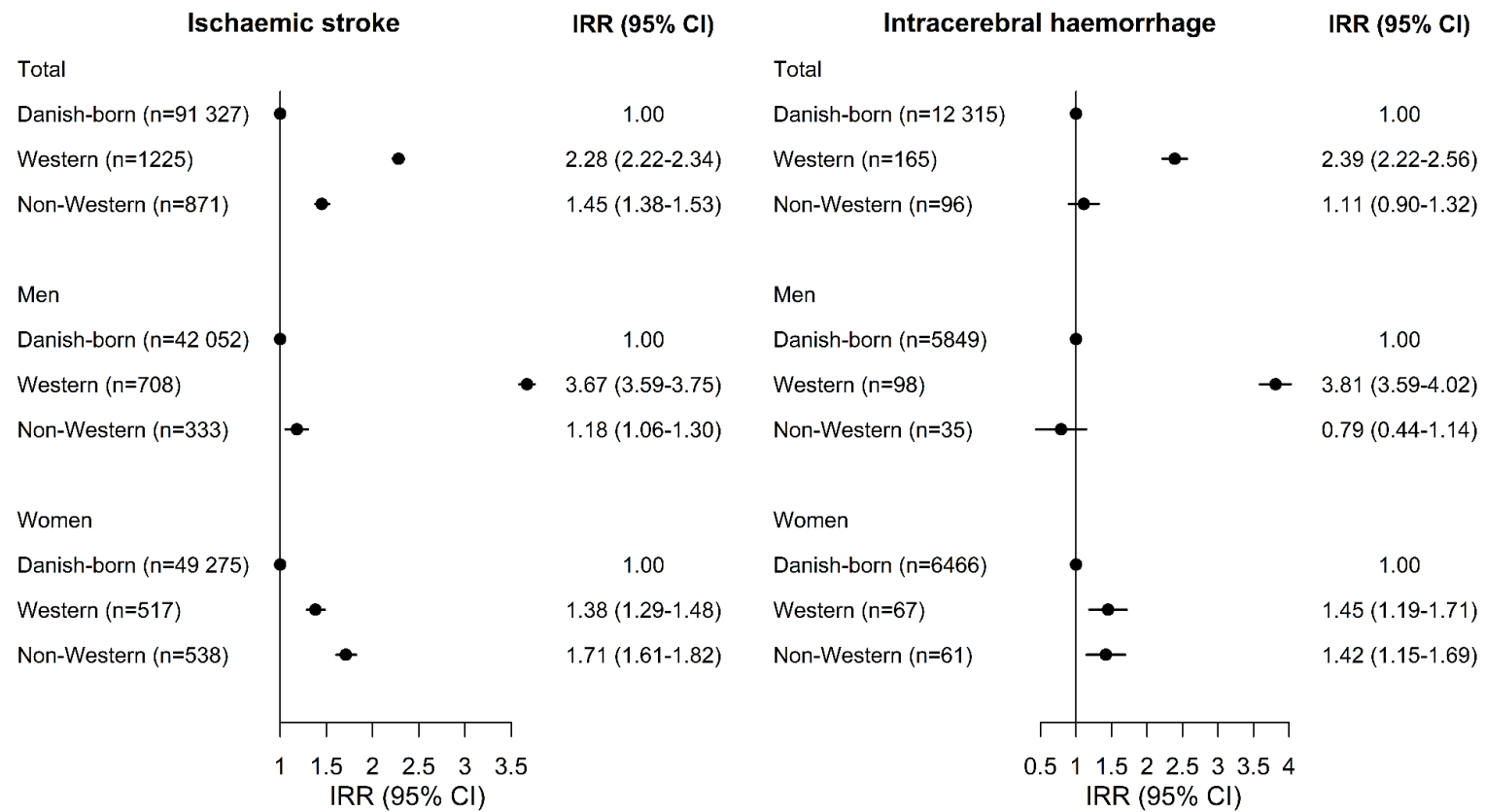


Figure S2. Incidence rate ratio (IRR) of ischaemic stroke and intracerebral haemorrhage by country classification.

Table S1. Data sources and description of variables.

Data Source	Variables
Danish Stroke Registry	Age, sex, marital status, smoking, Body Mass Index, stroke types (ischaemic stroke, intracerebral haemorrhage and unspecified stroke), transient ischaemic attack, stroke severity, thrombolysis and endovascular therapy
National Patient Registry	Acute myocardial infarction, hypertension, diabetes, atrial fibrillation and peripheral artery disease
Statistics Denmark	Date of birth, income, education, employment status and date of immigration
Cause of Death Register	Date of death

Table S2. Age-standardised incidence rates of stroke, stroke types and transient ischaemic attack per 100 000 person years by ethnic group.

	Total		Men		Women	
	n	Incidence rates* (95% CI)	n	Incidence rates* (95% CI)	n	Incidence rates* (95% CI)
Stroke						
Danish-born	113 473	173 (172–174)	52 603	156 (155–157)	60 870	186 (185–188)
Norwegian	335	265 (236–296)	206	406 (352–467)	129	162 (134–194)
Swedish	289	302 (267–340)	180	524 (448–610)	109	170 (138–206)
Polish	186	572 (474–684)	108	1298 (1014–1636)	78	307 (226–408)
German	687	604 (552–659)	374	777 (682–881)	313	496 (438–560)
Ex-Yugoslavian	208	275 (234–321)	88	238 (187–299)	120	309 (246–382)
Turkish	338	185 (160–213)	149	154 (125–188)	189	214 (174–260)
Iraqi	165	253 (212–301)	54	156 (110–215)	111	368 (298–451)
Iranian	109	265 (215–323)	32	149 (97–219)	77	449 (349–569)
Pakistani	224	367 (311–430)	75	226 (175–288)	149	538 (420–680)
Ischaemic stroke						
Danish-born	91 327	139 (138–140)	42 052	125 (123–126)	49 275	151 (149–152)
Norwegian	278	220 (194–249)	172	340 (290–396)	106	132 (107–161)
Swedish	239	248 (217–283)	144	422 (354–499)	95	145 (116–178)
Polish	158	472 (384–574)	93	1075 (821–1383)	65	255 (181–350)
German	550	480 (434–529)	299	629 (544–724)	251	387 (336–443)
Ex-Yugoslavian	175	234 (196–278)	73	202 (155–260)	102	264 (205–334)
Turkish	281	160 (136–188)	122	132 (104–164)	159	187 (148–233)
Iraqi	132	211 (172–255)	42	128 (86–184)	90	307 (242–384)
Iranian	95	228 (182–282)	28	129 (81–195)	67	389 (296–501)
Pakistani	188	310 (258–370)	68	208 (158–268)	120	435 (325–571)
Intracerebral haemorrhage						
Danish-born	12 315	19 (18–19)	5849	17 (17–18)	6466	20 (19–20)
Norwegian	39	31 (22–43)	24	47 (30–71)	15	19 (10–32)
Swedish	21	21 (13–32)	15	40 (22–68)	6	8 (3–17)
Polish	20	82 (46–135)	11	200 (95–370)	9	35 (13–75)
German	85	78 (60–100)	48	94 (64–133)	37	67 (45–96)
Ex-Yugoslavian	15	19 (10–31)	7	17 (7–35)	8	21 (9–42)
Turkish	31	14 (9–20)	15	13 (7–23)	16	13 (7–21)
Iraqi	19	27 (15–43)	6	17 (5–40)	13	39 (19–69)
Iranian	10	30 (14–55)	3	18 (3–54)	7	48 (19–100)
Pakistani	21	39 (23–62)	4	10 (3–26)	17	76 (41–128)
Transient ischaemic attack						

Danish-born	16 541	25 (25–26)	7654	23 (22–23)	8887	27 (27–28)
Norwegian	40	34 (24–47)	28	57 (37–82)	12	18 (9–33)
Swedish	47	44 (32–59)	28	76 (50–111)	19	26 (16–41)
Polish	32	86 (53–133)	22	216 (116–367)	10	35 (14–71)
German	88	76 (59–96)	46	95 (64–135)	42	66 (47–91)
Ex-Yugoslavian	26	35 (20–58)	14	39 (17–77)	12	29 (14–51)
Turkish	53	30 (19–43)	16	21 (9–40)	37	38 (23–59)
Iraqi	28	35 (22–52)	12	30 (13–59)	16	44 (24–75)
Iranian	32	71 (47–102)	11	40 (18–77)	21	122 (73–192)
Pakistani	35	50 (34–71)	10	30 (14–57)	25	70 (43–108)

CI indicates confidence interval. *Standardised to 2004 Danish population age distribution. Stroke includes ischaemic stroke, intracerebral haemorrhage and unspecified stroke.

Table S3. Age-standardised incidence rates of stroke, stroke types and transient ischaemic attack per 100 000 person years by country classification.

	Total		Men		Women	
	n	Incidence rates* (95% CI)	n	Incidence rates* (95% CI)	n	Incidence rates* (95% CI)
Stroke						
Danish-born	113 473	173 (172–174)	52 603	156 (155–157)	60 870	186 (185–188)
Western [†]	1497	390 (369–412)	868	560 (521–602)	629	258 (237–281)
Non-Western [‡]	1044	237 (221–254)	398	171 (153–190)	646	305 (277–335)
Ischaemic stroke						
Danish-born	91 327	139 (138–140)	42 052	125 (123–126)	49 275	151 (149–152)
Western [†]	1225	317 (298–337)	708	457 (421–495)	517	208 (189–229)
Non-Western [‡]	871	202 (187–219)	333	147 (130–165)	538	258 (232–286)
Intracerebral haemorrhage						
Danish-born	12 315	19 (18–19)	5849	17 (17–18)	6466	20 (19–20)
Western [†]	165	45 (38–53)	98	66 (53–81)	67	29 (22–37)
Non-Western [‡]	96	21 (17–26)	35	14 (9–19)	61	28 (21–37)
Transient ischaemic attack						
Danish-born	16 541	25 (25–26)	7654	23 (22–23)	8887	27 (27–28)
Western [†]	207	52 (45–61)	124	76 (62–92)	83	33 (26–42)
Non-Western [‡]	174	37 (30–44)	63	26 (19–34)	111	47 (37–58)

CI indicates confidence interval. *Standardised to 2004 Danish population age distribution. [†]Western includes Norwegian, Swedish, Polish and German. [‡]Non-Western includes Ex-Yugoslavian, Turkish, Iraqi, Iranian and Pakistani. Stroke includes ischaemic stroke, intracerebral haemorrhage and unspecified stroke.

Table S4. Association between duration of residence, age at immigration and all-cause 1-year mortality.

	Death	Unadjusted	Model 1	Model 2
	n	HR (95% CI)	HR (95% CI)	HR (95% CI)
Danish-born (ref)	2069	1.00	1.00	1.00
Duration of residence				
Immigrants* (≤ 15 years of residence)	54	0.69 (0.39–1.22)	0.61 (0.34–1.09)	0.36 (0.14–0.91)
Immigrants* (> 15 years of residence)	234	0.88 (0.70–1.12)	0.89 (0.70–1.13)	0.97 (0.73–1.29)
Age at immigration				
18–24 years	41	0.82 (0.46–1.45)	0.61 (0.34–1.10)	0.53 (0.25–1.09)
25–34 years	75	0.78 (0.52–1.18)	0.80 (0.52–1.21)	0.89 (0.53–1.50)
35–50 years	127	0.74 (0.53–1.04)	0.75 (0.54–1.06)	0.79 (0.50–1.23)
> 50 years	34	0.98 (0.53–1.81)	0.99 (0.54–1.83)	1.07 (0.52–2.22)

HR indicates hazard ratios and CI confidence interval. *Immigrants include Norwegian, Swedish, Polish, German, Ex-Yugoslavian, Turkish, Iraqi, Iranian and Pakistani.

Model 1: Adjusted for age at stroke and sex.

Model 2: Model 1 adjusted for marital status, education, employment status and income.

Table S5. 3-year and 5-year hazard ratios for all-cause mortality by ethnic group.

	3-year				5-year			
		Unadjusted	Age adjusted	Fully adjusted		Unadjusted	Age adjusted	Fully adjusted
	n	HR (95% CI)	HR (95%)	HR (95% CI)	n	HR (95% CI)	HR (95% CI)	HR (95% CI)
Ischaemic stroke								
Men								
Danish-born (ref)	9582	1.00	1.00	1.00	12 070	1.00	1.00	1.00
Western*	156	0.97 (0.83–1.14)	0.97 (0.83–1.13)	0.90 (0.72–1.13)	205	1.02 (0.89–1.17)	1.01 (0.88–1.16)	0.96 (0.78–1.16)
Non-Western†	36	1.19 (0.86–1.65)	1.46 (1.05–2.02)	1.05 (0.67–1.67)	42	1.12 (0.83–1.52)	1.39 (1.03–1.89)	0.95 (0.62–1.46)
Women								
Danish-born (ref)	10 495	1.00	1.00	1.00	13 631	1.00	1.00	1.00
Western*	99	0.97 (0.79–1.18)	1.03 (0.84–1.25)	0.89 (0.63–1.27)	135	1.05 (0.88–1.24)	1.11 (0.94–1.31)	0.93 (0.67–1.30)
Non-Western†	53	0.82 (0.62–1.07)	0.91 (0.69–1.20)	0.88 (0.59–1.31)	72	0.83 (0.66–1.05)	0.93 (0.74–1.18)	0.74 (0.51–1.06)
Intracerebral haemorrhage								
Men								
Danish-born (ref)	2479	1.00	1.00	1.00	2815	1.00	1.00	1.00
Western*	33	1.30 (0.92–1.84)	1.32 (0.93–1.85)	1.51 (0.94–2.43)	37	1.28 (0.92–1.77)	1.29 (0.93–1.78)	1.58 (1.01–2.48)
Non-Western†	10	0.84 (0.45–1.57)	0.97 (0.52–1.83)	1.17 (0.43–3.23)	10	0.66 (0.35–1.23)	0.78 (0.41–1.46)	1.19 (0.44–3.26)
Women								
Danish-born (ref)	2737	1.00	1.00	1.00	3103	1.00	1.00	1.00
Western*	21	0.74 (0.48–1.14)	0.75 (0.48–1.13)	1.12 (0.65–1.93)	26	0.80 (0.55–1.18)	0.81 (0.55–1.19)	1.24 (0.74–2.08)
Non-Western†	22	0.83 (0.55–1.27)	0.89 (0.58–1.35)	0.75 (0.41–1.40)	26	0.91 (0.62–1.34)	0.98 (0.67–1.45)	0.79 (0.45–1.39)

HR indicates hazard ratios and CI confidence interval. *Western includes Norwegian, Swedish, Polish and German. †Non-Western includes Ex-Yugoslavian, Turkish, Iraqi, Iranian and Pakistani. The fully adjusted model included age at stroke, smoking, acute myocardial infarction, diabetes, hypertension, atrial fibrillation, peripheral artery disease, marital status, education, employment status, income, stroke severity and thrombolytic or endovascular therapy (only for ischaemic stroke).

Table S6. Sensitivity analysis showing all-cause 1-year mortality hazard ratios by ethnic group.

	Unadjusted	Model 1	Model 2	Model 3	Model 4
	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Ischaemic stroke					
Men					
Danish-born (ref)	1.00	1.00	1.00	1.00	1.00
Western*	1.08 (0.87–1.33)	1.09 (0.88–1.34)	1.01 (0.81–1.26)	0.94 (0.75–1.19)	0.94 (0.73–1.22)
Non-Western†	0.88 (0.55–1.43)	1.03 (0.64–1.65)	0.85 (0.51–1.39)	0.73 (0.44–1.23)	0.62 (0.33–1.17)
Women					
Danish-born (ref)	1.00	1.00	1.00	1.00	1.00
Western*	0.91 (0.66–1.25)	0.97 (0.71–1.33)	0.89 (0.62–1.27)	0.79 (0.53–1.12)	0.64 (0.40–1.02)
Non-Western†	0.89 (0.58–1.37)	0.94 (0.61–1.44)	0.78 (0.49–1.26)	0.78 (0.48–1.29)	0.86 (0.51–1.45)
Intracerebral haemorrhage					
Men					
Danish-born (ref)	1.00	1.00	1.00	1.00	1.00
Western*	1.64 (1.05–2.59)	1.69 (1.07–2.66)	1.76 (1.08–2.85)	1.60 (0.99–2.60)	1.63 (1.00–2.65)
Non-Western†	1.52 (0.73–3.21)	1.00 (0.44–2.31)	1.27 (0.57–2.85)	1.14 (0.50–2.56)	1.19 (0.43–3.29)
Women					
Danish-born (ref)	1.00	1.00	1.00	1.00	1.00
Western*	0.81 (0.46–1.43)	0.81 (0.45–1.43)	0.80 (0.45–1.42)	0.99 (0.56–1.77)	0.78 (0.39–1.54)
Non-Western†	0.49 (0.25–0.94)	0.50 (0.25–0.96)	0.45 (0.20–1.02)	0.53 (0.24–1.20)	0.49 (0.19–1.21)

HR indicates hazard ratios and CI confidence interval. *Western includes Norwegian, Swedish, Polish and German. †Non-Western includes Ex-Yugoslavian, Turkish, Iraqi, Iranian and Pakistani.

Model 1: Adjusted for age at stroke.

Model 2: Additionally adjusted for smoking, acute myocardial infarction, diabetes, hypertension, atrial fibrillation and peripheral artery disease.

Model 3: Further adjusted for stroke severity and thrombolytic or endovascular therapy (only for ischaemic stroke).

Model 4 (Fully adjusted): Model 3 additionally adjusted for marital status, education, employment status and income.

Table S7. Sensitivity analysis showing association between duration of residence, age at immigration and all-cause 1-year mortality.

	Unadjusted	Model 1	Model 2
	HR (95% CI)	HR (95% CI)	HR (95% CI)
Danish-born (ref)	1.00	1.00	1.00
Duration of residence			
Immigrants* (≤ 15 years of residence)	0.60 (0.28–1.30)	0.53 (0.24–1.19)	0.27 (0.09–0.79)
Immigrants* (> 15 years of residence)	0.82 (0.63–1.06)	0.84 (0.64–1.09)	0.90 (0.66–1.23)
Age at immigration			
18–24 years	0.50 (0.26–0.95)	0.42 (0.22–0.81)	0.35 (0.15–0.77)
25–34 years	0.84 (0.51–1.38)	0.92 (0.55–1.53)	0.98 (0.54–1.81)
35–50 years	0.74 (0.50–1.08)	0.72 (0.48–1.07)	0.83 (0.52–1.34)
> 50 years	1.16 (0.57–2.36)	1.07 (0.53–2.22)	1.05 (0.47–2.33)

HR indicates hazard ratios and CI confidence interval. *Immigrants include Norwegian, Swedish, Polish, German, Ex-Yugoslavian, Turkish, Iraqi, Iranian and Pakistani.

Model 1: Adjusted for age at stroke and sex.

Model 2: Model 1 adjusted for marital status, education, employment status and income.

Table S8. Impact of comorbidities on all-cause 1-year mortality by ethnic group.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Ischaemic stroke						
Men						
Danish-born (ref)	1.00	1.00	1.00	1.00	1.00	1.00
Western*	1.08 (0.89–1.29)	1.10 (0.92–1.33)	1.11 (0.92–1.33)	1.10 (0.92–1.32)	1.10 (0.91–1.32)	1.04 (0.84–1.30)
Non-Western†	1.26 (0.84–1.91)	1.35 (0.89–2.04)	1.29 (0.86–1.96)	1.27 (0.84–1.92)	1.39 (0.92–2.09)	0.90 (0.55–1.48)
Women						
Danish-born (ref)	1.00	1.00	1.00	1.00	1.00	1.00
Western*	0.91 (0.69–1.19)	0.92 (0.70–1.21)	0.91 (0.69–1.19)	0.92 (0.69–1.21)	0.93 (0.71–1.23)	0.85 (0.59–1.21)
Non-Western†	0.98 (0.69–1.38)	1.00 (0.71–1.42)	1.02 (0.72–1.45)	0.96 (0.68–1.36)	1.02 (0.72–1.44)	0.87 (0.55–1.38)
Intracerebral haemorrhage						
Men						
Danish-born (ref)	1.00	1.00	1.00	1.00	1.00	1.00
Western*	1.46 (1.02–2.09)	1.48 (1.03–2.12)	1.54 (1.08–2.22)	1.48 (1.03–2.12)	1.48 (1.03–2.13)	1.66 (1.03–2.68)
Non-Western†	1.03 (0.53–2.00)	1.06 (0.54–2.05)	1.01 (0.52–1.97)	1.10 (0.53–2.01)	1.12 (0.58–2.19)	0.99 (0.43–2.29)
Women						
Danish-born (ref)	1.00	1.00	1.00	1.00	1.00	1.00
Western*	0.70 (0.43–1.15)	0.74 (0.45–1.21)	0.78 (0.48–1.28)	0.73 (0.45–1.20)	0.74 (0.45–1.21)	0.84 (0.47–1.48)
Non-Western†	0.53 (0.29–0.99)	0.53 (0.28–0.99)	0.54 (0.29–1.00)	0.52 (0.28–0.97)	0.53 (0.28–0.99)	0.42 (0.18–0.94)

HR indicates hazard ratios and CI confidence interval. *Western includes Norwegian, Swedish, Polish and German. †Non-Western includes Ex-Yugoslavian, Turkish, Iraqi, Iranian and Pakistani.

Model 1: Adjusted for age at stroke and smoking.

Model 2: Adjusted for age at stroke and acute myocardial infarction.

Model 3: Adjusted for age at stroke and atrial fibrillation.

Model 4: Adjusted for age at stroke and diabetes.

Model 5: Adjusted for age at stroke and hypertension.

Model 6: Adjusted for age at stroke and peripheral artery disease.