

Appendix

Table S1. Cluster mortality characteristics of ischemic heart disease in the ≥60 years old population

CLUSTER	MUNICIPALITY	RADIUS	START_DATE	END_DATE	NUMBER_MUN	LLR	P-VALUE	OBSERVED	EXPECTED	RR	POPULATION
1	11009	88.0	01/01/2016	31/12/2020	43	2873.07	<0.0001	24,014	14,156.1258	1.710	208,476
2	30160	144.5	01/01/2016	31/12/2020	171	2703.87	<0.0001	26,466	16,300.7803	1.637	250,273
3	8015	507.1	01/01/2016	31/12/2020	149	2564.92	<0.0001	27,237	17,131.7445	1.603	257,986
4	30045	150.9	01/01/2019	31/12/2020	276	2017.01	<0.0001	13,204	7201.27682	1.843	261,632
5	21150	86.0	01/01/2020	31/12/2020	194	1628.03	<0.0001	7837	3813.59179	2.062	262,725
6	7082	216.3	01/01/2020	31/12/2020	138	1605.19	<0.0001	7866	3855.19149	2.047	254,662
7	9002	11.5	01/01/2016	31/12/2020	6	1526.17	<0.0001	23158	15,783.1168	1.476	245,447
8	31002	173.0	01/01/2016	31/12/2020	112	1410.20	<0.0001	13,220	8032.3702	1.653	120,458
9	19022	172.0	01/01/2016	31/12/2020	66	1248.22	<0.0001	24,687	17,696.2044	1.403	255,236
10	10005	158.9	01/01/2016	31/12/2020	29	1122.13	<0.0001	7189	3888.07275	1.854	60,116
11	15021	70.9	01/01/2016	31/12/2020	78	1116.40	<0.0001	24,571	17,937.5018	1.377	254,625
12	9011	16.4	01/01/2020	31/12/2020	11	963.37	<0.0001	6941	3900.83717	1.784	256,506
13	16091	110.7	01/01/2016	31/12/2020	97	835.28	<0.0001	15,469	10,946.5503	1.418	173,994
14	15096	40.0	01/01/2020	31/12/2020	42	820.82	<0.0001	7015	4149.97027	1.694	242,395
15	14020	188.0	01/01/2016	31/12/2020	66	419.57	<0.0001	10,050	7426.58136	1.356	113,996
16	32016	185.0	01/01/2020	31/12/2020	96	312.41	<0.0001	5470	3825.96998	1.432	261,889

MUNICIPALITY, Municipality ID; NUMBER_MUN, Number of municipalities; LLR, log likelihood ratio; RR, relative risk.

Table S2. Cluster mortality characteristics of ischemic heart disease in the 20-59 years old population

CLUSTER	MUNICIPALITY	RADIUS	START_DATE	END_DATE	NUMBER_MUN	LLR	P-VALUE	OBSERVED	EXPECTED	RR	POPULATION
1	28007	164.9	01/01/2016	31/12/2020	47	1178.22	<0.0001	6434	3303.34036	1.972	1,471,024
2	26035	464.1	01/01/2016	31/12/2020	100	1152.36	<0.0001	6332	3258.14747	1.967	1,472,858
3	30032	208.6	01/01/2016	31/12/2020	233	505.48	<0.0001	5158	3210.67415	1.619	1,474,971
4	9005	11.4	01/01/2016	31/12/2020	6	478.62	<0.0001	4585	2806.07577	1.646	1,412,819
5	10011	341.9	01/01/2016	31/12/2020	109	474.95	<0.0001	5015	3148.52176	1.605	1,434,838
6	29030	81.9	01/01/2020	31/12/2020	183	390.49	<0.0001	1548	693.052178	2.241	1,480,934
7	16056	135.7	01/01/2016	31/12/2020	123	383.35	<0.0001	4943	3253.88958	1.529	1,478,286
8	15067	34.2	01/01/2020	31/12/2020	30	381.93	<0.0001	1487	660.218078	2.260	1,475,333
9	7115	264.0	01/01/2020	31/12/2020	130	350.02	<0.0001	1514	704.514921	2.156	1,478,126
10	15070	15.3	01/01/2020	31/12/2020	8	318.46	<0.0001	1310	596.184109	2.203	1,434,213
11	24040	219.5	01/01/2016	31/12/2020	181	301.03	<0.0001	4576	3119.50784	1.475	1,460,220
12	14011	116.2	01/01/2016	31/12/2020	72	154.16	<0.0001	4135	3112.53875	1.334	1,400,221
13	12042	141.8	01/01/2018	31/12/2020	176	145.52	<0.0001	2594	1822.08326	1.428	1,352,886
14	1010	125.9	01/01/2020	31/12/2020	66	23.84	<0.0001	891	700.729992	1.272	1,458,402

MUNICIPALITY, Municipality ID; NUMBER_MUN, Number of municipalities; LLR, log likelihood ratio; RR, relative risk.

Table S4. Cluster mortality characteristics of type II diabetes mellitus in the ≥60 years old population

CLUSTER	MUNICIPALITY	RADIUS	START_DATE	END_DATE	NUMBER_MUN	LLR	P-VALUE	OBSERVED	EXPECTED	RR	POPULATION
1	29058	75.5	01/01/2016	31/12/2020	171	3900.98	<0.0001	23,427	12,460.967	1.907	257,112
2	15058	9.9	01/01/2016	31/12/2020	6	1903.29	<0.0001	17,934	10,937.7495	1.655	231,167
3	30204	183.0	01/01/2016	31/12/2020	106	1810.29	<0.0001	16,453	9933.02028	1.670	207,559
4	15033	16.4	01/01/2016	31/12/2020	12	1593.11	<0.0001	18,680	12,039.9494	1.565	242,641
5	15123	120.5	01/01/2016	31/12/2020	117	1557.42	<0.0001	18,372	11,857.4369	1.563	258,160
6	11012	95.0	01/01/2016	31/12/2020	63	1477.19	<0.0001	17,300	11,143.7815	1.565	245,425
7	8037	-	01/01/2016	31/12/2020	1	574.87	<0.0001	3925	2167.77668	1.815	44,662
8	30114	107.4	01/01/2016	31/12/2020	116	569.61	<0.0001	10,251	7216.35934	1.426	158,186
9	9016	11.3	01/01/2020	31/12/2020	6	316.81	<0.0001	3257	2025.00546	1.611	212,497
10	20447	197.8	01/01/2020	31/12/2020	557	229.78	<0.0001	3551	2423.65591	1.467	257,395
11	14107	59.8	01/01/2013	31/12/2017	39	196.25	<0.0001	9501	7707.30638	1.236	185,567
12	13071	128.9	01/01/2020	31/12/2020	165	167.06	<0.0001	3467	2500.61483	1.388	250,034
13	10036	114.3	01/01/2016	31/12/2020	9	110.59	<0.0001	2316	1672.724	1.386	36,653
14	6009	97.5	01/01/2016	31/12/2020	5	76.12	<0.0001	1063	709.943068	1.498	15,068
15	5002	-	01/01/2020	31/12/2020	1	69.53	<0.0001	140	42.447236	3.299	4,016
16	32042	75.6	01/01/2020	31/12/2020	11	65.92	<0.0001	394	207.770956	1.897	23,140
17	18016	43.5	01/01/2016	31/12/2020	4	61.55	<0.0001	625	387.11258	1.615	9,389
18	28033	74.6	01/01/2020	31/12/2020	6	48.35	<0.0001	734	498.87439	1.472	47,135
19	5010	43.0	01/01/2014	31/12/2015	6	23.80	<0.0001	370	252.671312	1.465	15,242
20	5022	67.9	01/01/2012	31/12/2016	7	22.77	<0.0001	500	363.91193	1.374	9,313
21	28021	52.6	01/01/2015	31/12/2018	6	21.20	<0.0001	640	489.139783	1.309	14,650

MUNICIPALITY, Municipality ID; NUMBER_MUN, Number of municipalities; LLR, log likelihood ratio; RR, relative risk.

Table S5. Cluster mortality characteristics of type II diabetes mellitus in the 20-59 years old population

CLUSTER	MUNICIPALITY	RADIUS	START_DATE	END_DATE	NUMBER_MUN	LLR	P-VALUE	OBSERVED	EXPECTED	RR	POPULATION
1	15089	32.4	01/01/2016	31/12/2020	29	1988.04	<0.0001	7723	3446.94862	2.276	1,463,711
2	30204	183.0	01/01/2016	31/12/2020	106	1941.10	<0.0001	6911	2957.5886	2.371	1,234,186
3	21082	100.7	01/01/2016	31/12/2020	260	1616.86	<0.0001	7476	3598.30437	2.108	1,467,335
4	9005	11.4	01/01/2016	31/12/2020	6	1239.88	<0.0001	6134	3030.11444	2.048	1,412,819
5	15123	119.8	01/01/2016	31/12/2020	116	968.05	<0.0001	6438	3539.98651	1.838	1,444,710
6	30027	142.7	01/01/2016	31/12/2020	215	642.80	<0.0001	5783	3481.67489	1.675	1,465,699
7	11024	83.3	01/01/2016	31/12/2020	46	387.31	<0.0001	4713	3060.57827	1.549	1,248,175
8	8037	86.4	01/01/2020	31/12/2020	3	226.81	<0.0001	543	185.050839	2.938	373,566
9	16012	105.0	01/01/2016	31/12/2020	54	136.61	<0.0001	1638	1057.93257	1.552	448,403
10	28022	53.1	01/01/2016	31/12/2020	3	94.37	<0.0001	736	423.601045	1.739	179,966
11	5023	275.8	01/01/2016	31/12/2020	50	83.45	<0.0001	1660	1188.7745	1.399	511,495
12	24051	167.2	01/01/2020	31/12/2020	72	43.78	<0.0001	553	361.239263	1.532	720,357
13	28025	97.9	01/01/2020	31/12/2020	21	20.46	<0.0001	171	100.412069	1.703	192,006

MUNICIPALITY, Municipality ID; NUMBER_MUN, Number of municipalities; LLR, log likelihood ratio; RR, relative risk.

Table S6. Cluster mortality characteristics of cerebrovascular diseases in the ≥60 years old population

CLUSTER	MUNICIPALITY	RADIUS	START_DATE	END_DATE	NUMBER_MUN	LLR	P-VALUE	OBSERVED	EXPECTED	RR	POPULATION
1	20240	189.0	01/01/2020	31/12/2020	622	717.33	<0.0001	1951	719.719402	2.724	262,525
2	21174	109.4	01/01/2020	31/12/2020	206	551.63	<0.0001	1803	735.357248	2.462	256,581
3	22013	134.9	01/01/2020	31/12/2020	114	451.12	<0.0001	1691	737.79952	2.301	252,095
4	30111	193.6	01/01/2020	31/12/2020	140	420.63	<0.0001	1723	783.024153	2.209	257,714
5	28025	166.0	01/01/2020	31/12/2020	54	388.05	<0.0001	1687	786.876118	2.152	252,933
6	16106	110.4	01/01/2020	31/12/2020	107	324.64	<0.0001	1483	706.22351	2.106	250,473
7	15039	32.3	01/01/2020	31/12/2020	29	296.30	<0.0001	1641	843.018329	1.953	262,346
8	8015	507.1	01/01/2020	31/12/2020	149	263.58	<0.0001	1472	758.411981	1.946	257,986
9	12027	138.3	01/01/2020	31/12/2020	115	224.85	<0.0001	1395	746.163909	1.874	256,929
10	18017	190.8	01/01/2020	31/12/2020	85	219.82	<0.0001	1387	746.194219	1.863	261,099
11	9015	7.4	01/01/2001	31/12/2005	6	179.21	<0.0001	2546	1709.10612	1.495	185,611
12	15091	25.7	01/01/2020	31/12/2020	24	42.30	<0.0001	1108	829.807039	1.337	240,840

MUNICIPALITY, Municipality ID; NUMBER_MUN, Number of municipalities; LLR, log likelihood ratio; RR, relative risk.

Table S7. Cluster mortality characteristics of cerebrovascular diseases in the 20-59 years old population

CLUSTER	MUNICIPALITY	RADIUS	START_DATE	END_DATE	NUMBER_MUN	LLR	P_VALUE	OBSERVED	EXPECTED	RR	POPULATION
1	5016	231.3	01/01/2020	31/12/2020	57	186.62	<0.0001	386	119.607148	3.246	1,413,443
2	26060	471.6	01/01/2020	31/12/2020	85	165.92	<0.0001	370	120.662861	3.083	1,440,237
3	30149	211.1	01/01/2020	31/12/2020	235	159.77	<0.0001	363	119.841418	3.045	1,474,669
4	15031	14.8	01/01/2020	31/12/2020	9	156.94	<0.0001	341	109.26514	3.136	1,439,898
5	29037	86.2	01/01/2020	31/12/2020	186	143.90	<0.0001	361	126.907063	2.859	1,476,125
6	11008	113.9	01/01/2020	31/12/2020	84	130.35	<0.0001	344	124.662598	2.773	1,480,525
7	15064	87.8	01/01/2020	31/12/2020	81	93.80	<0.0001	306	124.663144	2.464	1,424,141
8	23004	450.5	01/01/2020	31/12/2020	154	86.62	<0.0001	304	128.491901	2.375	1,434,256
9	12029	187.9	01/01/2020	31/12/2020	195	86.23	<0.0001	293	121.85451	2.413	1,473,059
10	30058	-	01/01/2001	31/12/2004	1	83.08	<0.0001	49	3.558725	13.782	12,869
11	14088	98.9	01/01/2020	31/12/2020	68	79.42	<0.0001	291	125.585599	2.325	1,476,760
12	15109	14.8	01/01/2020	31/12/2020	13	78.08	<0.0001	250	100.830043	2.487	1,309,046
13	28017	246.0	01/01/2020	31/12/2020	116	69.58	<0.0001	263	115.165568	2.291	1,417,341
14	9010	16.1	01/01/2020	31/12/2020	10	60.76	<0.0001	238	105.946774	2.253	1,397,163

MUNICIPALITY, Municipality ID; NUMBER_MUN, Number of municipalities; LLR, log likelihood ratio; RR, relative risk.

Table S8. Cluster mortality characteristics of hypertension in the ≥60 years old population

CLUSTER	MUNICIPALITY	RADIUS	START_DATE	END_DATE	NUMBER_MUN	LLR	P-VALUE	OBSERVED	EXPECTED	RR	POPULATION
1	20538	209.5	01/01/2016	31/12/2020	521	934.70	<0.0001	2638	999.718463	2.682	187,366
2	7084	192.1	01/01/2016	31/12/2020	128	388.80	<0.0001	2679	1491.14518	1.818	257,446
3	30114	130.7	01/01/2011	31/12/2015	156	335.36	<0.0001	2139	1159.17291	1.863	246,588
4	12048	222.2	01/01/2011	31/12/2015	101	229.36	<0.0001	1706	970.716334	1.770	206,214
5	24003	72.3	01/01/2016	31/12/2020	30	199.55	<0.0001	626	249.827371	2.515	47,535
6	5002	384.9	01/01/2020	31/12/2020	54	143.37	<0.0001	328	108.608414	3.027	92,955
7	11042	87.3	01/01/2009	31/12/2013	55	135.61	<0.0001	1601	1032.06393	1.560	232,377
8	21159	83.6	01/01/2010	31/12/2014	184	132.41	<0.0001	1701	1118.25979	1.530	247,761
9	28023	65.9	01/01/2011	31/12/2015	6	120.14	<0.0001	303	106.696118	2.845	23,507
10	32051	174.4	01/01/2017	31/12/2020	59	62.08	<0.0001	597	364.869926	1.640	85,126
11	14069	91.8	01/01/2012	31/12/2016	68	59.95	<0.0001	747	486.914599	1.538	103,208
12	26048	299.9	01/01/2020	31/12/2020	24	44.88	<0.0001	228	113.230385	2.016	88,848
13	19034	25.6	01/01/2019	31/12/2020	6	35.77	<0.0001	104	39.763205	2.617	13,014
14	25003	47.6	01/01/2013	31/12/2017	2	33.31	<0.0001	76	25.098547	3.030	5,253
15	14003	21.1	01/01/2017	31/12/2020	4	28.76	<0.0001	52	14.560516	3.573	3,631
16	17007	13.5	01/01/2009	31/12/2013	4	26.77	<0.0001	262	160.782382	1.631	37,003

MUNICIPALITY, Municipality ID; NUMBER_MUN, Number of municipalities; LLR, log likelihood ratio; RR, relative risk.

Table S9. Cluster mortality characteristics of hypertension in the 20-59 years old population

CLUSTER	MUNICIPALITY	RADIUS	START_DATE	END_DATE	NUMBER_MUN	LLR	P-VALUE	OBSERVED	EXPECTED	RR	POPULATION
1	27001	209.8	01/01/2017	31/12/2020	87	137.39	<0.0001	296	94.848237	3.173	1,035,676
2	19020	48.0	01/01/2011	31/12/2015	6	90.62	<0.0001	99	17.437949	5.715	173,463
3	5031	207.5	01/01/2020	31/12/2020	33	77.95	<0.0001	58	6.204501	9.388	293,461
4	30011	160.2	01/01/2011	31/12/2015	221	58.85	<0.0001	291	143.771597	2.049	1,448,672
5	12023	211.4	01/01/2016	31/12/2020	407	53.21	<0.0001	245	117.493509	2.107	1,090,639
6	9006	7.7	01/01/2020	31/12/2020	5	41.59	<0.0001	80	23.516878	3.418	1,234,506
7	19034	25.6	01/01/2020	31/12/2020	6	38.70	<0.0001	35	4.907521	7.149	172,407
8	16058	56.3	01/01/2011	31/12/2015	23	24.77	<0.0001	67	24.619637	2.731	245,503
9	26043	481.3	01/01/2020	31/12/2020	93	20.72	<0.0001	75	32.17858	2.339	1,458,118

MUNICIPALITY, Municipality ID; NUMBER_MUN, Number of municipalities; LLR, log likelihood ratio; RR, relative risk.

Table S10. Cluster mortality characteristics in undernourished children 0-4 years old

CLUSTER	LOC_ID	RADIUS	START_DATE	END_DATE	NUMBER_MUN	LLR	P-VALUE	OBSERVED	EXPECTED	RR	POPULATION
1	15007	75.1	01/01/2001	31/12/2005	78	544.73	<0.0001	677	139.052068	5.075	262,823
2	21117	78.7	01/01/2000	31/12/2004	166	413.71	<0.0001	625	153.77509	4.215	278,760
3	20382	188.2	01/01/2000	31/12/2004	602	305.64	<0.0001	529	145.247495	3.751	254,922
4	8027	110.0	01/01/2006	31/12/2010	13	140.57	<0.0001	80	5.449798	14.762	9,383
5	22013	130.5	01/01/2000	31/12/2004	102	138.88	<0.0001	390	147.540495	2.693	267,366
6	7107	180.1	01/01/2000	31/12/2003	129	86.45	<0.0001	278	112.895723	2.494	276,994
7	14042	96.2	01/01/2013	31/12/2017	17	49.19	<0.0001	53	9.175907	5.795	16,132
8	15120	19.9	01/01/2000	31/12/2004	14	26.83	<0.0001	72	26.332878	2.744	60,503
9	15022	24.5	01/01/2001	31/12/2005	18	24.28	<0.0001	158	86.020032	1.847	160,368
10	31085	62.8	01/01/2000	31/12/2004	18	23.53	<0.0001	35	8.350402	4.200	14,934

MUNICIPALITY, Municipality ID; NUMBER_MUN, Number of municipalities; LLR, log likelihood ratio; RR, relative risk.

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