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**Table S1: Second stage random effect meta-regression models**

Significance test for predictors (Wald test, p-value), multivariate Cochran Q-test for heterogeneity (p-value), and  $I^2$  statistic (%) in different multivariate random-effects meta-regression models.

We pooled the overall cumulative exposure-response associations derived by decade, age category and Canton in the previous step through a multivariate multilevel longitudinal meta-regression model (Sera et al., 2019). This model included as fixed effect predictors a factor variable of time (i.e. decade) and age category, and mean temperature (as numeric variable) in each Canton and period. We additionally included a random intercept by region, a higher administrative unit than the Canton, to allow for random spatial variation across different geographical clusters (Fig. S1-S2 and Table S3). These terms were selected among a set of time-variant and invariant contextual factors defined at Cantonal level based on Wald test and the assessment of the heterogeneity (Cochran Q-test and the  $I^2$  statistic).

	Model	AIC	$I^2$	Coch-Q	Temp	Time	Age	Region	Density	%>80	Spatial terms	Time*age
<b>Crude model (no variables)</b>		5322	10.2%	<0.001								
<b>+ Region as Fixed effect</b>		5339	9.4%	<0.001								
<b>+ Region as random intercept (  region (r))</b>		5356	10.2%	<0.001								
<b>+ aver Temp   region (r)</b>		5360	10.1%	<0.001	0.15							
<b>+ aver Temp + age   region (r)</b>		5286	6.4%	0.02	0.21	<0.001						
<b>+ aver Temp + age + time   region (r)</b>		5280	6.0%	0.03	0.05	<0.001	<0.001					
<b>+ aver Temp + age + factor(time)   region (r)</b>		<b>5266</b>	<b>4.6%</b>	<b>0.07</b>	<b>0.04</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>					
<b>+ aver Temp + age + factor(time)   region (r)</b>		5283	3.9%	0.11	0.30	<0.001	<0.001	0.06				
<b>+ aver Temp + age + factor(time) + popdens   region (r)</b>		5274	4.8%	0.06	0.08	<0.001	<0.001	X	0.92			
<b>+ aver Temp + age + factor(time) + %pop80   region (r)</b>		5273	4.7%	0.07	0.07	<0.001	<0.001	X	X	0.71		
<b>+ aver Temp+ age+ factor(time) + spatial terms   region(r)</b>		5271	3.9%	0.11	0.06	<0.001	<0.001	X	X	X	0.07	
<b>+ aver Temp + age + factor(time) + interaction(time*age)   region (r)</b>		5293	4.1%	0.11	0.04	<0.001	<0.001	X	X	X	X	0.08

(r) = random effects for region, *Aver Temp*= average temperature from 1969-2017, *time* = decade as a linear trend, *Factor(time)* = time as a factor variable, *pop dens* = population density by canton, *region* = Indicator for one of the 7 regions as mentioned in Table S3, *%pop80* = % of people per canton ≥80 years of age, *spatial terms* = coordinates of center of the regional polygons

**Table S2: Summary statistics of the temperature and mortality series by canton.** Total number of all-cause deaths and number of municipalities, and average and interquartile range (IQR) of temperature by decade.

Region	Deaths	Municipalities (N)	1969/78 (°C) [IQR]	1979/88 (°C) [IQR]	1989/98 (°C) [IQR]	1999/08 (°C) [IQR]	2009/17 (°C) [IQR]
Zürich	506,999	162	7.3 [-3.9 ;18.5]	7.6 [-3.9 ;19.1]	8.5 [-2.5 ;19.3]	8.8 [-2.5 ;20.1]	9.0 [-2.2 ;20.2]
Bern	442,269	317	6.9 [-4.6 ;18.4]	7.2 [-4.7 ;19.1]	8.0 [-3.4 ;19.4]	8.3 [-3.7 ;20.3]	8.5 [-3.4 ;20.4]
Luzern	132,085	82	7.5 [-4.1 ;19.1]	7.8 [-4.0 ;19.6]	8.6 [-2.8 ;20.0]	9.0 [-3.0 ;21.0]	9.2 [-2.7 ;21.1]
Uri	14,362	19	2.4 [-8.0 ;12.8]	2.7 [-8.4 ;13.8]	3.6 [-6.6 ;13.8]	3.7 [-7.3 ;14.7]	3.9 [-6.7 ;14.8]
Schwyz	45,583	28	6.2 [-5.0 ;17.4]	6.6 [-5.1 ;18.2]	7.4 [-3.7 ;18.3]	7.6 [-4.1 ;19.3]	7.9 [-3.6 ;19.4]
Obwalden	12,102	7	4.2 [-6.6 ;15.0]	4.6 [-6.6 ;15.8]	5.4 [-5.0 ;15.8]	5.6 [-5.5 ;16.7]	5.9 [-5.1 ;16.9]
Nidwalden	12,027	11	6.0 [-5.1 ;17.1]	6.4 [-5.0 ;17.8]	7.3 [-3.6 ;18.2]	7.5 [-4.1 ;19.1]	7.7 [-3.8 ;19.2]
Glarus	19,473	3	3.5 [-7.0 ;14.0]	3.8 [-7.6 ;15.1]	4.6 [-5.8 ;14.9]	4.8 [-6.2 ;15.8]	5.1 [-6.0 ;16.1]
Zug	29,713	11	7.3 [-4.2 ;18.8]	7.7 [-4.1 ;19.5]	8.5 [-2.9 ;19.9]	8.8 [-3.1 ;20.7]	9.1 [-2.8 ;21.0]
Fribourg	88,677	121	7.4 [-4.1 ;18.9]	7.7 [-4.0 ;19.4]	8.5 [-2.7 ;19.7]	8.7 [-3.0 ;20.4]	9.0 [-2.7 ;20.7]
Solothurn	104,534	104	7.9 [-3.8 ;19.6]	8.1 [-3.8 ;20.0]	8.9 [-2.5 ;20.3]	9.3 [-2.7 ;21.3]	9.5 [-2.4 ;21.4]
Basel-Stadt	117,842	3	9.1 [-2.1 ;20.3]	9.4 [-2.1 ;20.9]	10.2 [-0.9 ;21.5]	10.8 [-0.8 ;22.4]	11.0 [0.6 ;22.6]
Basel-Landschaft	92,657	81	8.1 [-3.3 ;19.5]	8.5 [-3.1 ;20.1]	9.4 [-1.7 ;20.5]	9.9 [-1.7 ;21.4]	10.0 [-1.4 ;21.6]
Schaffhausen	35,502	25	7.9 [-4.0 ;19.8]	8.1 [-4.1 ;20.3]	8.9 [-2.9 ;20.7]	9.3 [-2.8 ;21.6]	9.5 [-2.6 ;21.6]
Appenzell Ausserrhoden	26,935	20	6.7 [-4.4 ;17.9]	6.9 [-4.7 ;18.5]	7.8 [-3.4 ;18.9]	8.09 [-3.5 ;19.7]	8.3 [-3.2 ;19.8]
Appenzell Innerrhoden	6,973	6	6.1 [-4.9 ;17.1]	6.3 [-5.2 ;17.8]	7.2 [-3.8 ;18.1]	7.4 [-4.0 ;18.8]	7.6 [-3.7 ;18.9]
St. Gallen	182,355	77	7.3 [-4.2 ;18.8]	7.6 [-4.2 ;19.4]	8.3 [-3.1 ;19.7]	8.7 [-3.3 ;20.7]	8.9 [-2.9 ;20.7]
Graubünden	77,913	95	3.0 [-8.0 ;14.0]	3.2 [-8.4 ;14.8]	4.1 [-7.0 ;15.1]	4.2 [-7.5 ;15.9]	4.5 [-7.0 ;16.0]
Aargau	192,591	204	8.2 [-3.6 ;20.0]	8.5 [-3.4 ;20.4]	9.3 [-2.2 ;20.8]	9.8 [-2.3 ;21.8]	9.9 [-2.1 ;21.9]
Thurgau	90,017	78	8.1 [-3.6 ;19.8]	8.3 [-3.6 ;20.2]	9.1 [-2.5 ;20.7]	9.5 [-2.6 ;21.6]	9.7 [-2.3 ;21.7]
Ticino	131,763	107	8.4 [-3.3 ;20.1]	8.7 [-3.6 ;21.0]	9.5 [-2.4 ;21.4]	9.9 [-2.5 ;22.3]	10.1 [-2.2 ;22.4]
Vaud	257,948	255	8.3 [-3.2 ;19.8]	8.6 [-3.2 ;20.3]	9.3 [-1.9 ;20.5]	9.6 [-2.1 ;21.3]	9.8 [-1.8 ;21.4]
Valais	101,760	119	3.4 [-7.6 ;14.4]	3.5 [-8.1 ;15.1]	4.5 [-6.5 ;15.5]	4.7 [-7.1 ;16.4]	4.9 [-6.8 ;16.6]
Neuchâtel	80,461	28	6.9 [-4.2 ;18.0]	7.2 [-4.3 ;18.7]	8.1 [-3.1 ;19.2]	8.3 [-3.2 ;19.8]	8.5 [-3.0 ;20.0]
Genève	152,046	44	9.4 [-2.1 ;20.9]	9.7 [-2.2 ;21.6]	10.5 [-1.0 ;22.0]	10.9 [-1.2 ;23.0]	11.0 [-0.9 ;22.9]
Jura	31,994	47	7.3 [-3.9 ;18.5]	7.6 [-3.9 ;19.1]	8.5 [-2.5 ;19.4]	8.8 [-2.5 ;20.1]	9.0 [-2.2 ;20.2]

**Table S3: Cantons and corresponding regions**

Region	Canton
1.Lake Geneva	Geneva, Valais, Vaud
2.Espace Mittelland	Bern, Fribourg, Solothurn, Neuchatel, Jura
3. North Western Switzerland	Basel-Stadt, Basel-land, Aargau
4. Zürich	Zürich
5. Eastern Switzerland	Thurgau, Graubünden, St.Gallen, Appenzell Innerhoden, Appenzell Aussehroden, Schaffhausen, Glarus
6. Central Switzerland	Zug, Nidwalden, Obwalden, Uri, Luzern, Schwyz
7. Ticino	Ticino

**Table S4: Heat- and cold-related excess deaths and mortality fraction (%) by location computed as separated components for age category and decade.**

Decade specific excess mortality with the associated 95% empirical Confidence Interval (eCI) and the corresponding mortality fractions (%) and rate per 100.000 people related to non-optimal temperature.

	Decade	Excess deaths	Excess mortality fractions (%)	Rate (per 100.000)
<b>Heat</b> Total	1969/78	74 (12 ; 125)	0.13 (0.02 , 0.21)	1.2 (0.2 ; 2.0)
	1979/88	158 (76 ; 236)	0.27 (0.13 , 0.40)	2.5 (1.2 ; 3.7)
	1989/98	105 (10 ; 193)	0.17 (0.02 , 0.31)	1.5 (0.1 ; 2.8)
	1999/08	338 (239 ; 432)	0.55 (0.39 , 0.70)	4.7 (3.3 ; 6.0)
	2009/17	181 (39 ; 307)	0.31 (0.07 , 0.53)	2.1 (0.4 ; 3.5)
<65 years	1969/78	17 (-12 ; 43)	0.11 (-0.07 ; 0.28 )	0.3 (-0.2 ; 0.8)
	1979/88	28 (-21 ; 73)	0.21 (-0.15 ; 0.55)	0.5 (-0.4 ; 1.3)
	1989/98	7 (-26 ; 32)	0.05 (-0.20 ; 0.26 )	0.1 (-0.4 ; 0.5)
	1999/08	40 (8 ; 68)	0.37 ( 0.07 ; 0.63 )	0.7 (0.1 ; 1.1)
	2009/17	5 (-23 ; 29)	0.06 (-0.26 ; 0.34 )	0.1 (-0.3 ; 0.4)
65 - 79 years	1969/78	25 (-17 ; 62)	0.10 ( -0.07 ; 0.26)	4.2 (-2.8 ; 10.2)
	1979/88	44 (-2 ; 86)	0.19 (0.00 ; 0.38 )	6.3 (-0.3 ; 12.0)
	1989/98	12 (-27 ; 50)	0.06 (-0.14 ; 0.25)	1.6 (-3.6 ; 6.8)
	1999/08	69 (28 ; 106)	0.34 (0.16 ; 0.61)	8.4 (3.4 ; 12.9)
	2009/17	14 (-40 ; 58)	0.09 (-0.27 , 0.39)	1.4 (-3.8 ; 5.4)
80 years & above	1969/78	33 (-2 ; 59)	0.19 (-0.02 ; 0.34)	29.4 (-1.9 ; 52.9)
	1979/88	86 (39 ; 136)	0.37 (0.17 ; 0.58 )	50.7 (22.6 ; 80.1)
	1989/98	85 (5 ; 161)	0.28 (0.02 ; 0.53)	33.6 (1.9 ; 63.0)
	1999/08	229 (144 ; 305)	0.68 (0.43 ; 0.91 )	78.5 (49.5 ; 104.7)
	2009/17	162 (36 ; 278)	0.47 (0.11 ; 0.81 )	39.1 (8.7 ; 67.1)
<b>Cold</b> Total	1969/78	6,559 (5,009 ; 7,985)	11.52 (8.80 ; 14.03)	104 (80 ; 127)
	1979/88	4,780 (3,780 ; 5,790)	8.04 (6.36 ; 9.74)	75 (59 ; 91)
	1989/98	5,145(3,839 ; 6,325)	8.22 (6.14 ; 10.11)	75 (56 ; 92)

<65	1999/08	6,306 (5,052 ; 7,533)	10.23 (8.20 ; 12.22)	88 (71 ; 105)
	2009/17	3,829 (2,642 ; 5,757)	6.59 (4.55 ; 9.91)	49 (30 ; 66)
	1969/78	957 (99 ; 1707)	6.25 (0.65 ; 11.14)	17 (2 ; 31)
	1979/88	271 (-155 ; 685)	2.04 (-1.17 , 5.15 )	5 (-3 ; 12)
	1989/98	320 (-179 ; 786)	2.57 (-1.44 , 6.32 )	5 (-3 ; 13)
	1999/08	487 (38 ; 886)	4.54 (0.35 ; 8.27 )	8 (1 ; 15)
65 - 79	2009/17	119 (-385 ; 542)	1.38 (-4.5 , 6.30)	2 (-5 ; 11)
	1969/78	2,999(1955 ; 4020)	12.42 (8.09 ; 16.65)	497 (324 ; 666)
	1979/88	1,873 (1173 ; 2510)	8.23 (5.15 ; 11.02 )	263 (165 ; 353)
	1989/98	1,602 (917 ; 2192)	8.16 (4.67 ; 11.16)	218 (125 ; 298)
	1999/08	1717 (1074 ; 2280)	9.90 (6.19 ; 13.14 )	209 (131 ; 277)
	2009/17	1,076 (370 ; 1722)	7.15 (2.46 ; 11.44)	101 (35 ; 161)
80 & above	1969/78	2,603 (1850 ; 3333)	14.90 (10.60 ; 19.10)	2339 (1663 ; 2995)
	1979/88	2,636 (1989 ; 3250)	11.26 (8.49 ; 13.88)	1547 (1168 ; 1908)
	1989/98	3,223 (2274 ; 4076)	10.57 (7.45 ; 13.36)	1262 (891 ; 1596)
	1999/08	4,102 (3119 ; 5026)	12.22 (9.30 ; 14.98)	1408 (1070 ; 1725)
	2009/17	3,059 (1787 ; 4283)	8.89 (5.20 ; 12.44)	738 (431 ; 1034)

**Table S5: Annual heat-related excess deaths and mortality fraction for the 1999-2008 decade (including and excluding the year 2003) computed as separated components for age category.**

Annual specific excess mortality with the associated 95% empirical Confidence Interval (eCI) and the corresponding mortality fractions (%) related to non-optimal temperature for the decade 1999-2008, including and excluding the year 2003.

Decade 1999-2008	Age	Excess deaths	Excess mortality fractions (%)
Including 2003	< 65	40 (9 ; 68)	0.37 ( 0.07 ; 0.63 )
	65-79	69 (28 ; 106)	0.34 (0.16 ; 0.61)
	≥ 80	229 (144 ; 305)	0.68 (0.43 ; 0.91 )
	Total	338 (239 ; 432)	0.55 (0.39 , 0.70)
Excluding 2003	< 65	27 (5 ; 49)	0.28 (0.05 ; 0.51)
	65-79	46 (14 ; 74)	0.30 (0.09 ; 0.48)
	≥ 80	161 (93 ; 217)	0.53 (0.31 ; 0.72)
	Total	234 (153 ; 298)	0.44 (0.29 ; 0.56)



**Table S6: Estimation of non-optimal temperature related mortality risk, MMT and MMP by canton and decade for cold and heat for the < 65 age category**

Temperature of minimum mortality (MMT) and percentile (MMP) and the Relative Risk (RR) for heat and cold by canton and decade

Canton	Decade	MMP	MMT	RR heat	RR cold
Zurich	1969/78	96	20.0	1.05 (0.98 , 1.12)	1.16 (1.06 , 1.28)
Zurich	1979/88	83	16.5	1.09 (1.02 , 1.17)	1.03 (0.94 , 1.14)
Zurich	1989/98	85	17.5	1.04 (0.95 , 1.14)	1.04 (0.95 , 1.12)
Zurich	1999/08	91	19.8	1.19 (1.07 , 1.32)	1.16 (1.06 , 1.26)
Zurich	2008/17	90	19.7	1.05 (0.92 , 1.20)	1.00 (0.91 , 1.10)
Bern	1969/78	97	19.7	1.02 (0.96 , 1.08)	1.16 (1.06 , 1.28)
Bern	1979/88	93	18.2	1.02 (0.97 , 1.08)	1.02 (0.93 , 1.11)
Bern	1989/98	98	21.4	0.99 (0.96 , 1.03)	1.04 (0.95 , 1.14)
Bern	1999/08	94	19.7	1.06 (0.99 , 1.15)	1.15 (1.05 , 1.26)
Bern	2008/17	98	22.4	0.99 (0.95 , 1.04)	1.02 (0.91 , 1.13)
Luzern	1969/78	97	19.9	1.02 (0.97 , 1.08)	1.21 (1.09 , 1.34)
Luzern	1979/88	86	16.6	1.04 (0.97 , 1.11)	1.06 (0.95 , 1.17)
Luzern	1989/98	98	21.7	1.00 (0.96 , 1.04)	1.06 (0.96 , 1.18)
Luzern	1999/08	93	19.9	1.10 (1.00 , 1.21)	1.19 (1.08 , 1.31)
Luzern	2008/17	98	22.9	0.99 (0.94 , 1.05)	1.04 (0.92 , 1.18)
Uri	1969/78	98	16.0	1.00 (0.96 , 1.03)	1.15 (0.96 , 1.37)
Uri	1979/88	98	16.7	1.00 (0.97 , 1.02)	0.96 (0.80 , 1.14)
Uri	1989/98	98	17.3	0.98 (0.95 , 1.01)	1.06 (0.91 , 1.22)
Uri	1999/08	98	17.9	1.00 (0.97 , 1.04)	1.12 (0.95 , 1.33)
Uri	2008/17	98	18.2	0.98 (0.94 , 1.01)	0.97 (0.81 , 1.15)
Schwyz	1969/78	97	18.5	1.01 (0.96 , 1.07)	1.22 (1.08 , 1.37)
Schwyz	1979/88	91	16.7	1.02 (0.96 , 1.08)	1.03 (0.92 , 1.15)
Schwyz	1989/98	98	20.5	0.99 (0.96 , 1.03)	1.07 (0.96 , 1.19)
Schwyz	1999/08	94	18.9	1.07 (0.98 , 1.16)	1.18 (1.06 , 1.32)
Schwyz	2008/17	98	21.6	0.99 (0.94 , 1.04)	1.03 (0.91 , 1.17)
Obwalden	1969/78	98	17.0	1.00 (0.97 , 1.04)	1.19 (1.03 , 1.37)
Obwalden	1979/88	97	17.2	1.00 (0.96 , 1.05)	1.00 (0.87 , 1.14)
Obwalden	1989/98	98	18.6	0.98 (0.94 , 1.03)	1.07 (0.95 , 1.22)
Obwalden	1999/08	96	17.7	1.04 (0.95 , 1.13)	1.15 (1.01 , 1.33)
Obwalden	2008/17	98	19.7	0.98 (0.92 , 1.04)	1.02 (0.87 , 1.19)

Nidwalden	1969/78	97	18.4	1.02 (0.96 , 1.08)	1.22 (1.08 , 1.37)
Nidwalden	1979/88	91	16.4	1.02 (0.96 , 1.09)	1.03 (0.92 , 1.14)
Nidwalden	1989/98	98	20.4	0.99 (0.95 , 1.03)	1.07 (0.96 , 1.20)
Nidwalden	1999/08	94	18.8	1.07 (0.97 , 1.18)	1.18 (1.05 , 1.32)
Nidwalden	2008/17	98	21.7	0.99 (0.94 , 1.04)	1.03 (0.90 , 1.18)
Glarus	1969/78	98	16.0	1.01 (0.97 , 1.06)	1.15 (0.98 , 1.34)
Glarus	1979/88	96	15.5	1.01 (0.94 , 1.08)	0.95 (0.82 , 1.11)
Glarus	1989/98	98	17.2	0.98 (0.94 , 1.04)	1.04 (0.90 , 1.20)
Glarus	1999/08	95	16.1	1.06 (0.94 , 1.19)	1.11 (0.95 , 1.29)
Glarus	2008/17	98	18.4	0.98 (0.90 , 1.06)	0.98 (0.83 , 1.16)
Zug	1969/78	97	19.8	1.03 (0.96 , 1.10)	1.23 (1.10 , 1.38)
Zug	1979/88	86	16.5	1.04 (0.97 , 1.11)	1.05 (0.94 , 1.18)
Zug	1989/98	98	21.7	1.00 (0.95 , 1.04)	1.07 (0.96 , 1.19)
Zug	1999/08	93	19.8	1.10 (0.99 , 1.21)	1.19 (1.08 , 1.32)
Zug	2008/17	98	22.9	0.99 (0.94 , 1.05)	1.04 (0.91 , 1.18)
Fribourg	1969/78	97	19.9	1.02 (0.97 , 1.07)	1.19 (1.07 , 1.32)
Fribourg	1979/88	92	18.1	1.03 (0.97 , 1.08)	1.02 (0.92 , 1.13)
Fribourg	1989/98	98	21.5	1.00 (0.96 , 1.03)	1.03 (0.94 , 1.14)
Fribourg	1999/08	94	19.9	1.07 (0.99 , 1.16)	1.16 (1.05 , 1.27)
Fribourg	2008/17	98	22.8	0.99 (0.95 , 1.04)	1.01 (0.89 , 1.14)
Solothurn	1969/78	97	20.1	1.01 (0.97 , 1.05)	1.17 (1.07 , 1.29)
Solothurn	1979/88	91	18.1	1.03 (0.98 , 1.08)	1.03 (0.93 , 1.14)
Solothurn	1989/98	98	21.8	1.00 (0.97 , 1.03)	1.03 (0.94 , 1.14)
Solothurn	1999/08	93	20.1	1.07 (0.99 , 1.15)	1.16 (1.06 , 1.26)
Solothurn	2008/17	98	23.1	1.00 (0.96 , 1.04)	1.01 (0.90 , 1.13)
Basel-Stadt	1969/78	96	20.7	1.04 (0.97 , 1.11)	1.16 (1.04 , 1.30)
Basel-Stadt	1979/88	85	17.7	1.06 (0.99 , 1.13)	1.02 (0.90 , 1.16)
Basel-Stadt	1989/98	91	20.2	1.02 (0.93 , 1.11)	1.01 (0.91 , 1.11)
Basel-Stadt	1999/08	92	21.1	1.16 (1.04 , 1.29)	1.13 (1.02 , 1.26)
Basel-Stadt	2008/17	93	21.7	1.04 (0.88 , 1.22)	0.97 (0.87 , 1.08)
Basel-Landschaft	1969/78	97	20.3	1.02 (0.98 , 1.06)	1.14 (1.03 , 1.27)
Basel-Landschaft	1979/88	89	17.8	1.04 (0.98 , 1.10)	1.00 (0.89 , 1.12)
Basel-Landschaft	1989/98	95	20.8	1.01 (0.93 , 1.08)	1.00 (0.91 , 1.10)
Basel-Landschaft	1999/08	92	20.2	1.12 (1.02 , 1.23)	1.12 (1.02 , 1.24)
Basel-Landschaft	2008/17	95	21.8	1.02 (0.90 , 1.15)	0.96 (0.86 , 1.07)
Schaffhausen	1969/78	96	19.9	1.04 (0.97 , 1.13)	1.19 (1.08 , 1.33)

Schaffhausen	1979/88	85	16.7	1.06 (0.99 , 1.14)	1.03 (0.91 , 1.16)
Schaffhausen	1989/98	92	19.5	1.01 (0.90 , 1.12)	1.04 (0.93 , 1.17)
Schaffhausen	1999/08	92	20.0	1.14 (1.03 , 1.27)	1.17 (1.06 , 1.30)
Schaffhausen	2008/17	96	21.8	1.01 (0.90 , 1.12)	0.99 (0.88 , 1.11)
Appenzell Ausserrhoden	1969/78	97	18.9	1.02 (0.97 , 1.07)	1.18 (1.06 , 1.31)
Appenzell Ausserrhoden	1979/88	88	16.1	1.04 (0.97 , 1.10)	1.00 (0.89 , 1.12)
Appenzell Ausserrhoden	1989/98	98	20.8	1.00 (0.95 , 1.05)	1.04 (0.93 , 1.16)
Appenzell Ausserrhoden	1999/08	93	19.1	1.10 (1.00 , 1.20)	1.16 (1.04 , 1.28)
Appenzell Ausserrhoden	2008/17	98	22.3	1.00 (0.95 , 1.05)	0.99 (0.87 , 1.13)
Appenzell Innerrhoden	1969/78	97	18.2	1.02 (0.97 , 1.07)	1.18 (1.05 , 1.32)
Appenzell Innerrhoden	1979/88	91	16.4	1.03 (0.97 , 1.09)	0.98 (0.87 , 1.11)
Appenzell Innerrhoden	1989/98	98	20.3	1.00 (0.95 , 1.04)	1.04 (0.93 , 1.16)
Appenzell Innerrhoden	1999/08	93	18.4	1.09 (0.99 , 1.19)	1.14 (1.02 , 1.29)
Appenzell Innerrhoden	2008/17	98	21.7	0.99 (0.94 , 1.05)	0.98 (0.85 , 1.13)
St. Gallen	1969/78	97	19.8	1.03 (0.97 , 1.09)	1.18 (1.07 , 1.31)
St. Gallen	1979/88	86	16.4	1.05 (0.98 , 1.11)	1.02 (0.93 , 1.13)
St. Gallen	1989/98	98	21.6	1.00 (0.96 , 1.04)	1.04 (0.94 , 1.14)
St. Gallen	1999/08	93	19.8	1.10 (1.01 , 1.21)	1.16 (1.05 , 1.28)
St. Gallen	2008/17	98	22.8	1.00 (0.96 , 1.05)	1.00 (0.89 , 1.12)
Graubunden	1969/78	98	17.4	1.01 (0.96 , 1.06)	1.13 (0.96 , 1.34)
Graubunden	1979/88	97	17.1	1.00 (0.95 , 1.06)	0.92 (0.78 , 1.1)
Graubunden	1989/98	98	18.5	0.98 (0.94 , 1.03)	1.03 (0.89 , 1.2)
Graubunden	1999/08	96	17.5	1.03 (0.94 , 1.13)	1.09 (0.92 , 1.29)
Graubunden	2008/17	98	19.4	0.98 (0.92 , 1.04)	0.94 (0.78 , 1.12)
Aargau	1969/78	97	20.6	1.02 (0.98 , 1.07)	1.14 (1.03 , 1.26)
Aargau	1979/88	88	17.8	1.04 (0.98 , 1.11)	1.00 (0.89 , 1.12)
Aargau	1989/98	95	20.7	1.01 (0.93 , 1.08)	1.00 (0.91 , 1.1)
Aargau	1999/08	92	20.2	1.12 (1.02 , 1.23)	1.13 (1.02 , 1.24)
Aargau	2008/17	96	22.1	1.01 (0.92 , 1.11)	0.97 (0.87 , 1.08)
Thurgau	1969/78	96	19.9	1.03 (0.97 , 1.10)	1.17 (1.06 , 1.28)
Thurgau	1979/88	85	16.8	1.05 (0.99 , 1.12)	1.04 (0.95 , 1.15)
Thurgau	1989/98	91	19.2	1.01 (0.92 , 1.10)	1.04 (0.95 , 1.13)
Thurgau	1999/08	92	20.0	1.12 (1.02 , 1.24)	1.17 (1.06 , 1.28)
Thurgau	2008/17	95	21.4	1.01 (0.91 , 1.12)	1.01 (0.91 , 1.11)
Ticino	1969/78	96	20.8	1.04 (0.98 , 1.11)	1.20 (1.08 , 1.34)
Ticino	1979/88	83	17.1	1.07 (1.00 , 1.15)	1.07 (0.97 , 1.18)

Ticino	1989/98	85	18.1	1.03 (0.95 , 1.12)	1.06 (0.97 , 1.16)
Ticino	1999/08	92	20.8	1.12 (1.03 , 1.21)	1.18 (1.07 , 1.3)
Ticino	2008/17	90	20.6	1.03 (0.93 , 1.14)	1.02 (0.92 , 1.13)
Vaud	1969/78	96	20.3	1.05 (0.97 , 1.13)	1.12 (1.02 , 1.23)
Vaud	1979/88	86	17.2	1.07 (1.00 , 1.15)	0.99 (0.90 , 1.08)
Vaud	1989/98	92	19.8	1.02 (0.94 , 1.11)	0.98 (0.90 , 1.07)
Vaud	1999/08	92	20.0	1.13 (1.04 , 1.24)	1.10 (1.01 , 1.21)
Vaud	2008/17	94	21.1	1.03 (0.92 , 1.14)	0.95 (0.86 , 1.05)
Valais	1969/78	97	17.3	1.02 (0.95 , 1.11)	1.08 (0.93 , 1.25)
Valais	1979/88	96	16.8	1.01 (0.96 , 1.07)	0.90 (0.78 , 1.04)
Valais	1989/98	98	19.3	0.99 (0.95 , 1.04)	0.99 (0.87 , 1.13)
Valais	1999/08	96	18.0	1.04 (0.96 , 1.13)	1.05 (0.92 , 1.22)
Valais	2008/17	98	20.1	0.99 (0.94 , 1.04)	0.92 (0.79 , 1.07)
Neuchatel	1969/78	97	19.9	1.03 (0.96 , 1.10)	1.16 (1.06 , 1.27)
Neuchatel	1979/88	93	18.2	1.03 (0.96 , 1.10)	1.02 (0.94 , 1.11)
Neuchatel	1989/98	98	21.7	0.99 (0.96 , 1.03)	1.04 (0.95 , 1.14)
Neuchatel	1999/08	94	19.7	1.07 (0.99 , 1.16)	1.14 (1.05 , 1.25)
Neuchatel	2008/17	98	22.5	0.99 (0.94 , 1.04)	1.02 (0.92 , 1.13)
Geneva	1969/78	96	21.2	1.03 (0.98 , 1.08)	1.17 (1.04 , 1.33)
Geneva	1979/88	83	17.6	1.09 (1.01 , 1.18)	1.01 (0.89 , 1.14)
Geneva	1989/98	89	20.2	1.03 (0.95 , 1.13)	0.99 (0.89 , 1.09)
Geneva	1999/08	92	21.3	1.18 (1.06 , 1.32)	1.13 (1.01 , 1.27)
Geneva	2008/17	92	21.5	1.04 (0.93 , 1.17)	0.95 (0.84 , 1.07)
Jura	1969/78	98	20.0	1.01 (0.98 , 1.03)	1.18 (1.07 , 1.31)
Jura	1979/88	92	17.8	1.02 (0.98 , 1.07)	1.01 (0.91 , 1.13)
Jura	1989/98	98	21.5	0.99 (0.96 , 1.03)	1.04 (0.94 , 1.14)
Jura	1999/08	94	19.8	1.06 (0.99 , 1.13)	1.15 (1.05 , 1.26)
Jura	2008/17	98	22.7	0.99 (0.95 , 1.04)	1.00 (0.89 , 1.13)

**Table S7: Estimation of non-optimal temperature related mortality risk, MMT and MMP by canton and decade for cold and heat for the 65-79 age category**

Temperature of minimum mortality (MMT) and percentile (MMP) and the Relative Risk (RR) for heat and cold by canton and decade

Canton	Decade	MMP	MMT	RR heat	RR cold
Zurich	1969/78	96	20.0	1.01 (0.99 , 1.03)	1.41 (1.29 , 1.54)
Zurich	1979/88	87	17.5	1.05 (1.00 , 1.10)	1.28 (1.18 , 1.39)
Zurich	1989/98	88	18.4	1.03 (0.98 , 1.07)	1.24 (1.15 , 1.34)
Zurich	1999/08	91	19.8	1.08 (1.03 , 1.12)	1.39 (1.28 , 1.51)
Zurich	2008/17	90	19.7	1.03 (0.97 , 1.09)	1.20 (1.11 , 1.31)
Bern	1969/78	97	19.7	1.00 (0.99 , 1.01)	1.41 (1.29 , 1.54)
Bern	1979/88	93	18.2	1.01 (0.99 , 1.04)	1.25 (1.16 , 1.36)
Bern	1989/98	98	21.4	1.00 (0.99 , 1.01)	1.24 (1.12 , 1.37)
Bern	1999/08	94	19.7	1.02 (1.00 , 1.05)	1.38 (1.27 , 1.50)
Bern	2008/17	98	22.4	1.00 (0.99 , 1.01)	1.23 (1.09 , 1.38)
Luzern	1969/78	97	19.9	1.00 (0.99 , 1.01)	1.47 (1.34 , 1.62)
Luzern	1979/88	90	17.6	1.02 (0.98 , 1.06)	1.32 (1.20 , 1.44)
Luzern	1989/98	98	21.7	1.00 (0.99 , 1.01)	1.27 (1.14 , 1.42)
Luzern	1999/08	93	19.9	1.04 (1.00 , 1.08)	1.44 (1.32 , 1.57)
Luzern	2008/17	98	22.9	1.00 (0.99 , 1.01)	1.25 (1.12 , 1.41)
Uri	1969/78	98	16.0	1.00 (1.00 , 1.01)	1.44 (1.21 , 1.72)
Uri	1979/88	98	16.7	1.00 (0.99 , 1.01)	1.20 (1.01 , 1.43)
Uri	1989/98	98	17.3	1.01 (1.00 , 1.02)	1.31 (1.12 , 1.52)
Uri	1999/08	98	17.9	1.00 (0.99 , 1.01)	1.39 (1.18 , 1.64)
Uri	2008/17	98	18.2	1.01 (1.00 , 1.02)	1.22 (1.02 , 1.46)
Schwyz	1969/78	97	18.5	1.00 (0.99 , 1.01)	1.51 (1.35 , 1.68)
Schwyz	1979/88	92	17.0	1.01 (0.98 , 1.04)	1.28 (1.17 , 1.41)
Schwyz	1989/98	98	20.5	1.00 (0.99 , 1.01)	1.29 (1.15 , 1.45)
Schwyz	1999/08	94	18.9	1.02 (0.99 , 1.06)	1.44 (1.30 , 1.60)
Schwyz	2008/17	98	22.8	1.00 (0.99 , 1.01)	1.26 (1.10 , 1.45)
Obwalden	1969/78	98	17.0	1.00 (0.99 , 1.01)	1.48 (1.29 , 1.70)
Obwalden	1979/88	95	16.0	1.00 (0.98 , 1.02)	1.24 (1.10 , 1.40)
Obwalden	1989/98	98	19.7	1.01 (0.99 , 1.02)	1.32 (1.15 , 1.51)
Obwalden	1999/08	95	17.1	1.01 (0.98 , 1.04)	1.42 (1.25 , 1.62)
Obwalden	2008/17	98	20.9	1.01 (0.99 , 1.02)	1.27 (1.07 , 1.51)
Nidwalden	1969/78	97	18.4	1.00 (0.99 , 1.01)	1.51 (1.35 , 1.69)

Nidwalden	1979/88	92	16.8	1.01 (0.98 , 1.04)	1.28 (1.16 , 1.41)
Nidwalden	1989/98	98	20.4	1.00 (0.99 , 1.01)	1.30 (1.15 , 1.47)
Nidwalden	1999/08	94	18.8	1.02 (0.99 , 1.06)	1.45 (1.30 , 1.61)
Nidwalden	2008/17	98	22.8	1.00 (0.99 , 1.02)	1.26 (1.09 , 1.47)
Glarus	1969/78	97	15.4	1.00 (0.99 , 1.01)	1.43 (1.23 , 1.66)
Glarus	1979/88	95	15.0	1.00 (0.98 , 1.03)	1.19 (1.04 , 1.36)
Glarus	1989/98	98	17.2	1.00 (0.99 , 1.02)	1.28 (1.10 , 1.49)
Glarus	1999/08	94	15.7	1.02 (0.97 , 1.07)	1.37 (1.19 , 1.58)
Glarus	2008/17	98	18.4	1.00 (0.99 , 1.02)	1.22 (1.00 , 1.49)
Zug	1969/78	97	19.8	1.00 (0.99 , 1.01)	1.53 (1.38 , 1.70)
Zug	1979/88	90	17.6	1.02 (0.98 , 1.06)	1.32 (1.20 , 1.46)
Zug	1989/98	98	21.7	1.00 (0.99 , 1.01)	1.29 (1.14 , 1.45)
Zug	1999/08	93	19.8	1.04 (1.00 , 1.08)	1.46 (1.32 , 1.61)
Zug	2008/17	98	22.9	1.00 (0.99 , 1.01)	1.26 (1.09 , 1.45)
Fribourg	1969/78	97	19.9	1.00 (0.99 , 1.01)	1.46 (1.33 , 1.61)
Fribourg	1979/88	92	18.1	1.01 (0.98 , 1.04)	1.28 (1.17 , 1.39)
Fribourg	1989/98	98	21.5	1.00 (0.99 , 1.01)	1.25 (1.13 , 1.38)
Fribourg	1999/08	94	19.9	1.02 (1.00 , 1.05)	1.41 (1.29 , 1.54)
Fribourg	2008/17	98	22.8	1.00 (0.99 , 1.01)	1.22 (1.07 , 1.40)
Solothurn	1969/78	97	20.1	1.00 (1.00 , 1.01)	1.43 (1.31 , 1.56)
Solothurn	1979/88	92	18.4	1.01 (0.98 , 1.04)	1.29 (1.18 , 1.41)
Solothurn	1989/98	98	21.8	1.00 (0.99 , 1.01)	1.24 (1.13 , 1.37)
Solothurn	1999/08	93	20.1	1.03 (1.00 , 1.06)	1.40 (1.29 , 1.52)
Solothurn	2008/17	98	23.1	1.00 (0.99 , 1.01)	1.22 (1.1 , 1.36)
Basel-Stadt	1969/78	96	20.7	1.01 (0.99 , 1.02)	1.43 (1.29 , 1.58)
Basel-Stadt	1979/88	90	18.9	1.02 (0.98 , 1.07)	1.31 (1.17 , 1.45)
Basel-Stadt	1989/98	91	20.2	1.01 (0.97 , 1.05)	1.23 (1.12 , 1.35)
Basel-Stadt	1999/08	91	20.7	1.07 (1.02 , 1.12)	1.38 (1.26 , 1.52)
Basel-Stadt	2008/17	92	21.3	1.02 (0.95 , 1.10)	1.18 (1.07 , 1.31)
Basel-Landschaft	1969/78	97	20.3	1.00 (1.00 , 1.01)	1.40 (1.28 , 1.54)
Basel-Landschaft	1979/88	92	18.7	1.02 (0.99 , 1.05)	1.26 (1.15 , 1.39)
Basel-Landschaft	1989/98	93	20.0	1.00 (0.97 , 1.04)	1.22 (1.11 , 1.33)
Basel-Landschaft	1999/08	92	20.2	1.05 (1.01 , 1.09)	1.36 (1.25 , 1.49)
Basel-Landschaft	2008/17	94	21.3	1.01 (0.96 , 1.06)	1.17 (1.06 , 1.30)
Schaffhausen	1969/78	96	19.9	1.01 (0.99 , 1.03)	1.47 (1.33 , 1.62)
Schaffhausen	1979/88	89	17.7	1.03 (0.99 , 1.08)	1.31 (1.18 , 1.45)

Schaffhausen	1989/98	92	19.5	1.01 (0.96 , 1.05)	1.29 (1.16 , 1.43)
Schaffhausen	1999/08	92	20.0	1.06 (1.02 , 1.11)	1.44 (1.31 , 1.58)
Schaffhausen	2008/17	94	20.9	1.01 (0.96 , 1.06)	1.22 (1.10 , 1.35)
Appenzell Ausserrhoden	1969/78	97	18.9	1.00 (1.00 , 1.01)	1.45 (1.32 , 1.59)
Appenzell Ausserrhoden	1979/88	91	17.0	1.02 (0.98 , 1.05)	1.26 (1.14 , 1.39)
Appenzell Ausserrhoden	1989/98	97	20.2	1.00 (0.99 , 1.01)	1.26 (1.14 , 1.39)
Appenzell Ausserrhoden	1999/08	93	19.1	1.04 (1.00 , 1.07)	1.42 (1.28 , 1.56)
Appenzell Ausserrhoden	2008/17	97	21.4	1.00 (0.99 , 1.01)	1.21 (1.08 , 1.35)
Appenzell Innerrhoden	1969/78	97	18.2	1.00 (0.99 , 1.01)	1.45 (1.31 , 1.61)
Appenzell Innerrhoden	1979/88	92	16.7	1.01 (0.98 , 1.05)	1.24 (1.12 , 1.38)
Appenzell Innerrhoden	1989/98	98	20.3	1.00 (0.99 , 1.01)	1.26 (1.12 , 1.43)
Appenzell Innerrhoden	1999/08	93	18.4	1.03 (0.99 , 1.07)	1.41 (1.27 , 1.57)
Appenzell Innerrhoden	2008/17	98	21.7	1.00 (0.98 , 1.02)	1.20 (1.06 , 1.37)
St. Gallen	1969/78	96	19.3	1.00 (0.99 , 1.02)	1.45 (1.32 , 1.59)
St. Gallen	1979/88	90	17.5	1.02 (0.99 , 1.06)	1.28 (1.17 , 1.39)
St. Gallen	1989/98	94	19.6	1.00 (0.97 , 1.03)	1.25 (1.15 , 1.36)
St. Gallen	1999/08	92	19.4	1.04 (1.00 , 1.08)	1.42 (1.29 , 1.55)
St. Gallen	2008/17	96	21.4	1.00 (0.98 , 1.03)	1.21 (1.10 , 1.34)
Graubünden	1969/78	97	16.4	1.00 (0.99 , 1.01)	1.42 (1.21 , 1.66)
Graubünden	1979/88	96	16.3	1.00 (0.98 , 1.02)	1.16 (0.99 , 1.36)
Graubünden	1989/98	98	18.5	1.00 (0.99 , 1.02)	1.28 (1.09 , 1.49)
Graubünden	1999/08	96	17.5	1.01 (0.98 , 1.03)	1.35 (1.15 , 1.58)
Graubünden	2008/17	98	19.4	1.01 (0.99 , 1.02)	1.18 (0.98 , 1.43)
Aargau	1969/78	96	20.0	1.00 (0.99 , 1.02)	1.40 (1.27 , 1.53)
Aargau	1979/88	92	18.9	1.02 (0.99 , 1.05)	1.27 (1.15 , 1.40)
Aargau	1989/98	94	20.4	1.00 (0.98 , 1.03)	1.22 (1.11 , 1.33)
Aargau	1999/08	92	20.2	1.05 (1.01 , 1.09)	1.37 (1.25 , 1.50)
Aargau	2008/17	94	21.1	1.01 (0.97 , 1.05)	1.18 (1.07 , 1.30)
Thurgau	1969/78	96	19.9	1.01 (0.99 , 1.02)	1.41 (1.29 , 1.54)
Thurgau	1979/88	89	17.8	1.03 (0.98 , 1.07)	1.29 (1.19 , 1.41)
Thurgau	1989/98	91	19.2	1.01 (0.97 , 1.04)	1.25 (1.15 , 1.36)
Thurgau	1999/08	92	20.0	1.05 (1.01 , 1.09)	1.41 (1.29 , 1.53)
Thurgau	2008/17	94	21.0	1.01 (0.96 , 1.05)	1.21 (1.11 , 1.33)
Ticino	1969/78	96	20.8	1.01 (0.99 , 1.03)	1.47 (1.32 , 1.62)
Ticino	1979/88	87	18.2	1.04 (0.99 , 1.10)	1.30 (1.20 , 1.42)
Ticino	1989/98	88	19.0	1.02 (0.98 , 1.07)	1.26 (1.16 , 1.37)

Ticino	1999/08	92	20.8	1.05 (1.02 , 1.09)	1.42 (1.29 , 1.55)
Ticino	2008/17	90	20.6	1.02 (0.97 , 1.07)	1.23 (1.12 , 1.35)
Vaud	1969/78	96	20.3	1.01 (0.99 , 1.03)	1.36 (1.24 , 1.49)
Vaud	1979/88	90	18.3	1.03 (0.99 , 1.07)	1.21 (1.12 , 1.31)
Vaud	1989/98	92	19.8	1.01 (0.97 , 1.05)	1.17 (1.08 , 1.27)
Vaud	1999/08	92	20.0	1.05 (1.02 , 1.09)	1.33 (1.23 , 1.44)
Vaud	2008/17	93	20.7	1.02 (0.97 , 1.06)	1.15 (1.05 , 1.26)
Valais	1969/78	97	17.3	1.00 (0.99 , 1.01)	1.33 (1.16 , 1.53)
Valais	1979/88	96	16.8	1.00 (0.99 , 1.02)	1.12 (0.98 , 1.29)
Valais	1989/98	98	19.3	1.00 (0.99 , 1.02)	1.20 (1.04 , 1.38)
Valais	1999/08	95	17.3	1.01 (0.98 , 1.04)	1.29 (1.13 , 1.48)
Valais	2008/17	98	20.1	1.00 (0.99 , 1.02)	1.13 (0.96 , 1.33)
Neuchâtel	1969/78	97	19.9	1.00 (0.99 , 1.01)	1.40 (1.28 , 1.52)
Neuchâtel	1979/88	93	18.2	1.01 (0.99 , 1.04)	1.24 (1.15 , 1.34)
Neuchâtel	1989/98	98	21.7	1.00 (0.99 , 1.01)	1.23 (1.11 , 1.36)
Neuchâtel	1999/08	94	19.7	1.03 (0.99 , 1.06)	1.37 (1.26 , 1.48)
Neuchâtel	2008/17	98	22.5	1.00 (0.99 , 1.01)	1.22 (1.08 , 1.37)
Geneva	1969/78	96	21.2	1.01 (0.99 , 1.02)	1.47 (1.31 , 1.64)
Geneva	1979/88	89	19.0	1.04 (0.99 , 1.09)	1.29 (1.15 , 1.43)
Geneva	1989/98	89	20.2	1.02 (0.98 , 1.06)	1.21 (1.1 , 1.33)
Geneva	1999/08	92	21.3	1.07 (1.03 , 1.12)	1.4 (1.26 , 1.57)
Geneva	2008/17	91	21.1	1.03 (0.97 , 1.09)	1.17 (1.05 , 1.31)
Jura	1969/78	98	20.0	1.00 (0.99 , 1.01)	1.45 (1.32 , 1.59)
Jura	1979/88	93	18.1	1.01 (0.99 , 1.03)	1.28 (1.17 , 1.41)
Jura	1989/98	98	21.5	1.00 (0.99 , 1.01)	1.25 (1.13 , 1.39)
Jura	1999/08	94	19.8	1.02 (1.00 , 1.04)	1.40 (1.28 , 1.52)
Jura	2008/17	98	22.7	1.00 (0.99 , 1.01)	1.22 (1.07 , 1.39)



**Table S8: Estimation of non-optimal temperature related mortality risk, MMT and MMP by canton and decade for cold and heat for the  $\geq 80$  age category**

Temperature of minimum mortality (MMT) and percentile (MMP) and the Relative Risk (RR) for heat and cold by canton and decade

Canton	Decade	MMP	MMT	RR heat	RR cold
Zurich	1969/78	95	19.5	1.09 (1.02 , 1.16)	1.50 (1.38 , 1.64)
Zurich	1979/88	87	17.5	1.15 (1.08 , 1.21)	1.36 (1.25 , 1.47)
Zurich	1989/98	87	18.1	1.13 (1.04 , 1.23)	1.34 (1.24 , 1.44)
Zurich	1999/08	90	19.5	1.33 (1.22 , 1.45)	1.49 (1.39 , 1.60)
Zurich	2008/17	88	19.1	1.20 (1.09 , 1.33)	1.29 (1.20 , 1.39)
Bern	1969/78	96	19.1	1.05 (0.99 , 1.12)	1.50 (1.37 , 1.64)
Bern	1979/88	92	17.9	1.08 (1.03 , 1.14)	1.33 (1.23 , 1.44)
Bern	1989/98	92	18.6	1.05 (0.97 , 1.12)	1.30 (1.21 , 1.40)
Bern	1999/08	92	19.0	1.16 (1.09 , 1.23)	1.47 (1.36 , 1.58)
Bern	2008/17	92	19.2	1.07 (0.99 , 1.16)	1.27 (1.17 , 1.37)
Luzern	1969/78	96	19.3	1.06 (0.99 , 1.13)	1.56 (1.42 , 1.72)
Luzern	1979/88	90	17.6	1.09 (1.04 , 1.16)	1.40 (1.28 , 1.52)
Luzern	1989/98	90	18.4	1.06 (0.98 , 1.15)	1.36 (1.26 , 1.47)
Luzern	1999/08	91	19.1	1.22 (1.12 , 1.32)	1.53 (1.42 , 1.66)
Luzern	2008/17	90	19.0	1.11 (1.00 , 1.22)	1.32 (1.21 , 1.44)
Uri	1969/78	98	16.0	1.01 (0.98 , 1.05)	1.50 (1.26 , 1.78)
Uri	1979/88	95	14.4	1.02 (0.97 , 1.08)	1.25 (1.07 , 1.47)
Uri	1989/98	98	17.3	1.00 (0.97 , 1.03)	1.34 (1.16 , 1.54)
Uri	1999/08	95	15.6	1.05 (0.98 , 1.12)	1.45 (1.24 , 1.69)
Uri	2008/17	98	18.2	1.00 (0.97 , 1.04)	1.22 (1.03 , 1.44)
Schwyz	1969/78	96	18.0	1.04 (0.98 , 1.10)	1.59 (1.42 , 1.77)
Schwyz	1979/88	91	16.7	1.08 (1.02 , 1.14)	1.36 (1.24 , 1.49)
Schwyz	1989/98	92	17.6	1.04 (0.97 , 1.13)	1.36 (1.24 , 1.48)
Schwyz	1999/08	92	18.1	1.17 (1.08 , 1.26)	1.53 (1.39 , 1.68)
Schwyz	2008/17	92	18.4	1.07 (0.98 , 1.16)	1.30 (1.18 , 1.43)
Obwalden	1969/78	97	16.3	1.03 (0.98 , 1.08)	1.55 (1.35 , 1.78)
Obwalden	1979/88	92	14.8	1.06 (0.99 , 1.14)	1.31 (1.17 , 1.48)
Obwalden	1989/98	94	16.2	1.02 (0.94 , 1.11)	1.35 (1.21 , 1.50)
Obwalden	1999/08	93	16.3	1.12 (1.03 , 1.23)	1.49 (1.32 , 1.69)
Obwalden	2008/17	94	17.0	1.04 (0.93 , 1.15)	1.26 (1.11 , 1.43)

Nidwalden	1969/78	96	17.8	1.05 (0.98 , 1.12)	1.59 (1.42 , 1.78)
Nidwalden	1979/88	91	16.4	1.08 (1.02 , 1.15)	1.36 (1.24 , 1.49)
Nidwalden	1989/98	92	17.5	1.05 (0.96 , 1.13)	1.36 (1.24 , 1.49)
Nidwalden	1999/08	92	18.0	1.18 (1.09 , 1.28)	1.53 (1.38 , 1.69)
Nidwalden	2008/17	92	18.2	1.07 (0.97 , 1.18)	1.29 (1.17 , 1.43)
Glarus	1969/78	96	14.8	1.04 (0.97 , 1.12)	1.50 (1.29 , 1.74)
Glarus	1979/88	92	13.9	1.07 (1.00 , 1.16)	1.26 (1.11 , 1.43)
Glarus	1989/98	94	15.1	1.03 (0.93 , 1.14)	1.31 (1.16 , 1.48)
Glarus	1999/08	93	15.3	1.17 (1.04 , 1.31)	1.44 (1.26 , 1.65)
Glarus	2008/17	94	15.9	1.06 (0.92 , 1.22)	1.21 (1.06 , 1.39)
Zug	1969/78	96	19.2	1.07 (0.99 , 1.15)	1.62 (1.45 , 1.80)
Zug	1979/88	90	17.6	1.10 (1.04 , 1.16)	1.4 (1.27 , 1.54)
Zug	1989/98	90	18.2	1.07 (0.98 , 1.16)	1.37 (1.26 , 1.49)
Zug	1999/08	91	19.1	1.22 (1.12 , 1.32)	1.55 (1.42 , 1.69)
Zug	2008/17	90	19.0	1.10 (1.00 , 1.22)	1.32 (1.20 , 1.44)
Fribourg	1969/78	96	19.3	1.05 (0.99 , 1.12)	1.55 (1.41 , 1.70)
Fribourg	1979/88	92	18.1	1.09 (1.04 , 1.14)	1.35 (1.24 , 1.47)
Fribourg	1989/98	91	18.6	1.05 (0.98 , 1.13)	1.32 (1.22 , 1.42)
Fribourg	1999/08	92	19.2	1.17 (1.10 , 1.24)	1.50 (1.38 , 1.62)
Fribourg	2008/17	91	19.2	1.08 (1.00 , 1.18)	1.27 (1.17 , 1.39)
Solothurn	1969/78	96	19.6	1.04 (0.99 , 1.09)	1.52 (1.39 , 1.66)
Solothurn	1979/88	91	18.1	1.07 (1.03 , 1.12)	1.36 (1.25 , 1.48)
Solothurn	1989/98	91	19.0	1.05 (0.99 , 1.12)	1.32 (1.23 , 1.43)
Solothurn	1999/08	92	19.7	1.16 (1.10 , 1.23)	1.49 (1.38 , 1.60)
Solothurn	2008/17	91	19.6	1.08 (1.00 , 1.17)	1.28 (1.18 , 1.39)
Basel-Stadt	1969/78	96	20.7	1.08 (1.01 , 1.16)	1.52 (1.37 , 1.68)
Basel-Stadt	1979/88	90	18.9	1.11 (1.05 , 1.18)	1.37 (1.23 , 1.52)
Basel-Stadt	1989/98	90	19.8	1.10 (1.01 , 1.19)	1.31 (1.20 , 1.43)
Basel-Stadt	1999/08	90	20.4	1.29 (1.18 , 1.41)	1.47 (1.35 , 1.61)
Basel-Stadt	2008/17	89	20.3	1.21 (1.06 , 1.38)	1.26 (1.15 , 1.38)
Basel-Landschaft	1969/78	96	19.7	1.05 (1.00 , 1.10)	1.49 (1.36 , 1.64)
Basel-Landschaft	1979/88	91	18.4	1.09 (1.04 , 1.15)	1.33 (1.21 , 1.46)
Basel-Landschaft	1989/98	90	19.0	1.08 (1.00 , 1.17)	1.30 (1.20 , 1.41)
Basel-Landschaft	1999/08	91	19.9	1.23 (1.15 , 1.33)	1.45 (1.34 , 1.58)
Basel-Landschaft	2008/17	90	19.7	1.16 (1.04 , 1.29)	1.25 (1.14 , 1.36)
Schaffhausen	1969/78	95	19.4	1.09 (1.00 , 1.18)	1.56 (1.42 , 1.72)

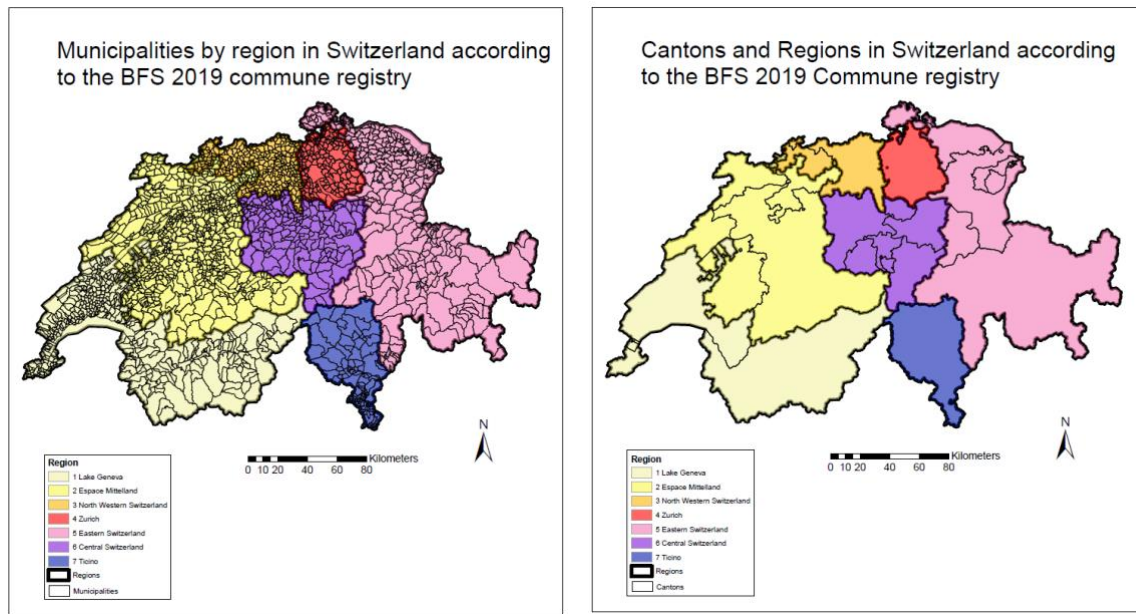
Schaffhausen	1979/88	89	17.7	1.13 (1.06 , 1.19)	1.37 (1.25 , 1.51)
Schaffhausen	1989/98	89	18.6	1.10 (1.00 , 1.21)	1.37 (1.25 , 1.51)
Schaffhausen	1999/08	91	19.7	1.28 (1.18 , 1.39)	1.53 (1.40 , 1.67)
Schaffhausen	2008/17	89	19.1	1.15 (1.04 , 1.28)	1.29 (1.18 , 1.42)
Appenzell Ausserrhoden	1969/78	96	18.3	1.05 (0.99 , 1.11)	1.54 (1.39 , 1.69)
Appenzell Ausserrhoden	1979/88	90	16.7	1.09 (1.04 , 1.15)	1.33 (1.21 , 1.46)
Appenzell Ausserrhoden	1989/98	91	17.7	1.07 (0.98 , 1.17)	1.34 (1.23 , 1.46)
Appenzell Ausserrhoden	1999/08	91	18.3	1.21 (1.12 , 1.31)	1.50 (1.37 , 1.64)
Appenzell Ausserrhoden	2008/17	91	18.3	1.11 (1.01 , 1.22)	1.27 (1.16 , 1.39)
Appenzell Innerrhoden	1969/78	96	17.7	1.05 (0.99 , 1.10)	1.54 (1.39 , 1.71)
Appenzell Innerrhoden	1979/88	91	16.4	1.09 (1.03 , 1.14)	1.31 (1.18 , 1.45)
Appenzell Innerrhoden	1989/98	91	17.0	1.06 (0.98 , 1.15)	1.34 (1.22 , 1.47)
Appenzell Innerrhoden	1999/08	92	18.0	1.20 (1.11 , 1.29)	1.49 (1.35 , 1.65)
Appenzell Innerrhoden	2008/17	92	18.1	1.09 (0.99 , 1.20)	1.25 (1.13 , 1.39)
St. Gallen	1969/78	96	19.3	1.06 (1.00 , 1.13)	1.54 (1.40 , 1.69)
St. Gallen	1979/88	90	17.5	1.10 (1.05 , 1.16)	1.35 (1.24 , 1.47)
St. Gallen	1989/98	90	18.2	1.07 (1.00 , 1.15)	1.34 (1.24 , 1.45)
St. Gallen	1999/08	91	19.1	1.22 (1.13 , 1.31)	1.50 (1.38 , 1.64)
St. Gallen	2008/17	90	18.8	1.11 (1.02 , 1.21)	1.28 (1.18 , 1.39)
Graubunden	1969/78	96	15.8	1.05 (0.97 , 1.14)	1.48 (1.26 , 1.73)
Graubunden	1979/88	93	14.7	1.06 (0.99 , 1.14)	1.22 (1.05 , 1.42)
Graubunden	1989/98	95	16.3	1.02 (0.94 , 1.11)	1.30 (1.14 , 1.49)
Graubunden	1999/08	94	16.3	1.12 (1.01 , 1.23)	1.41 (1.22 , 1.64)
Graubunden	2008/17	95	17.0	1.03 (0.93 , 1.14)	1.18 (1.01 , 1.37)
Aargau	1969/78	96	20.0	1.05 (1.00 , 1.11)	1.49 (1.35 , 1.63)
Aargau	1979/88	91	18.6	1.10 (1.05 , 1.15)	1.33 (1.21 , 1.46)
Aargau	1989/98	90	19.1	1.08 (1.00 , 1.16)	1.30 (1.20 , 1.41)
Aargau	1999/08	91	19.9	1.23 (1.15 , 1.33)	1.46 (1.35 , 1.58)
Aargau	2008/17	90	19.7	1.13 (1.03 , 1.23)	1.25 (1.15 , 1.36)
Thurgau	1969/78	95	19.4	1.07 (1.00 , 1.14)	1.50 (1.38 , 1.64)
Thurgau	1979/88	89	17.8	1.10 (1.05 , 1.16)	1.37 (1.26 , 1.49)
Thurgau	1989/98	89	18.6	1.09 (1.01 , 1.18)	1.34 (1.24 , 1.45)
Thurgau	1999/08	91	19.6	1.24 (1.15 , 1.34)	1.50 (1.39 , 1.62)
Thurgau	2008/17	89	19.3	1.13 (1.03 , 1.24)	1.29 (1.20 , 1.40)
Ticino	1969/78	95	20.3	1.08 (1.01 , 1.16)	1.56 (1.41 , 1.73)
Ticino	1979/88	87	18.2	1.12 (1.06 , 1.19)	1.39 (1.28 , 1.52)

Ticino	1989/98	87	18.7	1.10 (1.02 , 1.19)	1.36 (1.25 , 1.47)
Ticino	1999/08	91	20.5	1.21 (1.13 , 1.30)	1.51 (1.39 , 1.65)
Ticino	2008/17	88	19.9	1.14 (1.05 , 1.23)	1.31 (1.21 , 1.43)
Vaud	1969/78	95	19.8	1.10 (1.01 , 1.19)	1.45 (1.32 , 1.59)
Vaud	1979/88	90	18.3	1.14 (1.08 , 1.21)	1.29 (1.20 , 1.39)
Vaud	1989/98	90	19.1	1.10 (1.02 , 1.19)	1.26 (1.17 , 1.35)
Vaud	1999/08	91	19.7	1.25 (1.16 , 1.34)	1.42 (1.32 , 1.53)
Vaud	2008/17	90	19.6	1.15 (1.05 , 1.25)	1.22 (1.13 , 1.33)
Valais	1969/78	96	16.5	1.07 (0.98 , 1.17)	1.40 (1.22 , 1.61)
Valais	1979/88	93	15.1	1.06 (1.00 , 1.13)	1.18 (1.04 , 1.35)
Valais	1989/98	94	16.5	1.04 (0.95 , 1.13)	1.24 (1.11 , 1.39)
Valais	1999/08	94	16.8	1.12 (1.03 , 1.22)	1.36 (1.20 , 1.55)
Valais	2008/17	94	17.1	1.04 (0.95 , 1.15)	1.15 (1.01 , 1.31)
Neuchatel	1969/78	96	19.2	1.07 (0.99 , 1.16)	1.48 (1.36 , 1.61)
Neuchatel	1979/88	92	17.9	1.10 (1.04 , 1.17)	1.32 (1.23 , 1.42)
Neuchatel	1989/98	92	18.5	1.05 (0.97 , 1.14)	1.29 (1.21 , 1.39)
Neuchatel	1999/08	92	18.9	1.17 (1.09 , 1.25)	1.45 (1.35 , 1.56)
Neuchatel	2008/17	92	19.2	1.07 (0.99 , 1.17)	1.26 (1.17 , 1.36)
Geneva	1969/78	95	20.8	1.06 (1.01 , 1.11)	1.56 (1.39 , 1.74)
Geneva	1979/88	90	19.2	1.16 (1.09 , 1.23)	1.35 (1.22 , 1.50)
Geneva	1989/98	88	19.9	1.11 (1.03 , 1.20)	1.30 (1.19 , 1.42)
Geneva	1999/08	91	21.0	1.32 (1.21 , 1.45)	1.49 (1.35 , 1.66)
Geneva	2008/17	89	20.6	1.17 (1.06 , 1.28)	1.25 (1.13 , 1.38)
Jura	1969/78	97	19.3	1.03 (0.99 , 1.07)	1.53 (1.40 , 1.69)
Jura	1979/88	92	17.8	1.07 (1.03 , 1.12)	1.35 (1.23 , 1.48)
Jura	1989/98	92	18.6	1.05 (0.98 , 1.12)	1.32 (1.22 , 1.43)
Jura	1999/08	92	19.0	1.14 (1.08 , 1.20)	1.48 (1.37 , 1.60)
Jura	2008/17	92	19.2	1.08 (1.00 , 1.16)	1.27 (1.16 , 1.38)

**Table S9: Heat- and cold-related excess deaths and mortality fractions (%) by decade for the age adjusted scenario and in the no-ageing scenario in accordance with the 1969/78 age-mortality structure.**

Heat- and cold-related excess deaths related under the “observed” scenario and under a scenario of “no population ageing”. We assessed the role of population ageing in two ways. First, we compared the trends in average annual number of deaths and mortality rates by age-group to disentangle the influence of changes in the size of the population at risk in each age group. Second, we compared the estimated all-age heat/cold mortality rates (observed) in each decade with the corresponding mortality rates calculated assuming the demographic structure of the population in the first decade, that is assuming that no changes in the population age composition had happened (i.e. no ageing). In brief, we restructured the decade-specific population according to the relative age-group contribution in the first decade (1969/78). In this way, we re-scaled the observed population for each decade according to the age structure of 1969/78 (i.e. assuming no population ageing), while keeping constant the total population for the corresponding decade. We then calculated the heat- and cold-related deaths over the re-scaled population by using the corresponding age and decade-specific mortality rates estimated in the main analysis. This yielded the number of heat- and cold-related excess mortality in the hypothetical scenario of no population ageing. We then expressed the difference percent between the excess mortality calculated with- and without the population ageing, to quantify the contribution of population ageing to the observed trend. As the population between the observed and the hypothetical scenario in each decade remained constant, the differences would only reflect the influence of the changes in demographic structure across decades (i.e., distribution of the population across age groups). The contribution of the  $\geq 80$  age group (%) for cold and heat related mortality is computed as the heat and cold related mortality burden divided by heat and cold related mortality for all age groups.

		Excess deaths by decade						
		1969/78	1979/88	1989/98	1999/08	2009/17	Total	
Observed	Heat (N)	744	1584	1046	3382	1623	8,385	
	Cold (N)	65,588	47,803	51,450	63,065	38,288	266,193	
	Total (N)	66,332	49,387	52,496	66,417	39,911	274,578	
No ageing scenario	Heat (N)	744	1239	587	2001	693	5,273	
	Cold (N)	65,588	36,391	33,104	37,599	19,093	191,774	
	Total (N)	66,332	37,630	33,104	37,609	19,786	197,048	
Relative contribution of $\geq 80$ age groups relative to:								
Total mortality		30.7%	39.4%	48.8%	54.5%	59.3%		
Heat-related mortality		36.3%	51.9%	81.3%	67.7%	90.2%		
Cold-related mortality		39.0%	55.8%	62.1%	64.0%	70.8%		
Relative difference	heat	0.00%	21.7%	43.3%	40.6%	52.7%	31.7%	
	cold	0.00%	23.9%	35.7%	40.4%	44.6%	28.0%	

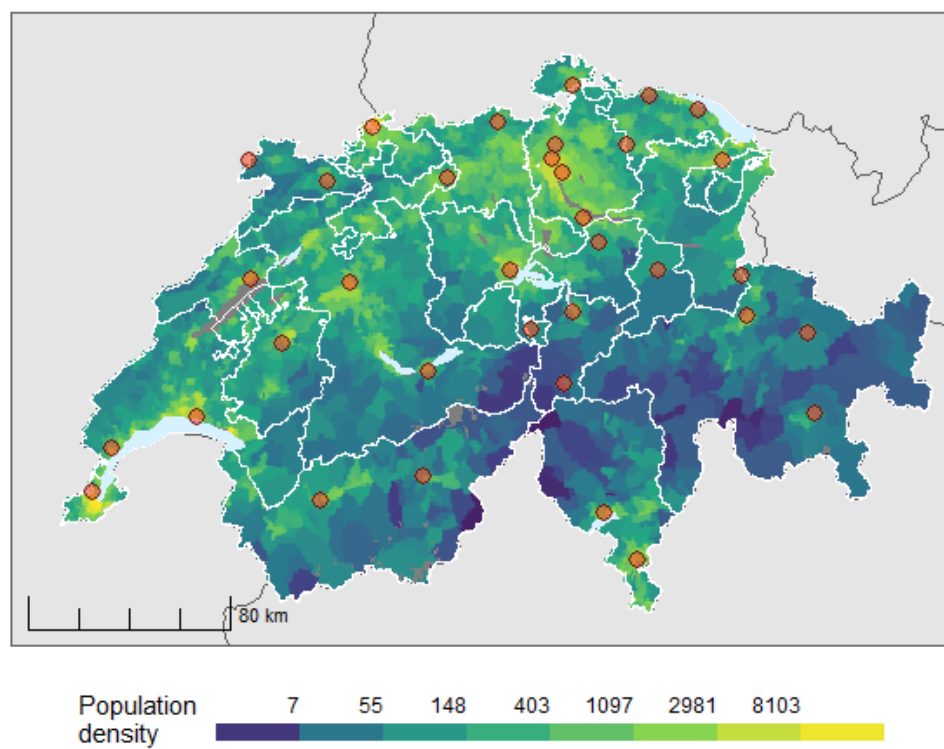


**Figure S1:** Spatial boundaries of 2056 municipalities and 26 cantons by region in Switzerland according to the 2019 BFS commune registry

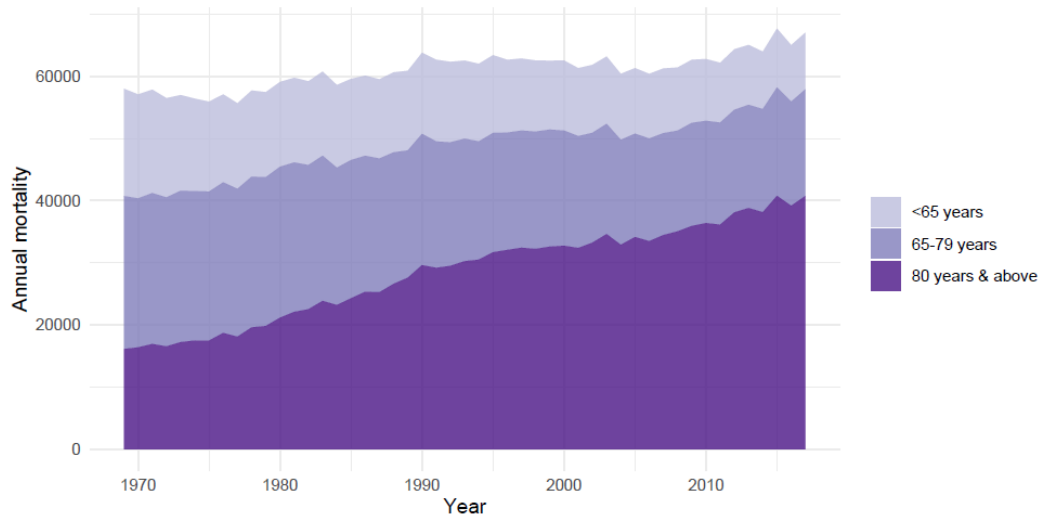
All 2,212 Swiss municipalities were included for this analysis. After merging the municipalities with <100 deaths with neighboring municipalities which were similar according to the Swiss Bureau of Federal Statistics (BFS) neighborhood structure, 2,056 municipalities were left for the analysis. To derive the BLUPS (Bes Linear Unbiased Prediction), elaborated upon in the methods section, through a multivariate multilevel longitudinal meta-regression model, we included region as a random effect predictor which is an administrative boundary including multiple cantons and that is considered homogenous in terms of population characteristics.



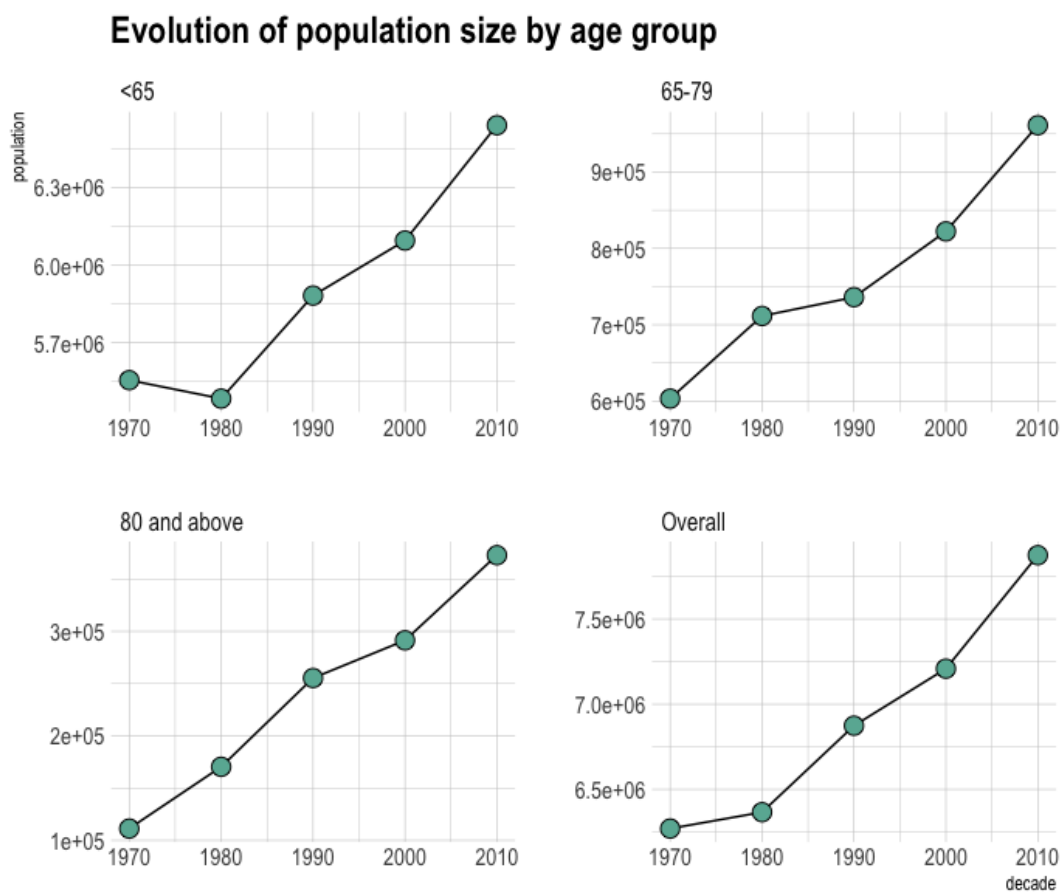
**Figure S2:** Elevation for Switzerland at a 1x1 km resolution



**Figure S3:** Population density in Switzerland at a 1x1 km resolution for 2015

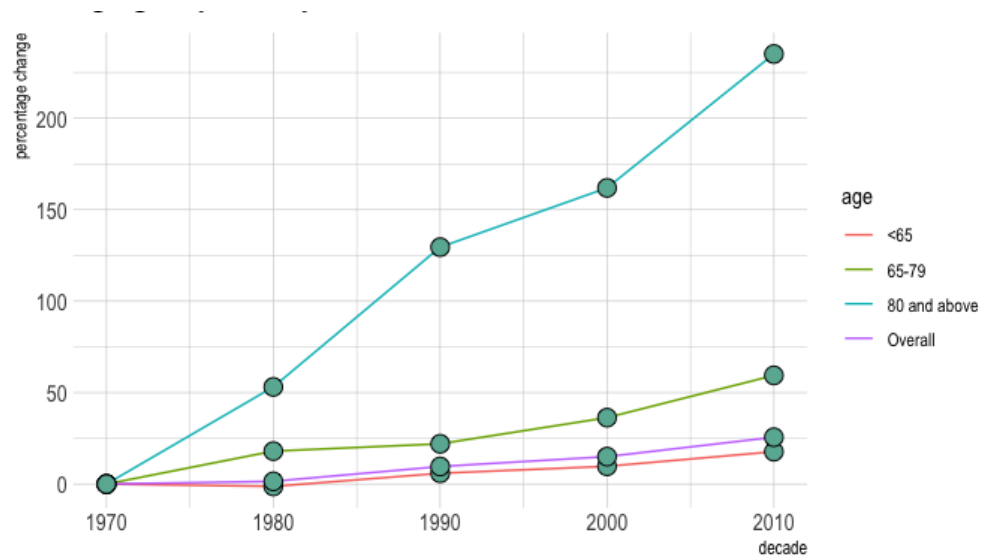


**Figure S4.** Trends in annual all-cause mortality by age-group between 1969 and 2017 in Switzerland.

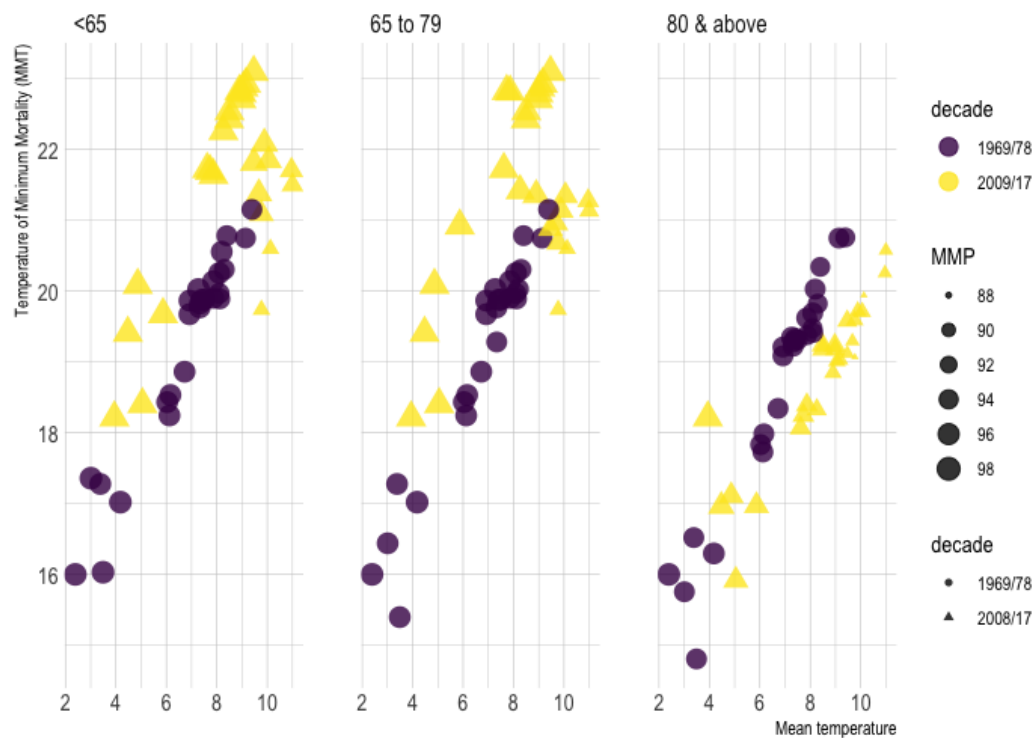


**Figure S5.** Evolution of population size, expressed as average annual population by age group for each decade in Switzerland between 1969 and 2017.

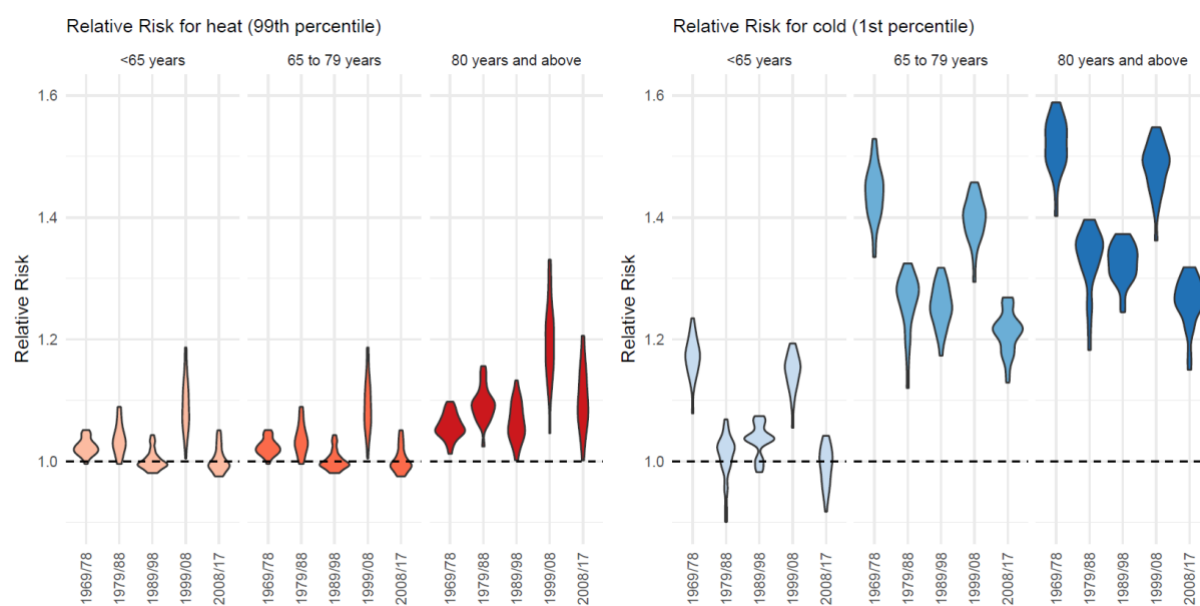




**Figure S6** Evolution of the relative increase in population size by age group for each decade in Switzerland compared to 1970.



**Figure S7. Relationship between canton-specific minimum mortality temperatures (MMTs) and average temperature for each age category for the decade 1969/78 (purple) compared to 2009/17 (yellow).** The corresponding minimum mortality percentile (MMP) is denoted as change in size of the point, while a change in decade is denoted by a different colour. All decades have been visualised in Figure S5 of the supplementary file and the corresponding MMT and MMP by age group are provided in Table S5-7.



**Figure S8. Distribution of the canton-specific relative risks for heat (left panel) at the 99<sup>th</sup> percentile and cold (right panel) at the 1<sup>st</sup> percentile of the temperature distribution for each age category and decade.** The shape illustrates the spread and density of the canton-specific relative risks and the colour represents the corresponding decade.