

Swiss-SEP 2.0 index

Report 1.08 - data analysis

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1 PCA on n'hood aggregated characteristics

Principal components/correlation
 Number of obs = 1,527,173
 Number of comp. = 4
 Trace = 4
 Rho = 1.0000
 Rotation: (unrotated = principal)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	1.95642	.776499	0.4891	0.4891
Comp2	1.17992	.731361	0.2950	0.7841
Comp3	.448564	.0334764	0.1121	0.8962
Comp4	.415087	.	0.1038	1.0000

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Unexplained
ocu1p	0.6054	-0.1324	0.4427	0.6481	0
edu1p	0.5902	0.2424	0.3022	-0.7082	0
ppr1	0.2401	0.7990	-0.4817	0.2680	0
rent	-0.4770	0.5341	0.6933	0.0812	0

(score assumed)

(3 components skipped)

Scoring coefficients

sum of squares(column-loading) = 1

Variable	Comp1	Comp2	Comp3	Comp4
ocu1p	0.6054	-0.1324	0.4427	0.6481
edu1p	0.5902	0.2424	0.3022	-0.7082
ppr1	0.2401	0.7990	-0.4817	0.2680
rent	-0.4770	0.5341	0.6933	0.0812

2 Hybrid version of SEP

This solution is mixing versions 1.0 & 2.0. First the new buildings have value of index 1.0 assigned using the closest (linear distance) neighbour.

Then, construction period of the building is retrieved from STATPOP 2018 dataset and then buildings build before year 2000 have the values of 1.0 index assigned and buildings constructed after 2000 have new values assigned. Buildings without the defined period of construction keep values 1.0 also.

2.1 Index deciles

(SSEP 3.0 - user dataset of index and XY coordinates)			
Summary for variables: ssep3 by categories of: ssep3_d (Swiss-SEP 3.0 - deciles)			
ssep3_d	min	mean	max
1st - lowest	0.00	44.94	50.89
2	43.96	52.48	55.45
3	49.12	56.26	58.69
4	52.84	59.29	61.49
5th decile	56.14	62.02	64.14
6	59.25	64.70	66.84
7	62.27	67.56	69.76
8	65.54	70.74	73.20
9	69.37	74.68	77.63
10th - highest	74.31	81.24	100.00
Total	0.00	63.45	100.00

2.2 Quantiles

Note that the original quantiles of second version :

Swiss-SEP 2.0 - deciles	Freq.	Percent	Cum.
1st - lowest	152,718	10.00	10.00
2	152,717	10.00	20.00
3	152,718	10.00	30.00
4	152,739	10.00	40.00
5th decile	152,695	10.00	50.00
6	152,717	10.00	60.00
7	152,718	10.00	70.00
8	152,721	10.00	80.00
9	152,722	10.00	90.00
10th - highest	152,708	10.00	100.00
Total	1,527,173	100.00	

... are tad 'broken' after replacements:

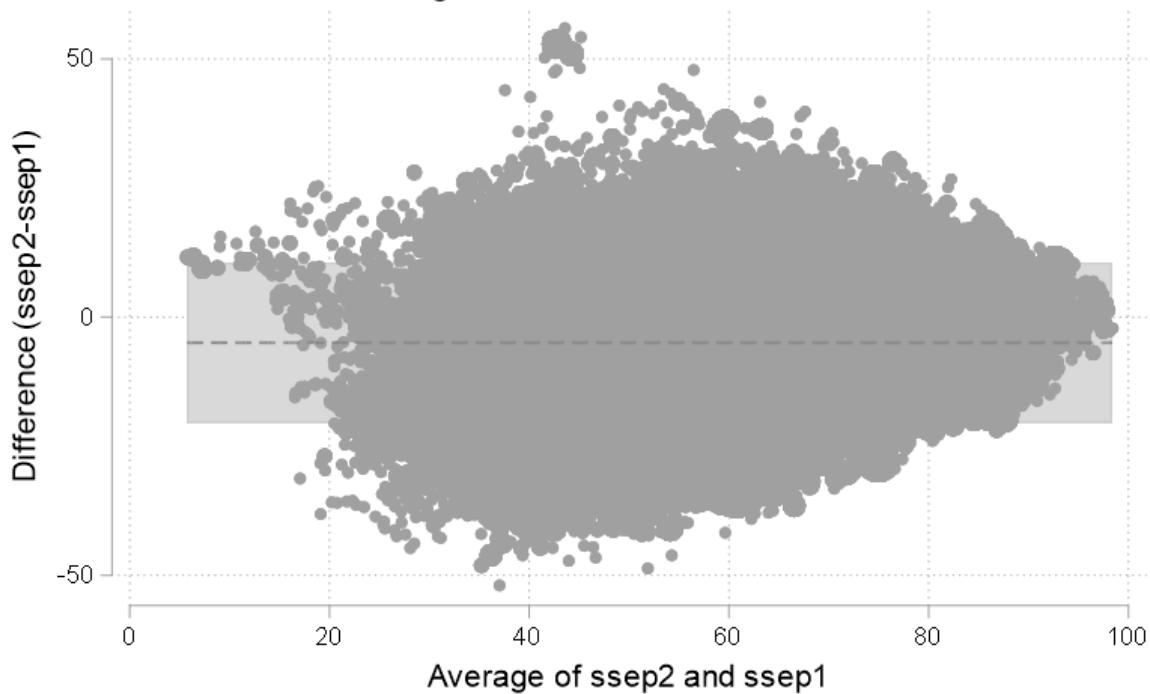
Swiss-SEP 3.0 - deciles	Freq.	Percent	Cum.
1st - lowest	147,376	9.65	9.65
2	151,060	9.89	19.54
3	152,588	9.99	29.53
4	153,271	10.04	39.57
5th decile	154,539	10.12	49.69
6	155,061	10.15	59.84
7	154,797	10.14	69.98
8	154,969	10.15	80.13
9	154,077	10.09	90.21
10th - highest	149,435	9.79	100.00
Total	1,527,173	100.00	

Some transitions happened:

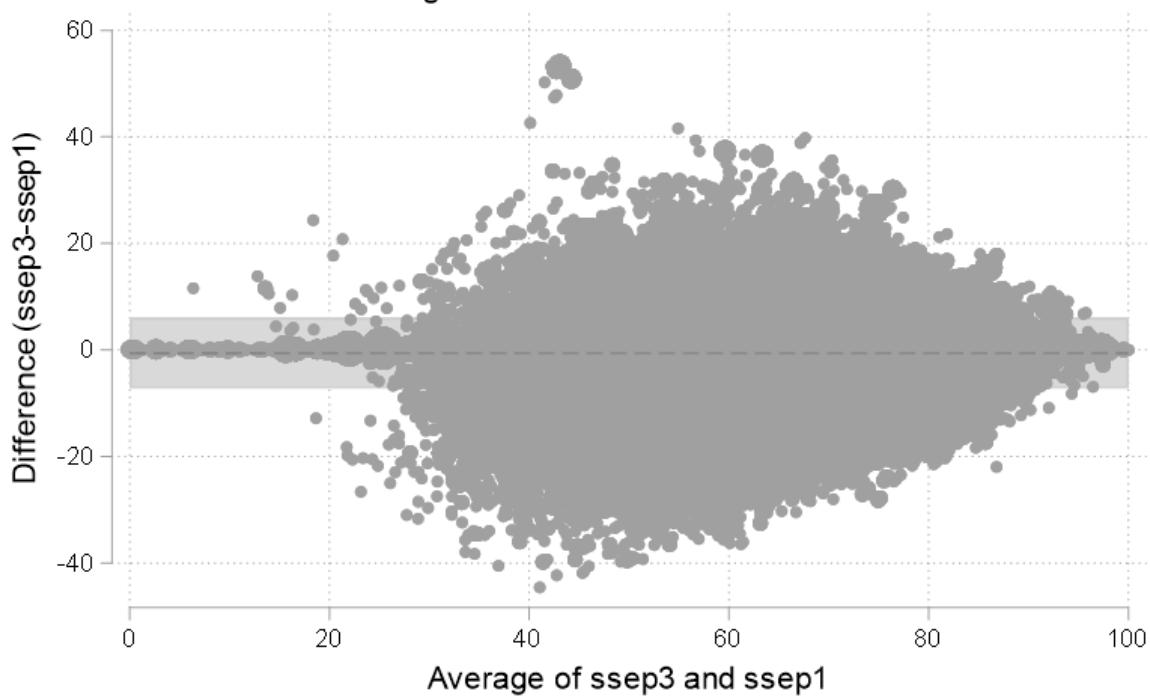
Swiss-SEP 2.0 - deciles		Swiss-SEP 3.0 - deciles								
		1st - low	2	3	4	5th decil	6	7	8	Total
1st - lowest	2	75,472	32,335	19,186	11,977	6,783	3,880	1,818	808	152,718
	3	30,225	49,637	24,587	19,172	12,987	8,450	4,774	2,054	152,717
	4	18,646	23,500	45,702	21,110	17,054	12,492	8,046	4,133	152,718
5th decile	5	10,654	17,983	21,377	43,486	19,752	16,570	11,827	7,172	152,739
	6	6,457	12,145	16,460	19,316	44,924	19,050	16,375	11,198	152,695
	7	3,071	7,787	11,670	15,852	18,977	46,631	20,378	15,975	152,717
	8	1,574	4,345	7,263	11,727	16,343	19,661	48,482	22,352	152,718
	9	821	2,131	4,389	6,890	10,499	15,210	20,949	53,051	152,721
10th - highest	10	333	720	1,491	2,854	5,579	9,648	15,342	25,258	152,722
	11	123	277	463	887	1,641	3,469	6,806	12,968	152,708
Total		147,376	151,060	152,588	153,271	154,539	155,061	154,797	154,969	1,527,173
Swiss-SEP 2.0 - deciles		Swiss-SEP 3.0 - deciles								
		9	10th - hi	Total						
1st - lowest	2	240	19	152,718	152,717	152,717	152,717	152,717		
	3	676	155	152,717	152,717	152,718	152,718	152,718		
5th decile	4	1,442	293	152,717	152,717	152,739	152,739	152,739		
	5	3,308	610	152,717	152,717	152,695	152,695	152,695		
	6	5,574	1,196	152,717	152,717	152,717	152,717	152,717		
	7	9,792	2,584	152,717	152,717	152,718	152,718	152,718		
	8	15,940	5,331	152,717	152,717	152,721	152,721	152,721		
	9	26,171	12,610	152,722	152,722	152,722	152,722	152,722		
10th - highest	10	61,173	30,324	96,613	96,613	152,708	152,708	152,708		
Total		154,077	149,435	1527,173	1527,173	1527,173	1527,173	1527,173		

2.3 Bland Altman plots of diffs

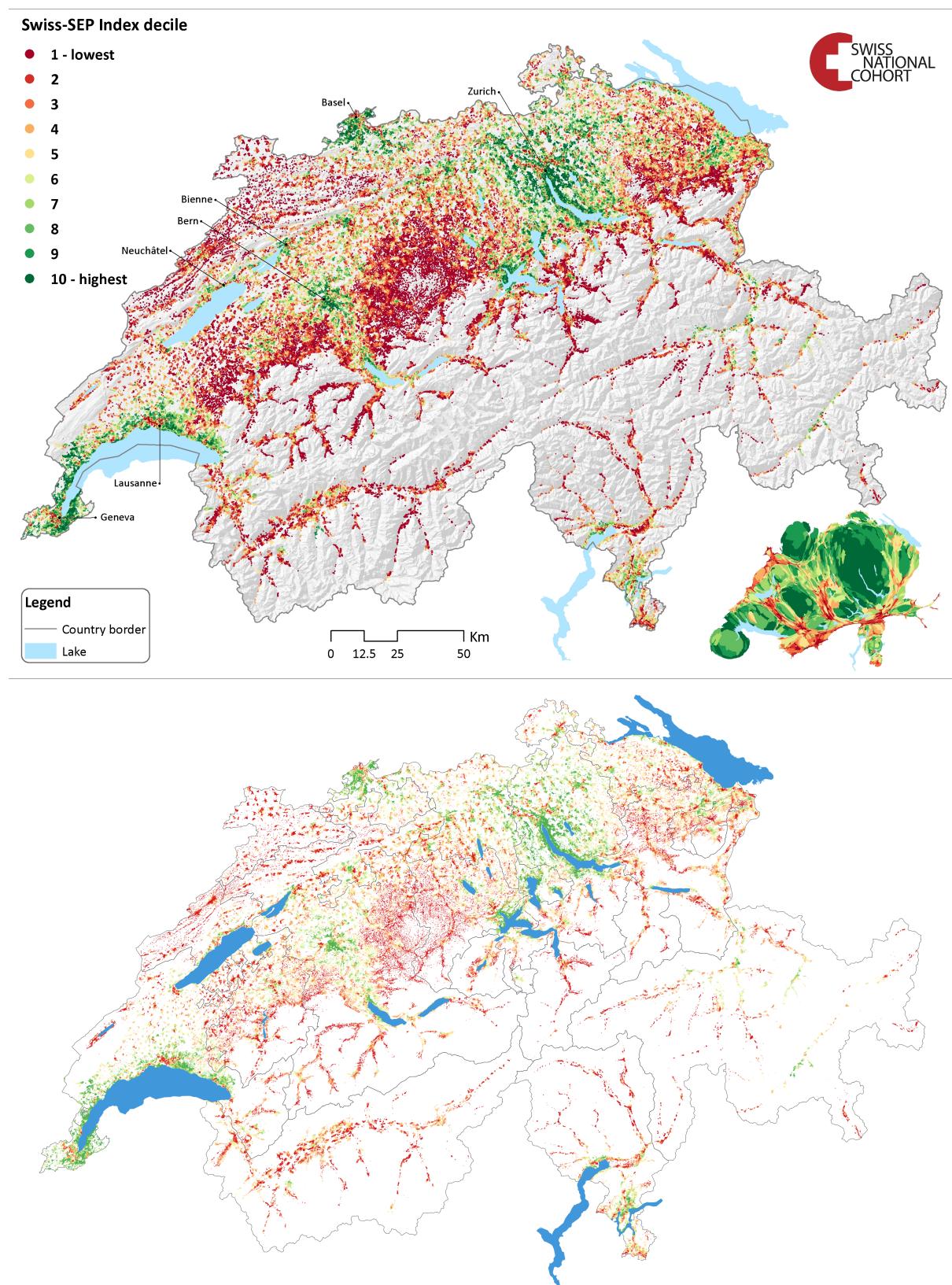
$80431/1527173 = 5.27\%$ outside the limits of agreement
Mean difference -4.978
95% limits of agreement (-20.557, 10.602)
Averages lie between 5.763 and 98.394



$97416/1527173 = 6.38\%$ outside the limits of agreement
Mean difference -0.620
95% limits of agreement (-7.308, 6.067)
Averages lie between 0.000 and 100.000

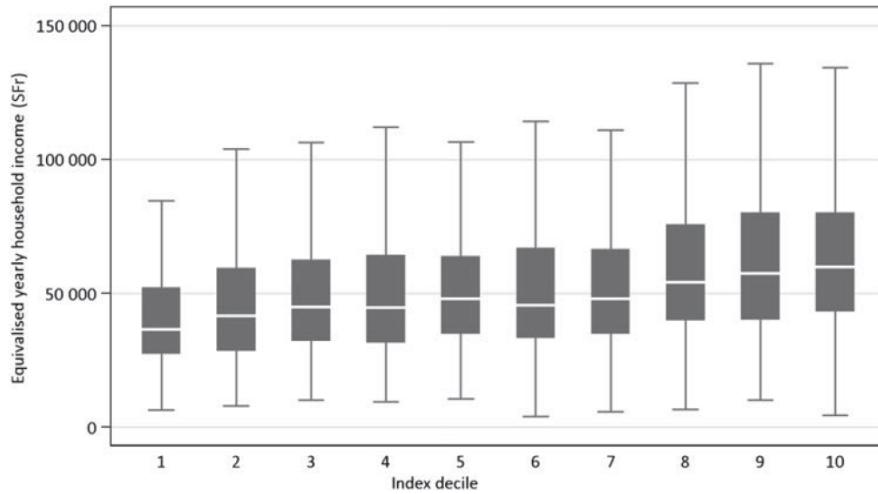


3 Maps

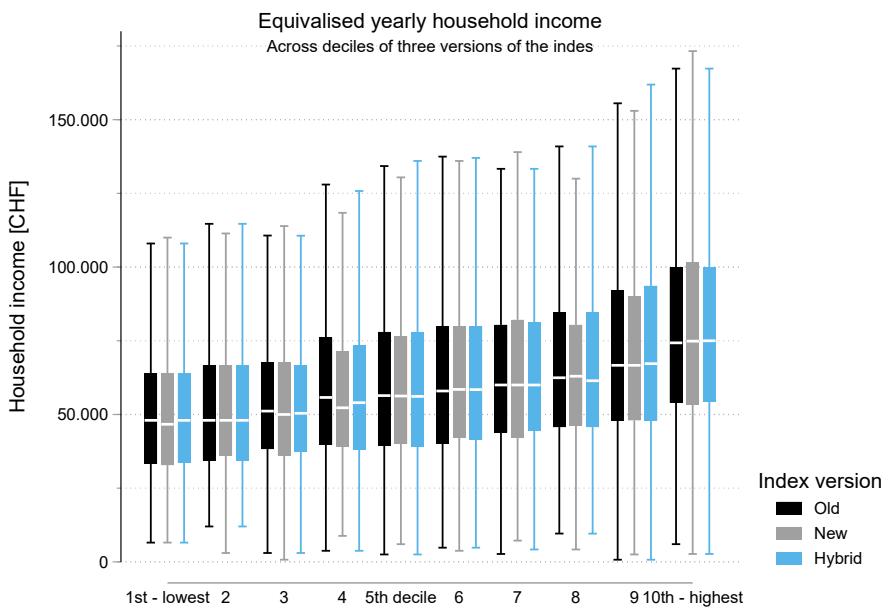


4 Validation - SHP data

4.1 Income graph - 1.0



4.2 Income graph - 2.0



4.3 Financial variables table - 1.0

Characteristic	Index decile			Total N (%)	p Value
	1 N (%)	5 N (%)	10 N (%)		
Number of households	437 (100.0)	447 (100.0)	426 (100.0)	4460 (100.0)	—
Mean yearly equivalised* household net income in SFr (SD)	42 329 (21 253)	54 785 (33 488)	72 074 (56 796)	55 372 (38 781)	<0.0001
Saving at least 100 SFr/month					
No answer/does not know	4 (0.9)	5 (1.1)	6 (1.4)	54 (1.2)	<0.0001
Yes	329 (75.3)	366 (81.9)	363 (85.2)	3629 (81.4)	
No	104 (23.8)	76 (17.0)	57 (13.4)	777 (17.4)	
Reason why not saving at least 100 SFr/month					
Inapplicable	333 (76.2)	371 (83.0)	369 (86.6)	3683 (82.6)	<0.0001
Because you cannot afford it	88 (20.1)	66 (14.8)	47 (11.0)	642 (14.4)	
For another reason	16 (3.7)	10 (2.2)	10 (2.3)	135 (3.0)	
Voluntary private pension scheme					
No answer/does not know	9 (2.1)	8 (1.8)	4 (0.9)	67 (1.5)	<0.0001
Yes	210 (48.1)	266 (59.5)	266 (62.4)	2581 (57.9)	
No	218 (49.9)	173 (38.7)	156 (36.6)	1812 (40.6)	
Reason why no voluntary private pension scheme					
Inapplicable	219 (50.1)	274 (61.3)	270 (63.4)	2648 (59.4)	<0.0001
No answer/does not know	1 (0.2)	0 (0.0)	2 (0.5)	25 (0.6)	
Because you cannot afford it	81 (18.5)	53 (11.9)	30 (7.0)	553 (12.4)	
For another reason	136 (31.1)	120 (26.8)	124 (29.1)	1234 (27.7)	
Reception of financial help					
No answer/does not know	1 (0.2)	5 (1.1)	1 (0.2)	23 (0.5)	0.002
Yes	102 (23.3)	75 (16.8)	56 (13.1)	765 (17.2)	
No	334 (76.4)	367 (82.1)	369 (86.6)	3672 (82.3)	
Assessment of household income and expenses					
No answer/does not know	2 (0.5)	3 (0.7)	7 (1.6)	38 (0.9)	<0.0001
Your household can save money	189 (43.2)	233 (52.1)	239 (56.1)	2262 (50.7)	
Your household spends what it earns	212 (48.5)	170 (38.0)	152 (35.7)	1821 (40.8)	
Your household eats into its assets and savings	27 (6.2)	39 (8.7)	23 (5.4)	296 (6.6)	
Your household gets into debt	7 (1.6)	2 (0.4)	5 (1.2)	43 (1.0)	
Financial situation manageable, mean (SD)†	6.6 (2.6)	7.5 (2.3)	8.0 (2.1)	7.3 (2.3)	<0.0001

4.4 Financial variables table - 2.0

Summary for variables: i13eqon
by categories of: ssep2_d (Swiss-SEP 2.0 - deciles)

ssep2_d	mean	sd
1st - lowest	51405.8	26113.2
5th decile	62935.3	33764.0
10th - highest	86560.1	69105.5

Summary for variables: h13i51
by categories of: ssep2_d (Swiss-SEP 2.0 - deciles)

ssep2_d	mean	sd
1st - lowest	6.8	2.3
5th decile	7.4	2.2
10th - highest	8.0	2.0

Savings min. 500 SFrs monthly	Swiss-SEP 2.0 - deciles			Total
	1st - low	5th decil	10th - hi	
no answer / doesn't k	23 2.68	11 1.42	22 2.65	56 2.27
yes	390 45.45	431 55.68	560 67.47	1,381 56.09
no	445 51.86	332 42.89	248 29.88	1,025 41.63
Total	858 100.00	774 100.00	830 100.00	2,462 100.00

Reason why no savings min. 500 Sfrs monthly	Swiss-SEP 2.0 - deciles			Total
	1st - low	5th decil	10th - hi	
inapplicable	413 48.14	442 57.11	582 70.12	1,437 58.37
no answer	0 0.00	1 0.13	0 0.00	1 0.04
no answer / doesn't k	0 0.00	1 0.13	0 0.00	1 0.04
because you cannot af	358 41.72	263 33.98	182 21.93	803 32.62
for another reason	87 10.14	67 8.66	66 7.95	220 8.94
Total	858 100.00	774 100.00	830 100.00	2,462 100.00

Savings into 3rd pillar	Swiss-SEP 2.0 - deciles			Total
	1st - low	5th decil	10th - hi	
does not know	23 2.68	8 1.03	13 1.57	44 1.79
yes	424 49.42	483 62.40	522 62.89	1,429 58.04
no	411 47.90	283 36.56	295 35.54	989 40.17
Total	858 100.00	774 100.00	830 100.00	2,462 100.00

Reasons why no savings into 3rd pillar	Swiss-SEP 2.0 - deciles			Total
	1st - low	5th decil	10th - hi	
inapplicable	447 52.10	491 63.44	535 64.46	1,473 59.83
no answer / doesn't k	7 0.82	4 0.52	4 0.48	15 0.61
because you cannot af	139 16.20	76 9.82	57 6.87	272 11.05
for another reason	265 30.89	203 26.23	234 28.19	702 28.51
Total	858 100.00	774 100.00	830 100.00	2,462 100.00

Financial help: health insurance	Swiss-SEP 2.0 - deciles			Total
	1st - low	5th decil	10th - hi	
inaplicable / no answ	6 0.70	4 0.52	5 0.60	15 0.61
yes	209 24.36	150 19.38	95 11.45	454 18.44
no	643 74.94	620 80.10	730 87.95	1,993 80.95
Total	858 100.00	774 100.00	830 100.00	2,462 100.00
Income: Assessment of income and expenses	Swiss-SEP 2.0 - deciles			Total
	1st - low	5th decil	10th - hi	
inaplicable / no answ	6 0.70	4 0.52	10 1.20	20 0.81
your household can sa	402 46.85	412 53.23	502 60.48	1,316 53.45
your household spends	356 41.49	278 35.92	236 28.43	870 35.34
your household eats i	73 8.51	67 8.66	78 9.40	218 8.85
your household gets i	21 2.45	13 1.68	4 0.48	38 1.54
Total	858 100.00	774 100.00	830 100.00	2,462 100.00

4.5 Financial variables table - 3.0

Summary for variables: i13eqon
by categories of: ssep3_d (Swiss-SEP 3.0 - deciles)

ssep3_d	mean	sd
1st - lowest	52269.4	28693.8
5th decile	62283.3	33751.1
10th - highest	85434.4	53120.9

Summary for variables: h13i51
by categories of: ssep3_d (Swiss-SEP 3.0 - deciles)

ssep3_d	mean	sd
1st - lowest	6.8	2.4
5th decile	7.5	2.2
10th - highest	8.2	1.8

Savings min. 500 SFrs monthly	Swiss-SEP 3.0 - deciles			Total
	1st - low	5th decil	10th - hi	
no answer / doesn't k	18 2.44	17 2.15	14 1.87	49 2.15
yes	354 47.90	450 57.03	534 71.20	1,338 58.74
no	367 49.66	322 40.81	202 26.93	891 39.11
Total	739 100.00	789 100.00	750 100.00	2,278 100.00

Reason why no savings min. 500 Sfrs monthly	Swiss-SEP 3.0 - deciles			Total
	1st - low	5th decil	10th - hi	
inapplicable	372 50.34	467 59.19	548 73.07	1,387 60.89
no answer	1 0.14	0 0.00	0 0.00	1 0.04
because you cannot af	306 41.41	255 32.32	145 19.33	706 30.99
for another reason	60 8.12	67 8.49	57 7.60	184 8.08
Total	739 100.00	789 100.00	750 100.00	2,278 100.00

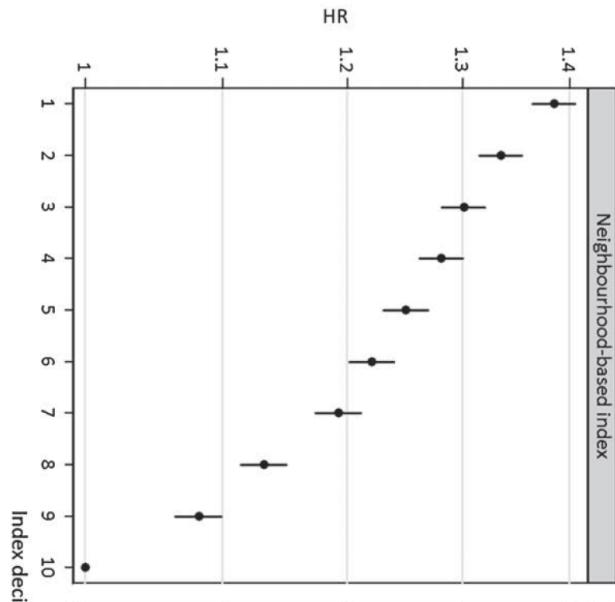
Savings into 3rd pillar	Swiss-SEP 3.0 - deciles			Total
	1st - low	5th decil	10th - hi	
does not know	21 2.84	6 0.76	9 1.20	36 1.58
yes	377 51.01	477 60.46	465 62.00	1,319 57.90
no	341 46.14	306 38.78	276 36.80	923 40.52
Total	739 100.00	789 100.00	750 100.00	2,278 100.00

Reasons why no savings into 3rd pillar	Swiss-SEP 3.0 - deciles			Total
	1st - low	5th decil	10th - hi	
inapplicable	398 53.86	483 61.22	474 63.20	1,355 59.48
no answer / doesn't k	9 1.22	4 0.51	2 0.27	15 0.66
because you cannot af	136 18.40	78 9.89	43 5.73	257 11.28
for another reason	196 26.52	224 28.39	231 30.80	651 28.58
Total	739 100.00	789 100.00	750 100.00	2,278 100.00

Financial help: health insurance	Swiss-SEP 3.0 - deciles			Total
	1st - low	5th decil	10th - hi	
inaplicable / no answ	7 0.95	6 0.76	4 0.53	17 0.75
yes	186 25.17	167 21.17	88 11.73	441 19.36
no	546 73.88	616 78.07	658 87.73	1,820 79.89
Total	739 100.00	789 100.00	750 100.00	2,278 100.00
Income: Assessment of income and expenses	Swiss-SEP 3.0 - deciles			Total
	1st - low	5th decil	10th - hi	
inaplicable / no answ	7 0.95	9 1.14	9 1.20	25 1.10
your household can sa	366 49.53	444 56.27	452 60.27	1,262 55.40
your household spends	284 38.43	262 33.21	216 28.80	762 33.45
your household eats i	64 8.66	57 7.22	69 9.20	190 8.34
your household gets i	18 2.44	17 2.15	4 0.53	39 1.71
Total	739 100.00	789 100.00	750 100.00	2,278 100.00

5 Validation - SNC mortality

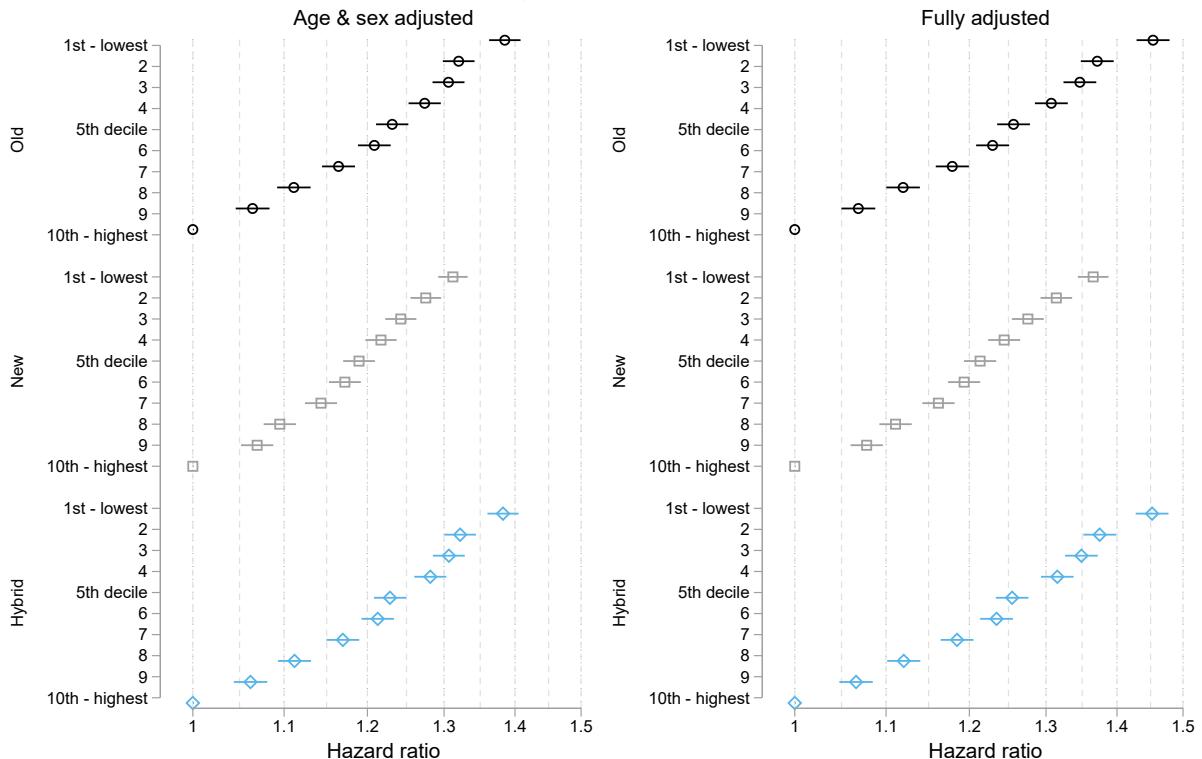
5.1 All cause mortality - 1.0



Note: Calculations from 'old' SNC data from the **2001 - 2008 period**, as described in original paper!

5.2 All cause mortality - three SEP indices

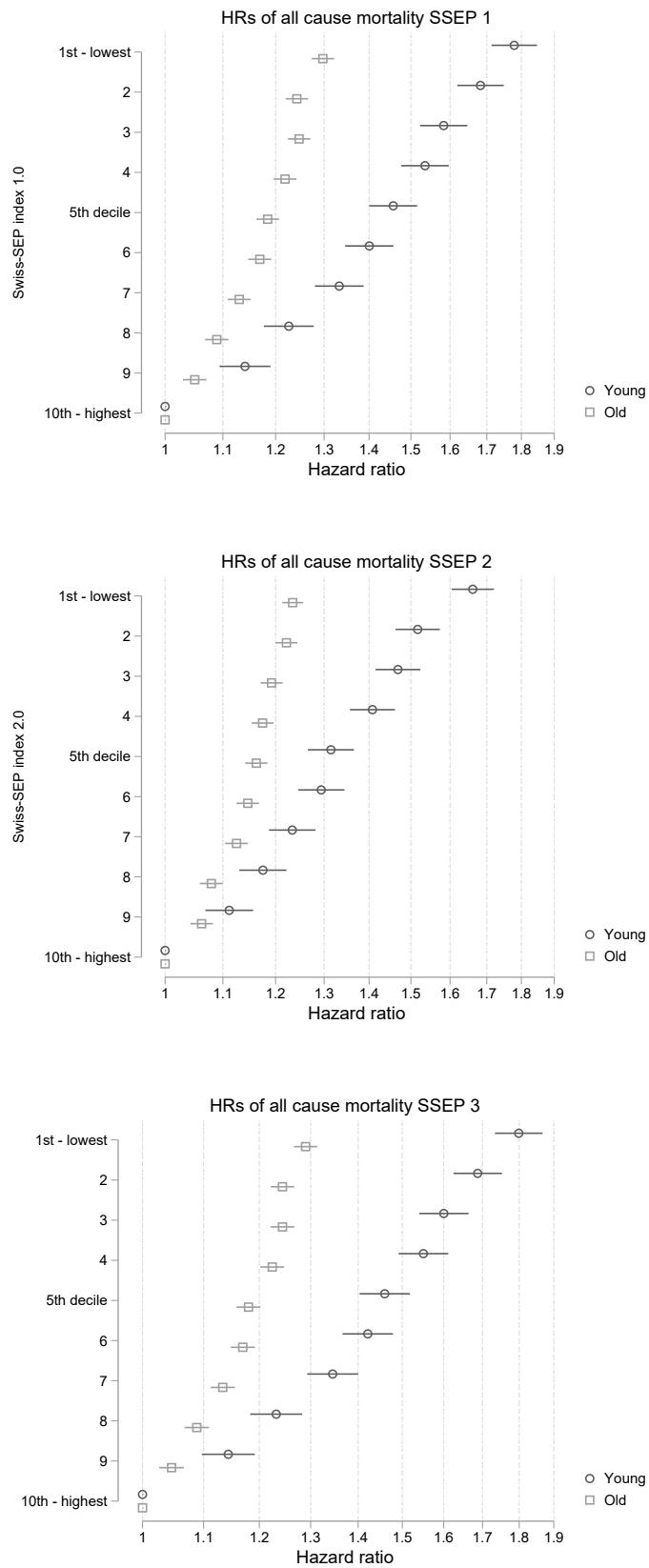
Hazard ratios of all cause mortality across deciles of three versions of the indices



Note: Results from Cox models. Calculations from 'new' SNC data from the **2012 - 2018 period!** 'Age & sex' - adjusted for age (via `stset`) and sex (as in original figure above); 'Adjusted' - additionally adjusted

for civil status, nationality, level of urbanization and language region. This is not the smae adjustment as in
adjudsted models in original papers since we are missing some crucial variables.

5.3 All cause mortality - three indices, stratified by age



5.4 Cause specific mortality - 1.0

Cause	Age and sex adjusted
	HR (95% CI)
All-causes	1.38 (1.36 to 1.41)
Lung cancer	1.83 (1.71 to 1.95)
Breast cancer	0.93 (0.85 to 1.02)
Prostate cancer	1.17 (1.07 to 1.28)
Cardiovascular diseases	1.48 (1.44 to 1.51)
Myocardial infarction	1.68 (1.57 to 1.80)
Stroke	1.28 (1.20 to 1.36)
Respiratory diseases	1.99 (1.87 to 2.12)
Traffic accidents	2.42 (1.94 to 3.01)
Suicide	0.86 (0.78 to 0.95)

5.5 Cause specific mortality - 2.0 results

	Age & sex HR	95% CI	Adjusted HR	95% CI
Lung cancer	1.79 (1.67, 1.92)		1.84 (1.71, 1.98)	
Breast can-r	1.01 (0.91, 1.13)		1.05 (0.94, 1.17)	
Prostate c-r	1.13 (1.02, 1.26)		1.14 (1.02, 1.27)	
Cardiovasc-r	1.38 (1.34, 1.43)		1.44 (1.39, 1.48)	
Myocardial-n	1.53 (1.40, 1.67)		1.67 (1.52, 1.83)	
Stroke	1.25 (1.15, 1.35)		1.28 (1.18, 1.40)	
Respiratory	1.63 (1.53, 1.74)		1.60 (1.49, 1.72)	
Traffic ac-s	2.13 (1.59, 2.86)		1.80 (1.33, 2.43)	
Suicide	1.31 (1.15, 1.49)		1.37 (1.20, 1.57)	

Note for both tables: HRs for the 10th (lowest SEP) decile compared to 1st (highest SEP). Breast and prostate cancer: for men and women respectively.

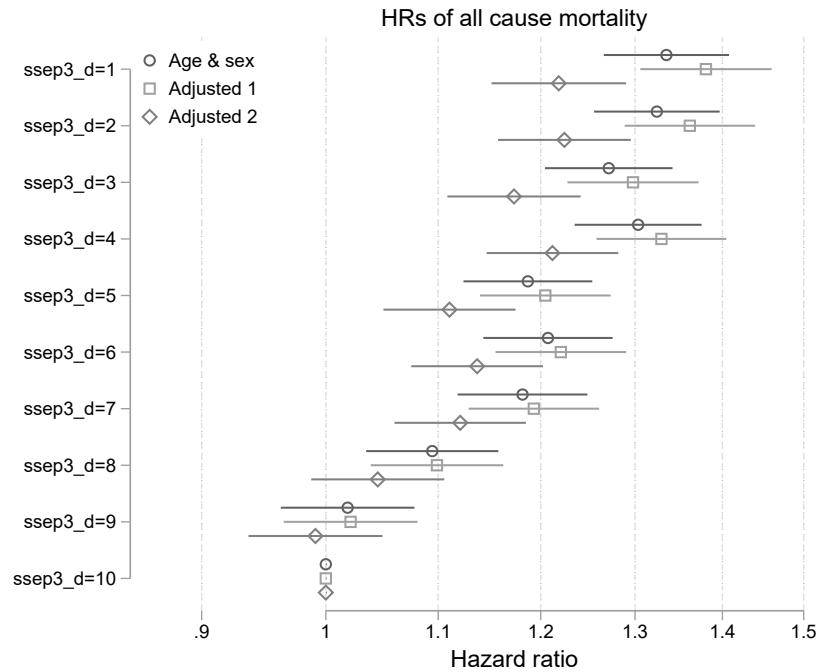
5.6 Cause specific mortality - 3.0 results

	Age & sex HR	95% CI	Adjusted HR	95% CI
Lung cancer	1.93 (1.79, 2.08)		2.01 (1.86, 2.17)	
Breast can-r	1.09 (0.97, 1.23)		1.13 (1.00, 1.28)	
Prostate c-r	1.18 (1.06, 1.32)		1.21 (1.07, 1.36)	
Cardiovasc-r	1.48 (1.43, 1.53)		1.55 (1.50, 1.61)	
Myocardial-n	1.61 (1.46, 1.78)		1.77 (1.60, 1.96)	
Stroke	1.23 (1.12, 1.34)		1.27 (1.16, 1.39)	
Respiratory	1.84 (1.71, 1.98)		1.82 (1.68, 1.96)	
Traffic ac-s	2.08 (1.56, 2.78)		1.72 (1.27, 2.32)	
Suicide	1.34 (1.17, 1.54)		1.41 (1.22, 1.63)	

Note for both tables: HRs for the 10th (lowest SEP) decile compared to 1st (highest SEP). Breast and prostate cancer: for men and women respectively.

6 Validation - SNC SE mortality

6.1 All cause mortality - 3.0



Note: See notes from previous section. 'Adjusted 2' - additionally adjusted for education and occupation.

6.2 Cause specific mortality - 3.0

	Age & sex		Adjusted 1		Adjusted 2	
	HR	95% CI	HR	95% CI	HR	95% CI
Lung cancer	1.92	(1.49, 2.48)	1.98	(1.52, 2.58)	1.45	(1.11, 1.91)
Breast can-r	0.91	(0.63, 1.32)	0.94	(0.64, 1.39)	0.94	(0.63, 1.40)
Prostate c-r	0.77	(0.54, 1.10)	0.77	(0.53, 1.12)	0.78	(0.53, 1.15)
Cardiovasc-r	1.51	(1.34, 1.68)	1.56	(1.38, 1.75)	1.35	(1.20, 1.53)
Myocardial-n	1.50	(1.10, 2.05)	1.58	(1.14, 2.19)	1.32	(0.95, 1.84)
Stroke	1.50	(1.10, 2.05)	1.60	(1.16, 2.20)	1.49	(1.07, 2.06)
Respiratory	2.03	(1.59, 2.59)	1.93	(1.50, 2.50)	1.63	(1.26, 2.13)
Traffic ac-s	1.55	(0.65, 3.70)	1.70	(0.68, 4.26)	1.88	(0.73, 4.86)
Suicide	0.82	(0.51, 1.30)	0.87	(0.53, 1.41)	0.73	(0.44, 1.20)

Note: results of traffic accidents have small number of events resulting in large CI (n=91)