

Lexicocalorimeter: Real-time health measurement

Last updated: 2021/10/26, 20:17:13 EDT

Principles of Complex Systems, Vols. 1 & 2
CSYS/MATH 300 and 303, 2021–2022 | @pocsvox

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Computational Story Lab | Vermont Complex Systems Center
Vermont Advanced Computing Core | University of Vermont



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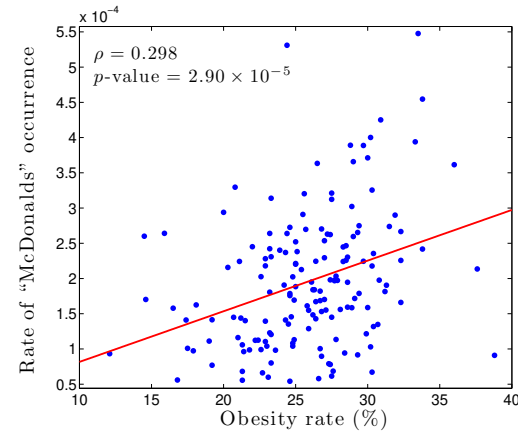
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Obesity and tweets—"McDonalds":



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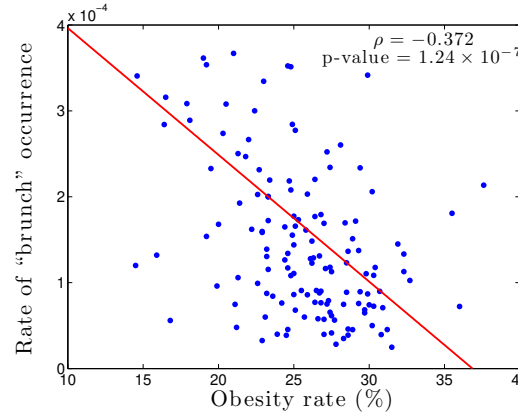
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Obesity and tweets—"Brunch":



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Word	ρ	$p\text{-value}$
cafe	-0.509	6.07×10^{-14}
sushi	-0.487	9.93×10^{-13}
brewery	-0.469	8.67×10^{-12}
restaurant	-0.448	8.93×10^{-11}
bar	-0.435	3.59×10^{-10}
banana	-0.434	3.77×10^{-10}
apple	-0.408	5.22×10^{-9}
fondue	-0.403	8.34×10^{-9}
wine	-0.400	1.08×10^{-8}
delicious	-0.392	2.17×10^{-8}
dinner	-0.386	3.85×10^{-8}
coffee	-0.384	4.51×10^{-8}
bakery	-0.383	5.12×10^{-8}
bean	-0.378	7.88×10^{-8}
espresso	-0.377	8.47×10^{-8}
cuisine	-0.376	8.82×10^{-8}
foods	-0.374	1.07×10^{-7}
tofu	-0.372	1.27×10^{-7}
brunch	-0.368	1.79×10^{-7}
veggie	-0.364	2.46×10^{-7}
organic	-0.361	3.13×10^{-7}
booze	-0.360	3.34×10^{-7}
grill	-0.354	5.4×10^{-7}
chocolate	-0.351	6.77×10^{-7}
#vegan	-0.350	7.47×10^{-7}

mcdonalds	0.246	6.18×10^{-4}
eat	0.241	8.22×10^{-4}
wings	0.222	2.13×10^{-3}
hungry	0.210	3.65×10^{-3}
heartburn	0.194	7.37×10^{-3}
ham	0.177	1.45×10^{-2}

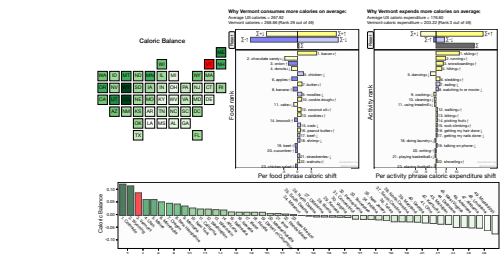
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"The Lexicocalorimeter: Gauging public health through caloric input and output on social media" [↗](#)
Alajajian, Williams, Reagan, Alajajian, Frank, Mitchell, Lahne, Danforth, and Dodds.
PLoS ONE, 12, e0168893, 2017. [1]



<http://panometer.org/instruments/lexicocalorimeter/> [↗](#)



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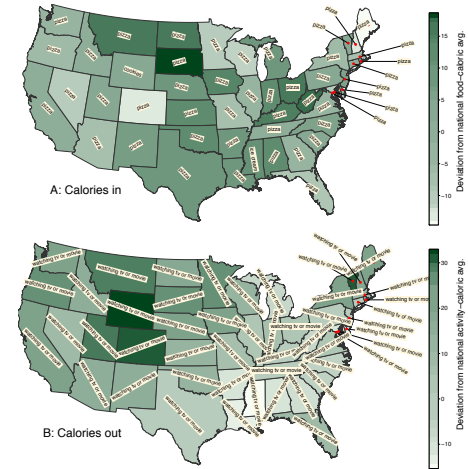
Outline

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The Lexicocalorimeter:



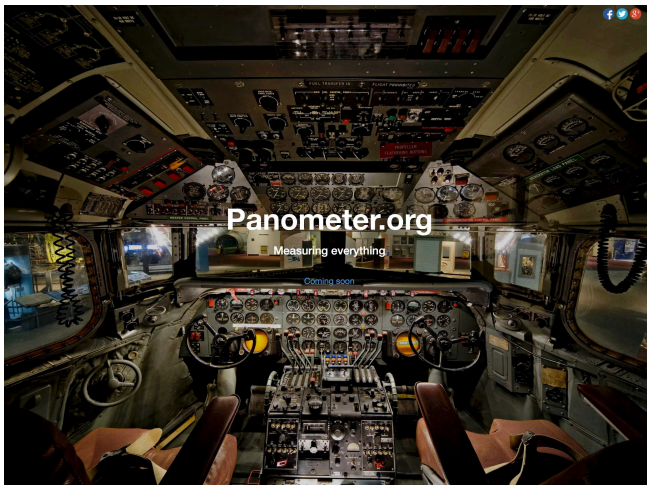
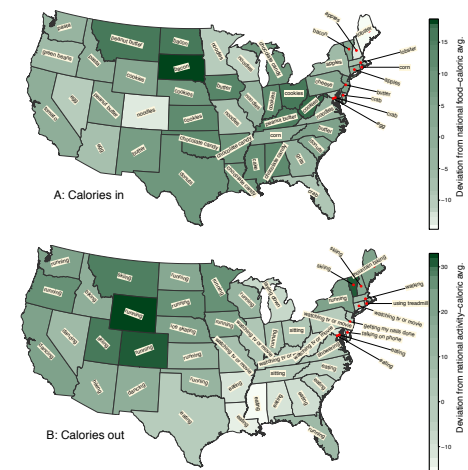
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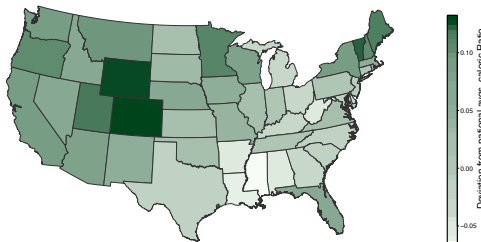
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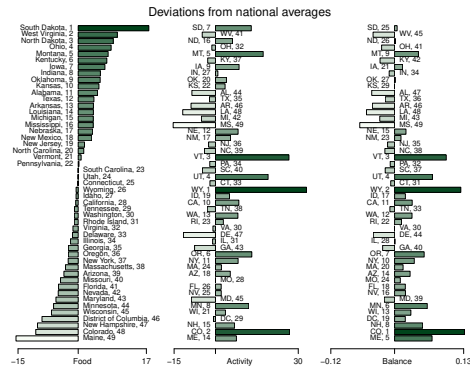


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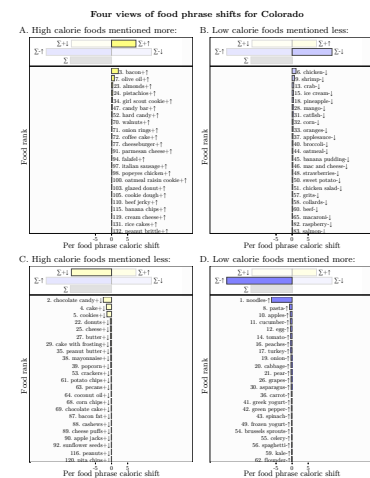


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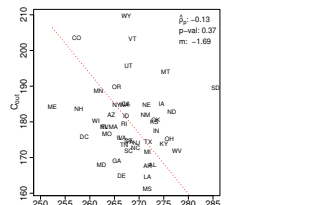


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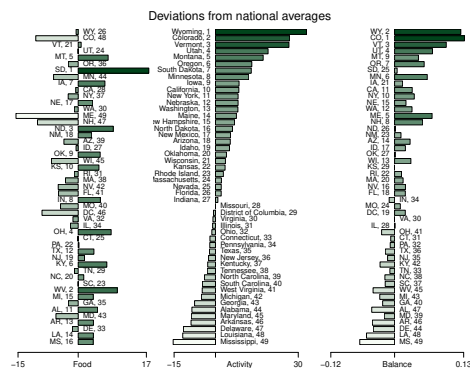


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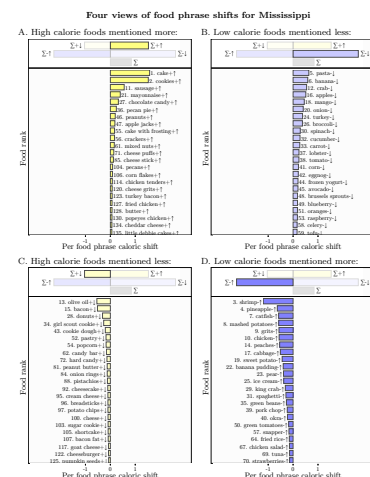


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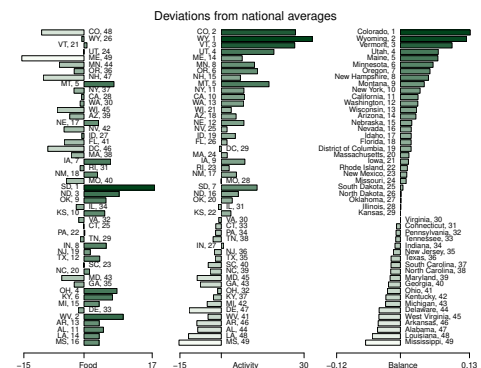


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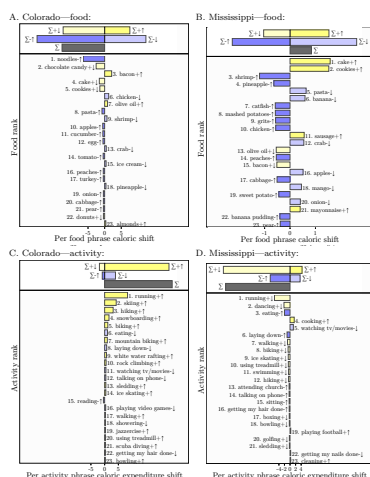


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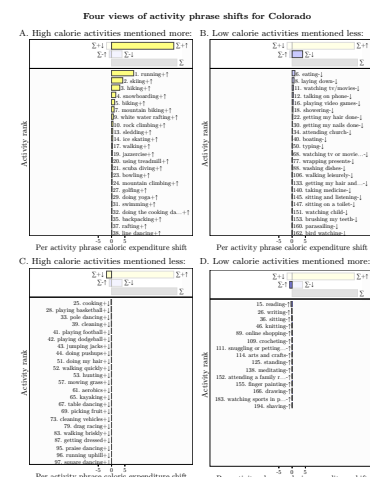


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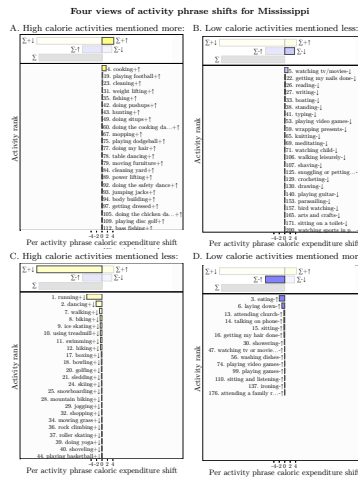


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Health and/or well-being quantity	ρ_s for C_{Lex}	p -val	ρ_s for C_{Lex}	p -val	ρ_s for C_{Lex}	p -val
1. % no physical activity in past 30 days [24]	-0.78	1.07×10^{-99}	0.58	4.91×10^{-69}	-0.66	1.59×10^{-98}
2. % have been physically active in past 30 days [24]	0.78	1.07×10^{-99}	0.58	4.91×10^{-69}	-0.66	1.59×10^{-98}
3. % high blood pressure [24]	-0.77	1.07×10^{-99}	0.58	1.16×10^{-69}	-0.73	2.07×10^{-98}
4. Heart disease death rate [27]	-0.74	1.12×10^{-99}	0.58	1.24×10^{-69}	-0.73	2.07×10^{-98}
5. Adult diabetes rate [25]	-0.74	1.17×10^{-99}	0.58	2.77×10^{-69}	-0.73	2.07×10^{-98}
6. CNBR quality of life ranking [26]	-0.71	1.25×10^{-99}	0.53	1.22×10^{-69}	-0.73	2.07×10^{-98}
7. % adult overweight/obesity [27]	-0.71	1.18×10^{-99}	0.53	1.14×10^{-69}	-0.69	1.56×10^{-98}
8. Gallup Wellbeing score [4]	0.7	1.17×10^{-99}	0.53	1.18×10^{-69}	-0.73	2.07×10^{-98}
9. % adult obesity [27]	-0.69	1.10×10^{-99}	0.52	1.11×10^{-69}	-0.69	1.56×10^{-98}
10. America's Health Rankings, overall [24]	-0.69	1.11×10^{-99}	0.4	1.14×10^{-69}	-0.67	2.65×10^{-98}
11. Life expectancy at birth [27]	-0.67	1.26×10^{-99}	0.51	1.19×10^{-69}	-0.67	2.58×10^{-98}
12. % who eat fruit less than once a day [28]	-0.65	1.12×10^{-99}	0.57	1.24×10^{-69}	-0.61	1.89×10^{-98}
13. % who eat vegetables less than once a day [28]	-0.63	1.12×10^{-99}	0.57	1.24×10^{-69}	-0.61	1.89×10^{-98}
14. % who eat vegetables less than once a day [28]	-0.65	1.12×10^{-99}	0.57	1.24×10^{-69}	-0.61	1.89×10^{-98}
15. Median daily intake of fruits [28]	-0.59	1.81×10^{-99}	0.47	1.60×10^{-69}	-0.48	1.24×10^{-98}
17. Median daily intake of vegetables [28]	0.5	1.75×10^{-99}	0.47	1.67×10^{-69}	-0.41	1.69×10^{-98}
18. Median household income [27]	0.48	1.17×10^{-99}	-0.5	8.58×10^{-69}	-0.4	1.07×10^{-98}
19. % high cholesterol [24]	-0.48	1.26×10^{-99}	0.24	1.16×10^{-69}	-0.48	1.05×10^{-98}
20. Colorectal cancer rate [25]	-0.47	1.72×10^{-99}	0.26	1.17×10^{-69}	-0.47	1.35×10^{-98}
21. Brain health ranking (29) (lower is better)	-0.46	1.95×10^{-99}	0.53	1.74×10^{-69}	-0.49	1.43×10^{-98}
22. US Census Gini index score (30) (lower is better)	-0.44	1.60×10^{-99}	0.11	1.12×10^{-69}	-0.51	2.22×10^{-98}
23. % with bachelor's degree or higher [6]	0.42	1.49×10^{-99}	0.41	1.42×10^{-69}	-0.29	2.82×10^{-98}
24. Avg. of poor mental health days, past 30 days [24]	-0.39	0.87×10^{-99}	0.1	1.31×10^{-69}	-0.48	1.23×10^{-98}
25. Nonintentional Big Five personality trait [31]	-0.37	1.13×10^{-99}	0.21	1.25×10^{-69}	-0.37	1.42×10^{-98}
26. Binge drinking rate [24]	-0.34	2.91×10^{-99}	-0.12	1.48×10^{-69}	-0.42	1.41×10^{-98}
27. Fatness markets per 100,000 in pop. [28]	0.33	2.96×10^{-99}	-0.01	0.92×10^{-69}	0.42	1.41×10^{-98}
28. Extraversion Big Five personality trait [31]	-0.33	2.83×10^{-99}	0.16	1.13×10^{-69}	-0.29	1.36×10^{-98}
29. Avg. of poor physical health days, past 30 days [24]	-0.32	1.43×10^{-99}	0.16	1.32×10^{-69}	-0.27	1.16×10^{-98}
30. Strolling of the Giffers because score (lower is better) [32]	-0.31	1.59×10^{-99}	-0.18	1.32×10^{-69}	-0.45	1.16×10^{-98}
31. % schools offering fruit/veg at cafeterias [28]	0.25	1.16×10^{-99}	-0.26	1.20×10^{-69}	0.03	1.75×10^{-98}
32. Openness Big Five personality trait [31]	0.23	1.13×10^{-99}	-0.2	1.24×10^{-69}	0.04	1.75×10^{-98}
33. % crop/land harvested for fruits/veg [28]	0.18	2.51×10^{-99}	-0.53	2.30×10^{-69}	-0.04	1.75×10^{-98}
34. Contentment/love Big Five personality trait [31]	-0.1	1.31×10^{-99}	0.14	1.37×10^{-69}	-0.01	1.78×10^{-98}
35. % women travel healthily food-related within 1/2 mile [28]	-0.06	7.4×10^{-99}	-0.26	1.69×10^{-69}	-0.24	1.28×10^{-98}
36. George Mason overall freedom ranking (33) (lower is better)	-0.02	8.90×10^{-99}	-0.02	1.73×10^{-69}	-0.1	1.58×10^{-98}
37. Agreeableness Big Five personality trait [31]	0	0.95×10^{-99}	0.24	1.26×10^{-69}	0.08	0.41×10^{-98}

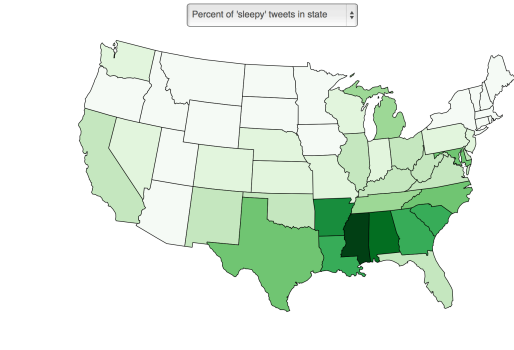
TABLE S1. Identical to Tab. 1 but with liquids included. Spearman correlation coefficients, ρ_s , and Benjamin-Hochberg p -values for caloric input C_{Lex} , caloric output C_{Lex} , and demographic data related to food and physical activity. Big Five personality traits [31], health and well-being rankings by state, and socioeconomic status, correlated, ordered from strongest to weakest Spearman correlations with caloric ratio.

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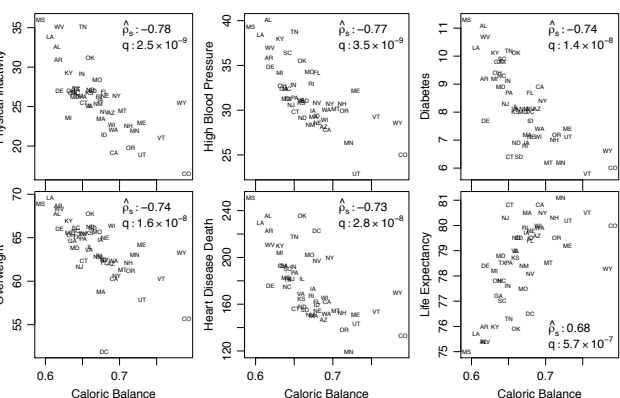


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Health and/or well-being quantity	ρ_s for C_{Lex}	p -val	ρ_s for C_{Lex}	p -val	ρ_s for C_{Lex}	p -val
1. % no physical activity in past 30 days [24]	-0.78	1.07×10^{-99}	0.58	4.91×10^{-69}	-0.66	1.59×10^{-98}
2. % have been physically active in past 30 days [24]	0.78	1.07×10^{-99}	0.58	4.91×10^{-69}	-0.66	1.59×10^{-98}
3. % high blood pressure [24]	-0.77	1.07×10^{-99}	0.58	1.16×10^{-69}	-0.73	2.07×10^{-98}
4. Heart disease death rate [27]	-0.74	1.12×10^{-99}	0.58	1.24×10^{-69}	-0.73	2.07×10^{-98}
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6. CNBR quality of life ranking [26]	-0.71	1.25×10^{-99}	0.53	1.22×10^{-69}	-0.73	2.07×10^{-98}
7. % adult overweight/obesity [27]	-0.71	1.18×10^{-99}	0.53	1.14×10^{-69}	-0.69	1.56×10^{-98}
8. Gallup Wellbeing score [4]	0.7	1.17×10^{-99}	0.53	1.18×10^{-69}	-0.73	2.07×10^{-98}
9. % adult obesity [27]	-0.69	1.10×10^{-99}	0.52	1.11×10^{-69}	-0.69	1.56×10^{-98}
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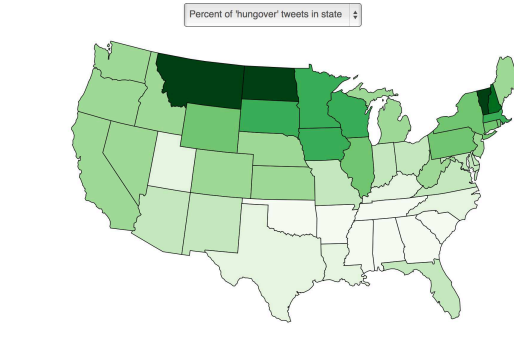
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2. % have been physically active in past 30 days [24]	0.78	1.07×10^{-99}	0.58	4.91×10^{-69}	-0.66	1.59×10^{-98}
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8. Gallup Wellbeing score [4]	0.7	1.17×10^{-99}	0.53	1.18×10^{-69}	-0.73	2.07×10^{-98}
9. % adult obesity [27]	-0.69	1.10×10^{-99}	0.52	1.11×10^{-69}	-0.69	1.56×10^{-98}
10. America's Health Rankings, overall [24]	-0.72	1.10×10^{-99}	0.53	1.20×10^{-69}	-0.59	2.96×10^{-98}
11. Life expectancy at birth [27]	-0.67	1.26×10^{-99}	0.51	1.19×10^{-69}	-0.67	2.58×10^{-98}
12. % who eat fruit less than once a day [28]	-0.65	1.12×10^{-99}	0.57	1.24×10^{-69}	-0.61	1.89×10^{-98}
13. % who eat vegetables less than once a day [28]	-0.63	1.12×10^{-99}	0.57	1.24×10^{-69}	-0.61	1.89×10^{-98}
14. % who eat vegetables less than once a day [28]	-0.65	1.12×10^{-99}	0.57	1.24×10^{-69}	-0.61	1.89×10^{-98}
15. Median daily intake of fruits [28]	-0.59	1.81×10^{-99}	0.47	1.60×10^{-69}	-0.48	1.24×10^{-98}
17. Median daily intake of vegetables [28]	0.5					