

General health and residential proximity to the coast in Belgium: results from a cross-sectional health survey

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12 Supplementary Materials

12.1 Tables

Table S 1: Overview of the health variables, proximity to the coast and the 12 covariables considered for control in the regression models.

	N (NA's excluded)	Based on question(s)/source	Reported answers	Value after manipulation	Year(s) questioned
Health					
General health	40970	How is your health in general?	Very bad, bad, fair, good, very good	1 - 5	1997, 2001, 2004, 2008, 2013
Residential proximity to the coast					
Proximity to the coast	60939	Town of residence based on National Register	390 municipalities in Belgium	0 - 310 km	1997, 2001, 2004, 2008, 2013
Covariables					
Age	60939	What is your age?	0 - 105 year	0-20, 21-45, 46-65, 65+	1997, 2001, 2004, 2008, 2013
Gender	60939	What is your gender?	Male, Female	Male, Female	1997, 2001, 2004, 2008, 2013
Having a chronic disease	32657	Do you suffer from (have) any chronic (long-standing) illness or condition (health problem)?	Yes, No	Yes, No	2001, 2004, 2008, 2013
BMI	45268	From length and weight of the respondents: How tall are you without shoes? How much do you weigh without clothes and shoes?	0 - 529	Normal weight, Underweight, Pre-obesity, Obesity class I, Obesity class II, Obesity class III	1997, 2001, 2004, 2008, 2013
Employment status	43569	Do you have at this moment a paid job, even if it is temporarily interrupted?	Yes, No	Yes, No	1997, 2001, 2004, 2008, 2013
Income	52468	Income of respondents compared to income distribution of Belgian population	Quintile 1, Quintile 2, Quintile 3, Quintile 4, Quintile 5	Quintile 1, Quintile 2, Quintile 3, Quintile 4, Quintile 5	1997, 2001, 2004, 2008, 2013
Smoking status	36963	Do you smoke at all nowadays?	Yes, daily, Yes, occasionally, Not at all	Non-smoker, occasional smoker, daily smoker	1997, 2001, 2004, 2008, 2013
Urbanization level	60939	Personal observations from HIS team based on criteria from Merenne et al 1997	Urban, sub-urban, rural	Urban, sub-urban, rural	1997, 2001, 2004, 2008, 2013
Green space ratio	54595	Statbel.be	6.4 % - 92.2 %	< 10 %, 10-20 %, 20-30 %, 30-40 %, 40-50 %, 50-60 %, 60-70 %, 70-80 %, 80-90 %, 90-100%	1997, 2001, 2004, 2008, 2013
Blue space ratio	55668	Statbel.be	0.0 % - 6.6 %	< 0.25 %, 0.25-0.5 %, 0.5-0.75 %, 0.75-1 %, 1-1.25 %, 1.25-1.5 %, 1.5-1.75 %, 1.75-2 %, > 2 %	1997, 2001, 2004, 2008, 2013
Season	60939	Date of taking the survey	For the 1997 survey: 01.01.1997 – 31.12.1997 For the 2001 survey: 01.01.2001 – 31.12.2001 For the 2004 survey: 01.02.2004 – 31.01.2005 For the 2008 survey: 15.05.2008 –	Winter, spring, summer, fall	1997, 2001, 2004, 2008, 2013

			30.06.2009 For the 2013 survey: 01.01.2013 – 31.12.2013		
Year	60939	Date of taking the survey	For the 1997 survey: 01.01.1997 – 31.12.1997 For the 2001 survey: 01.01.2001 – 31.12.2001 For the 2004 survey: 01.02.2004 – 31.01.2005 For the 2008 survey: 15.05.2008 – 30.06.2009 For the 2013 survey: 01.01.2013 – 31.12.2013	1997, 2001, 2004, 2008, 2013	1997, 2001, 2004, 2008, 2013
Hypothesized mechanisms					
Mental health	40535	All 12 items of the GHQ-12	More so than usual, same as usual, less than usual, much less than usual	0 - 12	1997, 2001, 2004, 2008, 2013
Physical activity	22451	6 questions related to how many days of vigorous, moderate and walking activities and the usual time spent performing these activities	0 - 25704 MET- min/week	< 250 MET- min/week, 250- 1250 MET- min/week, 1250-2500 MET-min/week, 2500-3500 MET-min/week, > 3500 MET- min/week	2001, 2004, 2008, 2013
Appreciation of social interactions	40983	How would you judge your social contacts?	Really satisfying, rather satisfying, rather unsatisfying, really unsatisfying	0 (really unsatisfying) – 3 (really satisfying)	1997, 2001, 2004, 2008, 2013
Air quality: PM ₁₀ concentration	60939	irCELine	8.3 µg/m ³ - 45.0 µg/m ³	< 10 µg/m ³ , 10- 20 µg/m ³ , 20-30 µg/m ³ , 30-40 µg/m ³ , 40-50 µg/m ³	1997, 2001, 2004, 2008, 2013

12.2 Figures

Model diagnostics revealed a linear distribution of the data with homogeneous variances (no heteroscedasticity) and the absence of outliers (Figure S 1, Figure S 2, **Error! Reference source not found., Error! Reference source not found.**). All models violate the assumption of normality.

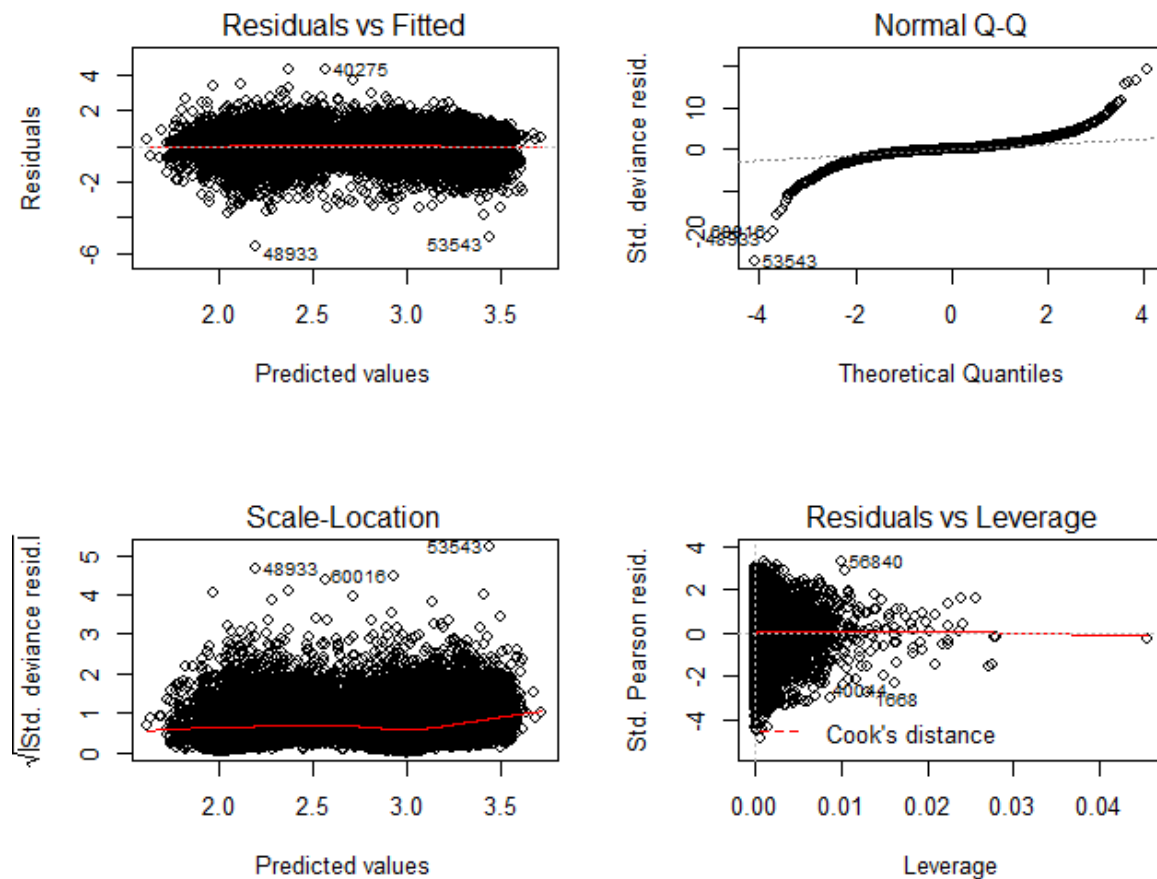


Figure S 1: Model diagnostics for comparing general health between coastal and inland populations. Top-left: the horizontal distribution of the residuals vs the fitted values indicate linear dependency; top-right: deviation at the ends of the normal Q-Q line indicates deviation from normality; bottom-left: Horizontal distribution of the variance of the residuals indicates homoscedasticity; bottom-right: Residuals vs the leverage indicates the absence of outliers.

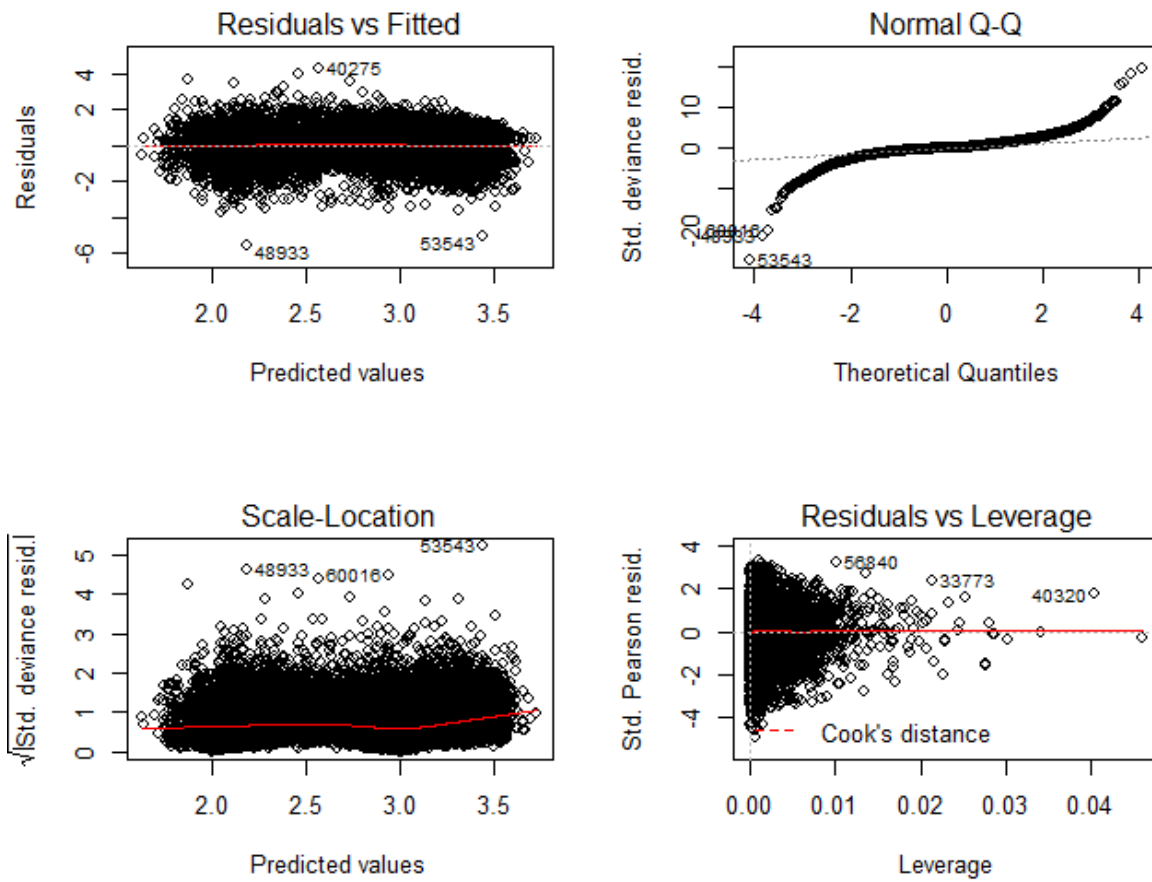


Figure S 2: Model diagnostics for the model comparing general health between eight populations with different proximity to the coast. Top-left: the horizontal distribution of the residuals vs the fitted values indicate linear dependency; top-right: deviation at the ends of the normal Q-Q line indicates deviation from normality; bottom-left: Horizontal distribution of the variance of the residuals indicates homoscedasticity; bottom-right: Residuals vs the leverage indicates the absence of outliers.

The modelling procedure inherently resulted in data reduction that was used in the model, since added variables contained missing values. This could lead to biased results from only including a particular part of the population. However, Figure S3 and Table S2 show that the data used in the entire survey compared to the data in the models had consistent age, sex ratio and income over all different categories of proximity to the coast, and that demographic characteristics also remained similar under the data-reduction.

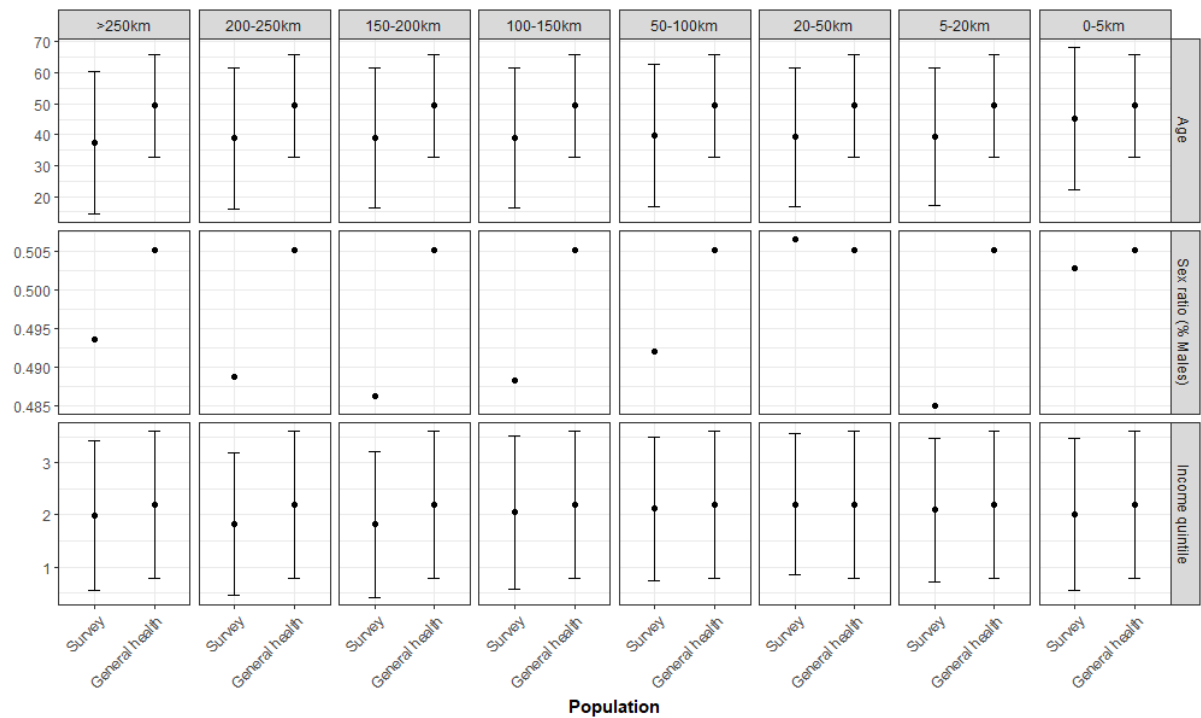


Figure S 3: Overview of the data that was available in the entire survey ('Survey' on x-axis) and the subset of the data that was used during modelling ('General health' on x-axis). Columns further subdivide the data according to different categories of proximity to the coast and rows indicate the age, sex ratio and income of the participants.

Table S 2: Overview of demographic parameters in all survey data, and of the data used during analyses. ‘Data models’ represents the models used to assess the total general health – residential proximity to the coast relationships, while ‘Data mediation’ refers to the models used for the mediation analyses used to investigate the indirect effects of the four hypothesized mechanisms.

	All data (N = 60,939) N = 57,360		Data models N = 23,624		Data mediation N = 15,418	
	Mean (1st Q, 3rd Q))/%	Weighted mean (1st Q, 3rd Q))/%	Mean (1st Q, 3rd Q))/%	Weighted mean (1st Q, 3rd Q))/%	Mean (1st Q, 3rd Q))/%	Weighted mean (1st Q, 3rd Q))/%
Mean age (years)	42.7 (24, 61)	39.263 (21, 56)	51.67 (37, 65)	49.378 (36, 62)	51.450 (37, 65)	49.342 (36,62)
Gender ratio (% males)	0.478	0.490	0.488	0.500	0.491	0.505
Ratio having a chronic disease (% no)	0.954	0.601	0.681	0.708	0.674	0.702
Mean BMI	25.129 (21.936, 27.472)	25.116 (21.967, 27.459)	25.379 (22.222, 27.739)	25.385 (22.266, 27.732)	25.344 (22.204, 27.732)	25.346 (22.222, 27.682)
Ratio employed (% yes)	0.568	0.523	0.508	0.558	0.518	0.564
Mean income (Q1, Q2, Q3, Q4, Q5)	1.91 (1, 3)	2.01 (1, 3)	2.062 (1, 3)	2.135 (1, 3)	2.124 (1, 3)	2.196 (1, 3)
Smoking ratio (% non-smoker)	0.996	0.633	0.678	0.672	0.698	0.693
Urbanization ratio (% urban)	0.525	0.449	0.444	0.411	0.466	0.422
Mean neighbourhood green space	0.361 (0.209, 0.468)	0.340 (0.218, 0.430)	0.369 (0.218, 0.487)	0.340 (0.217, 0.430)	0.365 (0.215, 0.485)	0.338 (0.215, 0.430)
Mean neighbourhood blue space	0.005 (0.001, 0.007)	0.006 (0.001, 0.007)	0.005 (0.001, 0.007)	0.006 (0.001, 0.008)	0.005 (0.001, 0.007)	0.006 (0.001, 0.007)

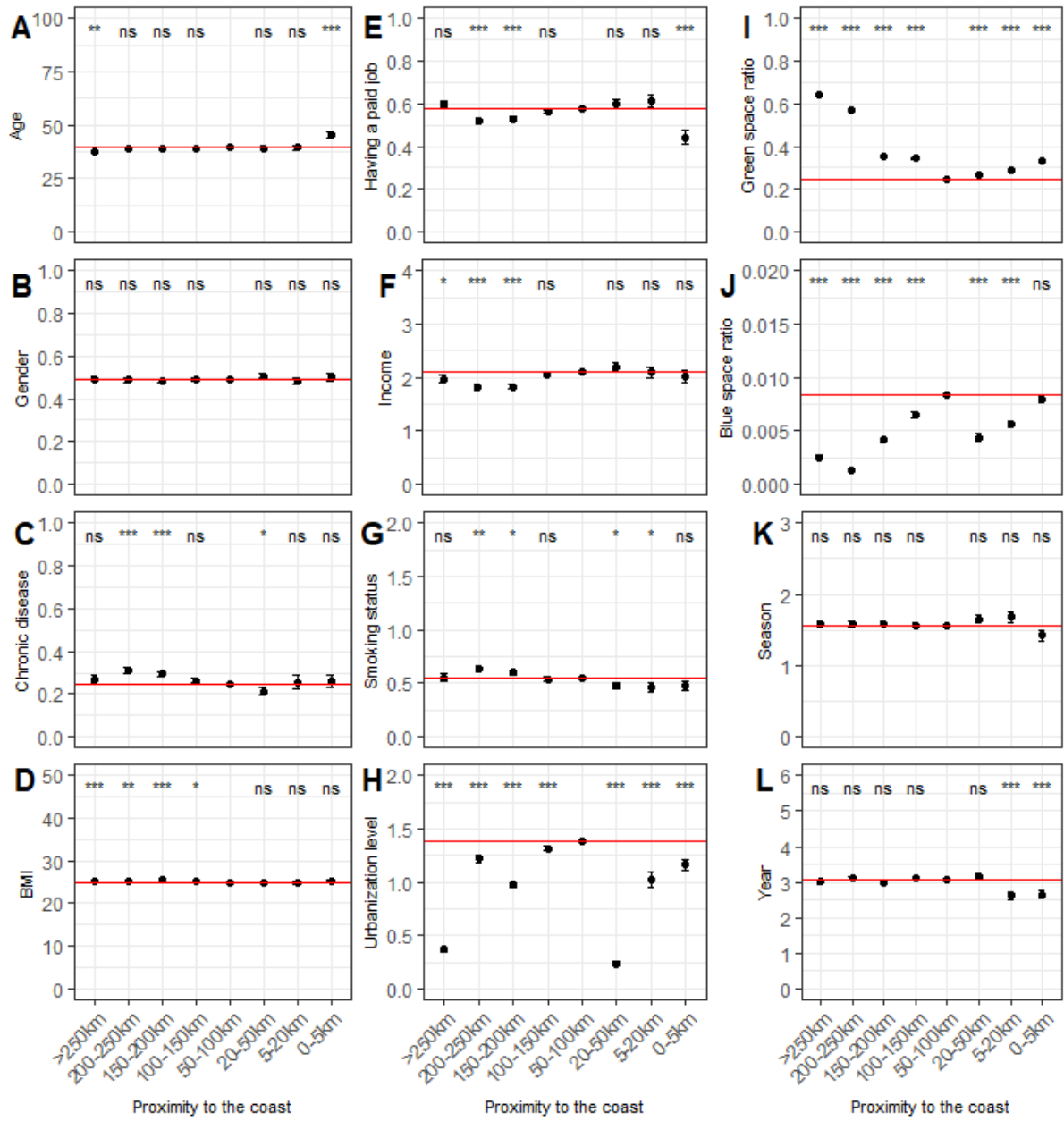


Figure S 4: Visualization of predicted output using linear regression models between each of the 12 covariables (A-L) and proximity to the coast (sole predictor). All categorical variables were numerically transformed.