

Table 9 (Cont'd.)

Year	Liberals			
	Canada	Ireland	U.K.	U.S.
1950	41.30	45.97	31.22	29.21
1951	38.37	45.74	31.11	28.45
1952	38.02	41.37	28.82	28.44
1953	35.42	39.37	27.62	27.78
1954	31.81	37.80	26.39	26.58
1955	31.17	36.74	25.80	26.41
1956	31.95	35.59	24.40	25.99
1957	30.95	33.10	23.95	26.35
1958	30.16	35.44	23.31	27.07
1959	28.37	32.02	23.13	26.39
1960	27.33	29.26	22.50	26.04
1961	27.20	30.54	22.12	25.29
1962	27.55	29.13	22.36	25.31
1963	26.34	26.59	21.78	25.23
1964	24.66	26.72	20.56	24.78
1965	23.56	25.25	19.62	24.70
1966	23.11	24.95	19.64	23.71
1967	21.98	24.43	18.79	22.45
1968	20.81	20.98	18.74	21.78
1969	19.34	20.55	18.56	21.02
1970	18.82	19.49	18.49	20.01
1971	17.55	17.97	17.93	19.12
1972	17.10	18.27	17.50	18.47
1973	15.55	17.96	17.23	17.72
1974	15.02	17.81	16.76	16.70
1975	13.67	17.51	16.04	16.07
1976	13.00	15.54	14.47	15.24
1977	12.38	15.52	14.16	14.12
1978	11.95	14.88	13.26	13.78
1979	10.91	12.78	12.90	13.07
1980	10.43	11.09	12.10	12.60

Table 9 (Cont'd.)

Year	Liberals (Cont'd.)			
	Canada	Ireland	U.K.	U.S.
1981	9.59	10.34	11.16	11.93
1982	9.12	10.52	10.98	11.52
1983	8.52	10.13	10.20	11.24
1984	8.11	9.63	9.61	10.79
1985	7.94	8.85	9.36	10.64
1986	7.89	8.69	9.51	10.35
1987	7.32	7.94	9.12	10.08
1988	7.20	8.86	8.97	9.95
1989	7.12	8.13	8.42	9.81
1990	6.82	8.18	7.85	9.22
1991	6.39	7.59	7.35	8.94
1992	6.10	6.48	6.58	8.52
1993	6.30	6.13	6.34	8.37
1994	6.28	5.74	6.19	8.02
1995	6.14	6.37	6.18	7.59
1996	5.60	5.98	6.09	7.32
1997	5.53	6.08	5.86	7.23
1998			5.69	
1999			5.78	7.20

Table 9 continues on following page

Table 9 (Cont'd.)

Year	Ex-dictatorships		
	Greece	Portugal	Spain
1951	62.27		
1952	54.30		
1953	52.50		
1954	48.86		
1955	90.24		
1956	87.82		
1957	87.97		
1958	84.00		
1959	88.60		
1960	77.50		
1961	39.85	88.77	37.08
1962	40.38	78.56	32.22
1963	39.29	73.11	31.95
1964	35.84	68.96	30.95
1965	34.30	64.94	29.46
1966	33.98	64.65	28.09
1967	34.33	59.22	26.14
1968	34.41	61.12	24.69
1969	31.80	55.76	22.61
1970	29.60	58.00	21.06
1971	26.91	49.77	18.88
1972	27.33	41.41	16.28
1973	24.14	44.83	15.21
1974	23.93	37.89	13.84
1975	23.96	38.91	18.88
1976	22.52	33.44	17.11
1977	20.36	30.29	16.03
1978	19.33	29.13	15.25
1979	18.73	26.02	13.03
1980	17.94	24.33	12.41

Table 9 (Cont'd.)

Year	Ex-dictatorships (Cont'd.)		
	Greece	Portugal	Spain
1981	16.27	21.81	12.48
1982	15.12	19.81	11.42
1983	14.57	19.31	10.89
1984	14.34	16.73	9.87
1985	14.14	17.83	8.92
1986	12.24	15.91	9.20
1987	11.72	14.24	8.88
1988	11.04	13.06	8.05
1989	9.73	12.18	7.78
1990	9.71	10.99	7.60
1991	9.03	10.81	7.19
1992	8.37	9.29	7.05
1993	8.49	8.73	6.69
1994	7.93	8.06	6.05
1995	8.15	7.51	5.49
1996	7.25	6.87	5.54
1997	6.44	6.43	5.03
1998	6.68	6.02	4.86
1999		5.63	

among the independent variables. We performed our analysis with bivariate statistical techniques based on cross-sectional studies for the years listed in the graphs and tables for each variable.

In this second part of the study, we used a statistical model that has enabled us to look at the impact of more than one variable while increasing the potency of the findings. We were able to do this by pooling all the data used in the study without considering the specific time periods; thus, all the data are presented in the same pool. This allowed us to look at the impact of each independent variable on the dependent variable for the entire time period and for the totality of countries. See Appendix II (p. 492) for a further explanation of the technique used for the analysis.

Multivariate analysis allows us to take into account several independent variables at the same time, and thus we can study the contribution of different aspects of the conceptual model, adjusting for other aspects. But we should mention that these models do not explain the full variability of mortality among the

different countries; there is some variability that depends on other aspects not included in our models. This is important for two reasons: the values of the parameters may change if we change the variables included or if we include new aspects in the models; and these models are not predictive: they refer only to the relationships in the time period and countries considered in the study.

Table 10 summarizes the changes in the actual value of IMR due to the variation of each unit of the independent variable. Thus, the first column (Separate) shows that:

*Power Relations*

- For every 1 percent increase in votes for SDPs, infant mortality declined 0.15 per 1,000 live births.
- For every 1 percent increase in population participation, infant mortality declined 0.13 per 1,000 live births.

*Welfare State*

- For every 1 percent increase in population covered by the public health care system, infant mortality declined 0.46 per 1,000 live births.

Table 10

Pooled cross-sectional analysis—dependent variable: infant mortality rate

Variables	(1) Separate	(2) Global 1 <sup>a</sup>	(3) Global 2	(4) Global 3 <sup>a</sup>
<b>Power relations</b>				
Left vote	-0.15**	-0.04**	-0.11**	-0.03**
Voter turnout	-0.13**			
<b>Welfare state</b>				
Health care coverage	-0.46**	-0.10**		
<b>Labor market</b>				
% Active population	-0.58**			
% Female labor force	-0.96**		-0.90**	
<b>Inequalities</b>				
Theil index	147.5**			178.2**
GDP per capita	-0.0007**			
Theil*GDP per capita in 1969				-0.04**

<sup>a</sup>Models also adjusted for the year.  
\* $P < 0.05$ ; \*\* $P < 0.01$

*Labor Market*

- For every 1 percent increase in active population, infant mortality declined 0.58 per 1,000 live births.
- For every 1 percent increase in female labor force, infant mortality declined 0.96 per 1,000 live births.

*Inequalities*

- For every increase in inequalities of 0.01 in the Theil index, infant mortality increased 1.47 per 1,000 live births.
- For every dollar increase (measured in PPC values) in the studied countries, infant mortality declined 0.0007 per 1,000 live births.

The other models also enable us to look at the changes in these values when several variables are considered, which is a substantial innovation over previous studies. The second column (Global 1) in Table 10 shows the influence on infant mortality of the percentage of left votes and public health care coverage. We can see that for every 1 percent increase in left votes, infant mortality declines 0.04 per 1,000 live births, controlling for the other variables included in the regression. If the variable that changes is 1 percent of public health coverage, then the decline is 0.10 per 1,000. In the third column (Global 2) of Table 10 we have a model that includes the percentage of left votes and the percentage of workers that are women. We see in this column that with every 1 percent increase in the percentage of workers that are women, IMR declines by 0.90 per 1,000. The fourth column (Global 3) of Table 10 includes the percentage of left votes and the Theil Inequality index adjusted for level of development at the starting date of this model, 1969. If the Theil index changes 0.01, the decline in IMR is 1.78 years per 1,000 live births, but this decline is less important in countries with higher GDP per capita at the starting point, 1969.

Table 11 summarizes the changes in the actual value of life expectancy at birth for females due to the variation of each unit of the independent variable. Thus, the first column (Separate) shows that:

*Power Relations*

- For every 1 percent increase in votes for SDPs, female life expectancy at birth increased 0.04 year.
- For every 1 percent increase in population participation, female life expectancy at birth increased 0.03 year.

*Welfare State*

- For every 1 percent increase in population covered by the public health care system, female life expectancy at birth increased 0.12 year.

*Labor Market*

- For every 1 percent increase in active population, female life expectancy at birth increased 0.17 year.

Table 11

Pooled cross-sectional analysis—dependent variable: life expectancy at birth, females

Variables	(1)	(2)	(3)	(4)
	Separate	Global 1 <sup>a</sup>	Global 2	Global 3 <sup>a</sup>
<b>Power relations</b>				
Left vote	0.04**	0.007*	0.018**	0.003
Voter turnout	0.03**			
<b>Welfare state</b>				
Health care coverage	0.12**	0.02*		
<b>Labor market</b>				
% Active population	0.17**			
% Female labor force	0.40**		0.38**	
<b>Inequalities</b>				
Theil index	-26.36*			-65.2**
GDP per capita	0.0002**			
Theil*GDP per capita in 1969				0.02**

<sup>a</sup>Models also adjusted for the year.\* $P < 0.05$ ; \*\* $P < 0.01$ 

- For every 1 percent increase in female labor force, female life expectancy at birth increased 0.40 year.

**Inequalities**

- For every increase in inequalities of 0.01 in the Theil index, female life expectancy at birth declined 0.26 year.
- For every dollar increase (measured in PPC values) in the studied countries, female life expectancy at birth increased 0.0002 year.

The other models also enable us to look at the changes in these values when several variables are considered. The second column (Global 1) in Table 11 shows the influence on female life expectancy at birth of the percentage of left votes and public health care coverage. We can see that for every 1 percent increase in the percentage of left votes, female life expectancy at birth increases by 0.007 year, controlling for the other variables. If the variable that changes is 1 percent of public health coverage, then the increase is 0.02 year. In the third column (Global 2) of Table 11, we have included the percentage of left votes and the percentage of workers that are women. We see in that column that for every 1 percent increase in the percentage of workers that are women, female life

expectancy at birth increases 0.38 year. The fourth column (Global 3) of Table 11 shows the model with the percentage of left votes (which loses statistical significance) and the Theil index adjusted for level of development at the starting date of the model, 1969. An increase of 0.01 in the Theil index reduces female life expectancy at birth by 0.65, but this reduction is less important in countries with higher GDP per capita at the starting point, 1969.

Table 12 summarizes the changes in the actual value of life expectancy at birth for males due to the variation of each unit of the independent variable. Thus, the first column (Separate) shows that:

**Power Relations**

- For every 1 percent increase in votes for SDPs, male life expectancy at birth increased 0.03 year.
- For every 1 percent increase in population participation, male life expectancy at birth increased 0.02 year.

**Welfare State**

- For every 1 percent increase in population covered by the public health care system, male life expectancy at birth increased 0.10 year.

Table 12

Pooled cross-sectional analysis—dependent variable: life expectancy at birth, males

Variables	(1)	(2)	(3)	(4)
	Separate	Global 1 <sup>a</sup>	Global 2	Global 3 <sup>a</sup>
<b>Power relations</b>				
Left vote	0.03**	0.002*	0.006	0.006**
Voter turnout	0.02**			
<b>Welfare state</b>				
Health care coverage	0.10**	0.009*		
<b>Labor market</b>				
% Active population	0.24**			
% Female labor force	0.41**		0.41**	
<b>Inequalities</b>				
Theil index	-12.8			-48.6**
GDP per capita	0.0003**			
Theil*GDP per capita in 1969				0.02**

<sup>a</sup>Models also adjusted for the year.\* $P < 0.05$ ; \*\* $P < 0.01$

*Labor Market*

- For every 1 percent increase in active population, male life expectancy at birth increased 0.24 year.
- For every 1 percent increase in female labor force, male life expectancy at birth increased 0.41 year.

*Inequalities*

- For every increase in inequalities of 0.01 in the Theil index, male life expectancy at birth declined 0.128 year.
- For every dollar increase (measured in PPC values) in the studied countries, male life expectancy at birth increased 0.0003 year.

The complete model also enables us to look at the changes in these values when several variables are considered. The second column (Global 1) in Table 12 shows the influence on male life expectancy at birth of the percentage of left votes and public health care coverage. We can see that for every 1 percent increase in the percentage of left votes, male life expectancy at birth increases 0.002 year, controlling for the other variables. If the variable that changes is 1 percent of public health coverage, then the increase is 0.009 year. In the third column (Global 2) of Table 12, we have included the percentage of left votes and the percentage of workers that are women. We see in this column that for every 1 percent increase in the percentage of workers that are women, male life expectancy at birth increases 0.41 year. In the fourth column (Global 3) we show the model with left votes and the Theil Inequality index adjusted by development at the starting date of this model, 1969. If the Theil index changes 0.01, then the decline in male life expectancy is 0.48 year, but this decline is less important in countries with higher GDP per capita at the starting point, 1969.

### SUMMARY CONCLUSIONS OF THE POOLED CROSS-SECTIONAL STUDY

In this second part of the article, we have gone to great lengths to quantify the relationships between political variables, labor market, welfare state, social inequalities, and mortality, looking at how, statistically, the changes in one variable affect mortality. The other major conclusion of this part of the study is that it confirms the findings of the bivariate analysis: that is, both statistical models present robust evidence that infant mortality is clearly affected by

1. *income inequalities*, such that the higher the income inequalities (measured by the Theil index), the higher the IMR;
2. *political variables*, such that the larger the left vote (or the votes for pro-redistribution parties), the lower the IMR;

### APPENDIX I Time in government, 1946–2000\*

	1946–2000		
	Yrs SDPs <sup>a</sup>	Yrs CDPs <sup>b</sup>	Yrs LPs <sup>c</sup>
<b>Social democrats</b>			
Sweden	45	10	0
Norway	39	16	0
Denmark	35	20	0
Finland	32	23	0
Austria	31	24	0
Mean	36.40	18.60	0.00
<b>Christian democrats</b>			
Belgium	20	35	0
Netherlands	14	41	0
Germany	15	37	0
France	13	29	0
Italy	10	41	0
Mean	14.40	36.60	0.00
<b>Liberals<sup>d</sup></b>			
Canada	0	0	31
Ireland	6	12	35
Great Britain	19	0	36
United States	0	0	28
Mean	6.25	3.00	32.50
<b>Ex-dictatorships</b>			
Spain	14	10	0
Greece	15	12	0
Portugal	9	16	0
Mean	12.67	12.67	0.00

\*This table was prepared by Nuria Vergés.

<sup>a</sup>This column includes those parties that explicitly state their commitment to redistributive public policies. We refer to them as SDPs. It includes: Sweden: SD; Norway: A; Denmark: SD, RL; Finland: SDP, PPDU, CE (if in coalition with SDP), GR, SDL; Austria: SPD, KPÖ; Belgium: PCB, KPB, SP, PS, AGALEV, ECOLO; Netherlands: KVP, PVDA, SP, D570, D66; Germany: KPB, GB, B 90, GR, SPD, France: PS, PC, ED, RCV; Italy: PSDI, GR, PSDI, RI, DS; Ireland: Lab., DL; United Kingdom: Lab., Spain: PSOE; Greece: PASOK, SYN; Portugal: PS, PC.

<sup>b</sup>This column includes those conservative parties that are either Christian democrats or conservative parties in the Judeo-Christian tradition. We refer to them as CDPs. It includes: Sweden: Ce, Li, Co; Norway: H, V, KR, SP; Denmark: JP, Con, Lib.; CD, CFP; Finland: Lib., SW, Con., CHR, CE (if in coalition with Con.); Austria: ÖVP, FPÖ; Belgium: PVV, PLP, CVP, PSC, PRL, VLD, VU, FDP; Netherlands: ARP, VVD, CHU, CDA; Germany: CDU, CSU, FDP, DP; France: UMR, CNI, CD, FNRL, RPR, UDF, UG; Italy: DC, PLI, PRI, FDI, LN, AN, CCD, PPI, SDI, UDR; Ireland: FG; Spain: UCD, PP; Greece: ND; Portugal: PSD, AD, CDS, PPM.

<sup>c</sup>This column includes the Anglo-Saxon conservative parties based in the liberal tradition. We refer to them as LPs. It includes: Canada: PC; Ireland: FF, PD; United Kingdom: Con.; United States: Rep.

<sup>d</sup>The aggregate number of years does not add up to the whole period 1946–2000 because we include only governing parties within those traditions stated in the table.

3. *welfare state policies*, such that the higher the level of public health care coverage and the higher the public health care expenditures, the lower the IMR; and
4. *labor market policies*, such that the larger the percentage of the adult population that is active and the larger the percentage of women working, the lower the IMR.

This last part of the article has quantified the level of these relationships.

#### APPENDIX II Multilevel Analysis\*

Over the past few years there has been a growing interest in public health research in considering factors defined at multiple levels. Multilevel analysis (or hierarchical modeling) has emerged as one analytical strategy that can partly address this need, by allowing the simultaneous examination of group-level and individual-level factors. The use of multilevel analysis raises theoretical and methodological issues related to the theoretical models being tested, the conceptual distinction between group-level and individual-level variables, the ability to differentiate "independent" effects, the reciprocal relationships between factors at different levels, and the increased complexity that these models imply. In addition to considering individuals nested within groups, multilevel models are useful in many other situations with nested sources of random variability. One of the most frequent applications of hierarchical models involves longitudinal data analysis, repeated observations (level 1) nested within individuals or sections (level 2) over time (1).

To analyze the association between indicators in the OECD countries considered in the Barcelona model and infant mortality or life expectancy, we used time series of aggregate-level data across the majority of OECD countries, a process called pooled cross-sectional time series analysis. Because there were missing data for some of the independent variables, we restricted this analysis to the years 1969 to 1994 and to 15 of the 17 countries included in the complete data set.

Hierarchical linear models provide the best alternative for analyzing such complex data sets. The reasons for using this method are twofold. On the one hand, it may be the best choice simply for statistical reasons, as single univariate time series are often too short for conventional time series techniques, and pooling of series across sections (e.g., countries, regions) may greatly increase sample size. On the other hand, one may be interested in modeling the differences in parameter estimates or in testing their homogeneity across sections. With these models, the association between the outcome and the independent variables need not

be fixed to be constant across sections, and intercept and slopes are assumed to vary randomly across sections

In the models used in our study, the infant mortality rate or life expectancy,  $Y_{ij}$ , for year  $i$  within country  $j$ , is conceived as a univariate outcome, observed at different times. The model is based in a matrix of repeated observation. The model has two levels:

$$\text{Level 1 model: } Y_{ij} = \beta_{0j} + \beta_{1j} \text{ left votes} + \beta_{2j} \text{ PHC coverage} + \beta_{3j} \text{ labor market} + \beta_{4j} \text{ Theil index} + \text{year} + \varepsilon_{ij}$$

$$\begin{aligned} \text{Level 2 model: } & \beta_{0j} = \delta_{00} + U_{0j} \\ & \beta_{1j} = \delta_{10} + U_{1j} \\ & \beta_{2j} = \delta_{20} + U_{2j} \\ & \beta_{3j} = \delta_{30} + U_{3j} \\ & \beta_{4j} = \delta_{40} + \delta_{41} \text{ GDP initial} + U_{4j} \end{aligned}$$

This model can also be expressed as:

$$M_{ij} = \delta_{00} + \delta_{10} \text{ left votes} + \delta_{20} \text{ PHC coverage} + \delta_{30} \text{ labor market} + \delta_{40} \text{ Theil index} + \delta_{41} (\text{Theil index} * \text{GDP initial}) + \varepsilon_{ij} + U_{0j} + U_{1j} + U_{2j} + U_{3j} + U_{4j}$$

The level 1 model relates the observed data to the complete data set (the data for all the years for each country) and it allows us to explain within-country variation. We were interested in associations between the outcome and each of the indicators considered (left votes, PHC coverage, labor market measured as active population or female labor force, and income inequality measured by Theil index) while controlling for the others.

The level 2 model includes the intercept and slope variation across countries and the interaction between the Theil index and GDP per capita in 1969 to control the poverty effect in income inequality association.

As we were interested in infant mortality and life expectancy differences among countries, we first obtained models including each of the independent variables—these models are indicated in the tables (Tables 10, 11, 12) as "separate"—to discover the principal indicator effects in outcome variability across countries. Then we adjusted three models that combined all indicators considered in the Barcelona model in order to discover the adjusted indicator effects in outcome variability observed across countries—left time governing, PHC coverage, percent active population or percent female labor force, Theil index, and the interaction between the Theil index and GDP per capita at initial time—in order to discover whether the effect of income inequalities on infant mortality or life expectancy changes, depending on the level of GDP.

It is important to emphasize that these ecological models are explicative and not predictive, and they estimate adjusted associations between health outcomes and

ecological determinants of health, but they do not permit any determination of causality in these associations.

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## DO SOCIAL POLICIES AND POLITICAL CONTEXT MATTER FOR HEALTH IN THE UNITED KINGDOM?

Tim Doran and Margaret Whitehead

This U.K. case study combines lessons from historical assessments with new empirical analyses of trends over the last decade to inform an appraisal of the impact of social actions on health. The empirical analyses examine life expectancy in the 354 local government councils in England by first identifying those that have better or worse health than expected from their socioeconomic profile, and then selecting paired sets of "overachievers" and "underachievers" for more in-depth analysis. The findings taken as a whole provide evidence that social policies and political context do indeed matter for health. The historical material from the first industrial revolution, in particular, provides some of the most compelling evidence for this proposition. The empirical analyses over the last decade found a very powerful inverse association: the more deprived the local council, the lower the life expectancy of the population within that locality. However, even for the same level of deprivation and socioeconomic characteristics, some councils were doing much better than others in terms of health: for example, more than three years difference in life expectancy for carefully matched "urban fringe" councils. The article then examines the councils' political makeup and hence their likely policy perspective.

As for our partners in this European collaborative project, our central focus is on the question "do social policies and political context matter for health?" However, to address this question in the United Kingdom, the situation needs to be put in its historical context. Politics, socioeconomic conditions, and health inequalities are intimately linked in the United Kingdom and map closely onto distinct geographic areas. The British industrial revolution of the 19th century and associated rapid urbanization produced the most atrocious living and working conditions for the workers needed for the new industries—which, furthermore,