



Amsterdam School of Economics

Econometric Game 2009

Case B (9 April 2009): Analysis of the decline in infant mortality in Brazil

Research question: Many studies conclude that the “Family Health Program” (PSF, Programa Saúda da Familia) has helped substantially to reduce childhood mortality in Brazil. Now about half of the population is covered by this program, which was gradually implemented from the mid-90’s on but at a different pace per state. This programme involves proactive integrated local primary health care services. Ideally such studies should be based on data per family, or by municipality, but we just have the publicly available aggregated data for the 27 Brazilian states (in fact 26 states and the federal district) over the 8 consecutive years 1998-2005. Hence, any analysis of these panel data will be hampered by both sample dimensions being relatively small. Nevertheless, make an attempt to advice on fruitful policy measures to further reduce infant mortality in Brazil.

Data: The data have been downloaded from:

I. The Ministry of Health:

<http://w3.datasus.gov.br/datasus/datasus.php>

II. Secretariat of Strategic Affairs (Presidential office):

<http://www.ipeadata.gov.br/ipeaweb.dll/ipeadata?5347125>

III. The Ministry of Health:

<http://dtr2004.saude.gov.br/dab/abnumeros.php#historico>

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Available data files (all containing the same data and variable names):

brazil.xls (Excel); brazil.dta (Stata); brazil.wf1 (EViews)

Code book (and origin of data):

im1 infant mortality: number that died before first birthday per 1000 live births (I)
ana analphabetic index: % of illiterates among population of over 15 years old (I)
chl number of children younger than 1 (I)
med medics: number of medical doctors per 1000 inhabitants (I)
hos hospital beds per 1000 inhabitants (I)
fer fertility: mean number of children per woman (I)

lbi	live birth: number of life births per 1000 inhabitants (I)
pc_11	GDP per capita, one year lagged (because 2005 was not available) (I)
pov	poverty index: % of poor people (less than half the minimum wage) (I)
wat	water: % of population living in houses with running water (I)
sew	sewerage: % of population living in houses with sewerage (I)
gar	garbage collection: % of population enjoying refusal collection (I)
gin	gini index of income inequality (II)
yhc	per capita household income in 2002 prices (II)
psf	coverage of population by teams from the family health plan in December (III)
im6	infant mortality between 1-6 days per 1000 live births (I)
im7	infant mortality between 7-27 days per 1000 live births (I)
im8	infant mortality between 28-365 days per 1000 live births (I)

The data set is balanced (no missing observations) because some missing intermediate years have been obtained by averaging neighboring years; this was done for 5 variables for one year each, viz.: an (2000), ho (2004), po (2000), se (2003), yc (2000), and in addition for 2 single observations of variable me.

Brazil has 5 major geographical regions. Some data (2006) on these are the following:

Região	total pop. in millions	contribution to GDP	% less than 8 years schooling	unemployment rate (%)	coverage by PSF (%)
A Região Norte	15	5.1	53	7.1	41.8
B Região Nordeste	52	13.1	61	8.3	67.2
C Região Sudeste	80	56.8	42	9.6	34.0
D Região Sul	27	16.3	46	6.0	44.6
E Região Centro-Oeste	13	8.7	48	8.4	44.7
Total	187	100%	49	8.4	46.2

Below the 27 states are given in alphabetic order, with in the first column their numeric id (code number) in the panel data files, and in the second column a letter indicating to which of the 5 geographical regions they belong. Some further 2005/2006 data are given in the columns:

a = population

b = GDP per capita in 2005 in 2000 prices

c = % less than 4 years schooling

d = % of child labourers in the age group of 10-15 years old

e = % of population covered by PSF (Programa Saúde da Família)

id	region	state	a	b	c	d	e
1	A	Acre	676625	6792.3	11.06	17.87	67.5
2	B	Alagoas	3050650	4686.81	14.28	15.71	69.7
3	A	Amapá	615714	7344.59	9.11	4.32	54.1
4	A	Amazonas	3321055	10289	7.58	11.34	46.7
5	B	Bahia	13950147	6582.76	14.26	15.44	46.1
6	B	Ceará	8217083	5053.92	13.70	18.09	56.2
7	E	Distrito Federal	2383788	34510.62	5.74	2.24	6.3
8	C	Espírito Santo	3464284	13845.64	10.79	10.95	46.0
9	E	Goiás	5730751	8992.3	10.81	9.16	57.1

10	B	Maranhão	6184538	4149.54	14.98	19.89	71.6
11	E	Mato Grosso	2856999	13365.09	12.56	13.86	54.0
12	E	Mato Grosso do Sul	2297982	9557.21	11.10	9.73	48.1
13	C	Minas Gerais	19479355	10012.29	12.00	13.30	55.4
14	A	Pará	7110467	5616.46	15.21	15.80	26.3
15	B	Paraíba	3623218	4689.8	15.83	15.64	90.8
16	D	Paraná	10387378	12339.09	10.44	12.63	47.4
17	B	Pernambuco	8502604	5931.35	13.51	16.61	62.6
18	B	Piauí	3036285	3699.84	14.50	19.68	95.2
19	C	Rio de Janeiro	15561721	16052.1	9.11	2.73	26.6
20	B	Rio Grande do Norte	3043759	5947.88	14.64	11.02	79.7
21	D	Rio Grande do Sul	10963219	13309.62	9.56	14.66	28.4
22	A	Rondônia	1562418	8407.44	11.42	15.70	36.8
23	A	Roraima	403344	8123.85	9.34	17.17	73.8
24	D	Santa Catarina	5958264	14539.16	10.28	14.51	63.6
25	C	São Paulo	41055735	17977.32	8.19	4.38	21.9
26	B	Sergipe	2000736	6820.85	14.91	13.73	82.5
27	A	Tocantins	1332441	6957.04	14.08	17.91	74.5

Dependent variable: Analyze what determines variable im (analyze im6-8 only when you have plenty of time). You are not expected to make attempts to collect further data.

References:

Regarding childhood mortality in Brazil, in particular infant mortality, various panel data studies analyzed the impact of “the family health programme” (PSF). Some of these **studies** are:

- Alves, D., Belluzzo, W., 2004. Infant mortality and child health in Brazil. *Economics and Human Biology*, Vol. 2, 391-410.
- Aquino, R., Oliveira, N.F. de, Barreto, M.L., 2009. Impact of the Family Health Program on infant mortality in Brazilian municipalities. *American Journal of Public Health*, Vol. 99, 87-93.
- Macinko, J., Guanais, F.C., Marinho de Souza, M.F., 2006. Evaluation of the impact of the Family Health Program on infant mortality in Brazil, 1990-2002. *Journal of Epidemiology and Community Health*, Vol. 60, 13-19.
- Macinko, J., Marinho de Souza, M.F., Guanais, F.C., Silva Simoes, C.C. da, 2007. Going to scale with community-based primary care: An analysis of the Family Health Program on infant mortality in Brazil, 1999-2004. *Social Science and Medicine*, Vol. 65, 2070-2080.