APPENDIX

TABLE A: All countries used in the study, quartiled by average GDP/capita from 1981-2011.

Quartile 4: Lowest GDP per capita	Quartile 3: second lowest GDP per capita	Quartile 2: second highest GDP per capita	Quartile 1: highest GDP per capita	Unclassified (GDP per capita data unavailable)
Angola	Albania	Antigua and Barbuda	Andorra	Afghanistan
Bangladesh	Algeria	Argentina	Aruba	Cayman Islands
Benin	Armenia	Barbados	Australia	Myanmar
Burkina Faso	Azerbaijan	Belize	Austria	South Sudan
Burundi	Belarus	Botswana	Bahamas, The	Virgin Islands (U.S.)
Cambodia	Bhutan	Brazil	Bahrain	
Central African Republic	Bolivia	Chile	Belgium	
Chad	Bosnia and Herzegovina	Colombia	Bermuda	
Comoros	Bulgaria	Costa Rica	Brunei Darussalam	
Congo, Dem. Rep.	Cape Verde	Croatia	Canada	
Cote d'Ivoire	China	Cuba	Channel Islands	
Ethiopia	Congo, Rep.	Czech Republic	Cyprus	
Eritrea	Djibouti	Dominica	Denmark	
Gambia, The	Ecuador	Dominican Republic	Faeroe Islands	
Ghana	Egypt, Arab Rep.	Equatorial Guinea	Finland	
Guinea	El Salvador	Estonia	France	
Guinea-Bissau	Fiji	Gabon	French Polynesia	
Haiti	Georgia	Grenada	Germany	
India	Guatemala	Hungary	Greece	
Kenya	Guyana	Jamaica	Greenland	
Kyrgyz Republic	Honduras	Latvia	Hong Kong SAR, China	
Lao PDR	Indonesia	Lebanon	Iceland	
Lesotho	Iran, Islamic Rep.	Libya	Ireland	
Liberia	Iraq	Lithuania	Isle of Man	
Madagascar	Jordan	Malaysia	Israel	
Malawi	Kazakhstan	Maldives	Italy	
Mali	Kiribati	Malta	Japan	
Mauritania	Kosovo	Marshall Islands	Korea, Rep.	
Moldova	Macedonia, FYR	Mauritius	Kuwait	
Mongolia	Montenegro	Mexico	Liechtenstein	
Mozambique	Morocco	Micronesia, Fed. Sts.	Luxembourg	

Nepal	Nicaragua	Namibia	Macao SAR, China	
Niger	Papua New Guinea	Oman	Monaco	
Nigeria	Paraguay	Palau	Netherlands	
Pakistan	Philippines	Panama	New Caledonia	
Rwanda	Romania	Peru	New Zealand	
Sao Tome and Principe	Samoa	Poland	Norway	
Senegal	Serbia	Russian Federation	Portugal	
Sierra Leone	Solomon Islands	Seychelles	Puerto Rico	
Sudan	Sri Lanka	Slovak Republic	Qatar	
Tajikistan	Swaziland	South Africa	San Marino	
Tanzania	Syrian Arab Republic	St. Kitts and Nevis	Saudi Arabia	
Timor-Leste	Thailand	St. Lucia	Singapore	
Togo	Tonga	St. Vincent and the Grenadines	Slovenia	
Uganda	Turkmenistan	Suriname	Spain	
Uzbekistan	Tuvalu	Trinidad and Tobago	Sweden	
Vietnam	Ukraine	Tunisia	Switzerland	
Yemen, Rep.	Vanuatu	Turkey	United Arab Emirates	
Zambia	West Bank and Gaza	Uruguay	United Kingdom	
Zimbabwe	West Bank and Gaza	Venezuela, RB	United States	

TABLE B: Changes in health outcomes 0-5 years after economic downturns end

The impact of economic downturns on four child-health metrics, 0-5 years after the downturn ends. We control for downturns in the intervening years; for example, when looking at 4 years after a downturn, we control for possible downturns 3, 2, and 1 years after the downturn in question. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset).

Years after downturn	Neonatal mortality		Post-neonatal mortality		One-to-five (child) mortality		Under-five mortality	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
5	0.6821	0.0000***	1.1418	0.0000***	1.6300	0.0000***	3.1260	0.0000***
4	0.7163	0.0000***	1.2123	0.0000***	1.7950	0.0000***	3.3541	0.0000***
3	0.7415	0.0000***	1.2687	0.0000***	1.8393	0.0000***	3.4712	0.0000***
2	0.8116	0.0000***	1.3979	0.0000***	2.0194	0.0000***	3.8172	0.0000***
1	0.8010	0.0000***	1.3984	0.0000***	1.9733	0.0000***	3.7673	0.0000***
0	1.1145	0.0000***	1.9954	0.0000***	2.9290	0.0000***	5.4420	0.0000***

$* p < 0.05$ $** p < 0.01$ $***p < 0.001$

TABLE C: Impact of intra-downturn GDP changes on health outcomes

The effect of GDP/capita growth-rate changes on health metrics, *only* during those years when GDP/capita changes are negative. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset).

	Coefficient	**RSE**	**P-value**	**Lower 95% CI**	**Upper 95% CI**
Neonatal mortality	-0.0472	(0.02120)	0.0261*	-0.0888	-0.0056
Post-neonatal mortality	-0.0575	(0.03487)	0.0993	-0.1259	0.0109
One-to-five (child) mortality	-0.1130	(0.05576)	0.0428*	-0.2224	-0.0037
Under-five mortality	-0.1990	(0.09490)	0.0362*	-0.3852	-0.0128

** $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$*

TABLE D: Influence of downturn length

The effect of all downturn years, except the first one, of a multi-year downturn, compared to the first year of all economic downturns. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset).

	Coefficient	RSE	P-value	Lower 95% CI	Upper 95% CI
Neonatal mortality	0.9774	(0.17251)	0.0000***	0.6392	1.3155
Post-neonatal mortality	1.9665	(0.25940)	0.0000***	1.4580	2.4751
One-to-five (child) mortality	2.8784	(0.44139)	0.0000***	2.0131	3.7438
Under-five mortality	5.2273	(0.75545)	0.0000***	3.7462	6.7083

** $p < 0.05$ ** $p < 0.01$ ***$p < 0.001$*

TABLE E: Stratification of countries into quartiles by GDP per capita:

The effect of GDP/capita growth-rate changes on four child-health outcomes. The data has been quartiled, depending on the country's average GDP per capita from 1981-2011. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset).

First quartile – richest countries:

	Coefficient	RSE	P-value	Lower 95% CI	Upper 95% CI	Beta coefficient
Neonatal mortality	-0.0697	0.0195	0.0004***	-0.108	-0.0314	-0.0698
Post-neonatal mortality	-0.0669	0.0177	0.0002***	-0.1016	-0.0321	-0.1093
One-to-five (child) mortality	-0.0372	0.0107	0.0005***	-0.0583	-0.0162	-0.1309
Under-five mortality	-0.1700	0.0452	0.0002***	-0.2586	-0.0813	-0.0924

Fourth quartile – poorest countries:

	Coefficient	RSE	P-value	Lower 95% CI	Upper 95% CI	Beta Coefficient
Neonatal mortality	-0.1156	0.0320	0.0003***	-0.1783	-0.0529	-0.0618
Post-neonatal mortality	-0.2250	0.0558	0.0001***	-0.3345	-0.1156	-0.0797
One-to-five (child) mortality	-0.3422	0.0857	0.0001***	-0.5102	-0.1741	-0.0609
Under-five mortality	-0.5974	0.1510	0.0001***	-0.8936	-0.3012	-0.0696

$* p < 0.05$ $** p < 0.01$ $***p < 0.001$

TABLE F: Impact of economic downturns, using three measures of GDP/capita, on health outcomes

We use three different measures of the annual rate of change in GDP per capita to form three different measures of economic downturns and then we assess the effect of these three variables on four child-health outcomes. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset).

	GDP per capita (constant local currency units)		**GDP per capita (constant 2005 international dollars)**		**GDP per capita (current international dollars).**	
	Coefficient	**P-value**	**Coefficient**	**P-value**	**Coefficient**	**P-value**
Neonatal mortality	1.1145	0.0000***	1.1162	0.0000***	0.8230	0.0000***
Post-neonatal mortality	1.9954	0.0000***	2.0105	0.0000***	1.6676	0.0000***
One-to-five (child) mortality	2.9290	0.0000***	2.9598	0.0000***	2.1478	0.0000***
Under-five mortality	5.4420	0.0000***	5.4812	0.0000***	4.1812	0.0000***

** $p < 0.05$ ** $p < 0.01$ ***$p < 0.001$*

TABLE G: Impact of GDP/capita changes, using three measures of GDP, on health outcomes

We use three different measures of the annual rate of change in GDP per capita on four child-health outcomes. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset).

	GDP per capita (constant local currency units)		**GDP per capita (constant 2005 international dollars)**		**GDP per capita (current international dollars).**	
	Coefficient	**P-value**	**Coefficient**	**P-value**	**Coefficient**	**P-value**
Neonatal mortality	-0.0681	0.0000***	-0.0668	0.0000***	-0.0208	0.0344*
Post-neonatal mortality	-0.1364	0.0000***	-0.1352	0.0000***	-0.0709	0.0000***
One-to-five (child) mortality	-0.1641	0.0000***	-0.1616	0.0000***	-0.0597	0.0118*
Under-five mortality	-0.3315	0.0000***	-0.3265	0.0000***	-0.1353	0.0015**

** $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$*

TABLE H: Impact of economic downturns on health outcomes using additional controls in multivariate regression

The effect of economic downturns on four child-health outcomes. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset). We also control for additional economic (private capital inflows), demographic (percentage of the population living in urban areas), infrastructure-related (water accessibility) and war-associated (armed personnel as a percentage of labor force) factors.

	Coefficient	**RSE**	**P-value**	**Lower 95% CI**	**Upper 95% CI**
Neonatal mortality	0.2745	(0.08836)	0.0019**	0.1012	0.4478
Post-neonatal mortality	0.5736	(0.15301)	0.0002***	0.2735	0.8736
One-to-five (child) mortality	0.7652	(0.25281)	0.0025**	0.2694	1.2610
Under-five mortality	1.4652	(0.41942)	0.0005***	0.6427	2.2877

** $p < 0.05$ ** $p < 0.01$ ***$p < 0.001$*

TABLE I: Impact of GDP/capita on health outcomes using additional controls in multivariate regression analysis

The impact of GDP/capita growth-rate changes on four child-health metrics. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset). We also control for additional economic (private capital inflows), demographic (percentage of the population living in urban areas), infrastructure-related (water accessibility) and war-associated (armed personnel as a percentage of labor force) factors.

	Coefficient	**RSE**	**P-value**	**Lower 95% CI**	**Upper 95% CI**
Neonatal mortality	-0.0102	(0.0083)	0.2220	-0.0265	0.0062
Post-neonatal mortality	-0.0391	(0.0162)	0.0158*	-0.0709	-0.0074
One-to-five (child) mortality	-0.0171	(0.0237)	0.4691	-0.0635	0.0293
Under-five mortality	-0.0619	(0.0407)	0.1280	-0.1416	0.0178

** $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$*

TABLE J: Impact of economic downturns on health outcomes including inflation as a control

The impact of economic downturns on four child-health metrics. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset). We also control for inflation.

	Coefficient	RSE	P-value	Lower 95% CI	Upper 95% CI
Neonatal mortality	0.9859	(0.13319)	0.0000***	0.7248	1.2470
Post-neonatal mortality	1.5615	(0.19144)	0.0000***	1.1862	1.9368
One-to-five (child) mortality	2.6572	(0.36284)	0.0000***	1.9459	3.3686
Under-five mortality	4.7308	(0.59547)	0.0000***	3.5633	5.8982

** $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$*

TABLE K: Impact of GDP/capita changes on health outcomes including inflation as a control

The impact of changes in the growth rate of GDP/capita on four child-health metrics. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset). We also control for inflation.

	Coefficient	**RSE**	**P-value**	**Lower 95% CI**	**Upper 95% CI**
Neonatal mortality	-0.0701	(0.01203)	0.0000***	-0.0937	-0.0465
Post-neonatal mortality	-0.1249	(0.01792)	0.0000***	-0.1600	-0.0897
One-to-five (child) mortality	-0.1900	(0.03139)	0.0000***	-0.2515	-0.1284
Under-five mortality	-0.3504	(0.05295)	0.0000***	-0.4543	-0.2466

** $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$*

TABLE L: Impact of economic downturns and GDP/capita on health outcomes using WHO surveillance robustness check

The impact of changes in the growth rate of GDP/capita and economic downturns on four child-health metrics. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset). We account for the WHO surveillance check. To account for variations in surveillance strength and data recording between countries, and the possibility that data quality from poorer nations may be less robust, we restricted our analysis to 'Level 1' and 'Level 2' quality data sources as defined by the WHO.

	Recession dummy		**GDP/capita**	
	Coefficient	**P-value**	**Coefficient**	**P-value**
Neonatal mortality	0.3774	0.0005***	-0.0264	0.0004***
Post-neonatal mortality	0.9243	0.0000***	-0.0836	0.0000***
One-to-five (child) mortality	0.4804	0.0002***	-0.0298	0.0005***
Under-five mortality	1.7057	0.0000***	-0.1334	0.0000***

** $p < 0.05$ ** $p < 0.01$ ***$p < 0.001$*

TABLE M: Impact of economic downturns on health outcomes using World Bank mortality data

The impact of economic downturns on three child-health metrics. Instead of using mortality data from the IHME, we use data from the World Bank. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset).

	Coefficient	**RSE**	**P-value**	**Lower 95% CI**	**Upper 95% CI**
Neonatal mortality	0.5714	(0.08567)	0.0000***	0.4034	0.7393
Infant mortality	3.2529	(0.33241)	0.0000***	2.6012	3.9045
Under-five mortality	5.7984	(0.61998)	0.0000***	4.5829	7.0138

TABLE N: Impact of economic downturns on health outcomes using World Bank mortality data (with WHO surveillance check)

The impact of economic downturns on three child-health metrics. Instead of using mortality data from the IHME we use data from the World Bank. We control for population size, population structure (proportion of population below 15 years of age, proportion of population above 65 years of age) and for inter-country differences in healthcare infrastructure in addition to political, cultural and structural differences (by introducing dummy variables for all of the countries in the dataset). To account for variations in surveillance strength and data recording between countries, and the possibility that data quality from poorer nations may be less robust, we restricted our analysis to 'Level 1' and 'Level 2' quality data sources as defined by the WHO.

	Coefficient	**RSE**	**P-value**	**Lower 95% CI**	**Upper 95% CI**
Neonatal mortality	0.3276	(0.08041)	0.0000***	0.1699	0.4853
Infant mortality	1.0687	(0.27314)	0.0001***	0.5331	1.6043
Under-five mortality	1.4938	(0.40550)	0.0002***	0.6986	2.2889

TABLE O: Indicator definitions

Child health outcome analysed	Definition	Years that data are available	Source
Neonatal mortality	Deaths per 1,000 live births (age 1 to 28 days)	1980-2010	IHME
Post-neonatal mortality	Deaths per 1,000 (age 29 to 364 days)	1980-2010	IHME
One-to-five years (child) mortality	Deaths per 1,000 (age 1 to 5 years)	1980-2010	IHME
Under-five mortality	Deaths per 1,000 live births (under the age of 5)	1980-2010	IHME

IHME: Institute for Health Metrics and Evaluation, Infant and Child Mortality Estimates by Country 1980-2010
Source: http://ghdx.healthmetricsandevaluation.org/record/infant-and-child-mortality-estimates-country-1970-2010