Stony Brook University

The Global Determinants of Health: A Cross-National Study of Child Mortality in Less-Developed Countries, 1985-2005

A Dissertation Presented
by

Eric Shircliff

to

The Graduate School

in Partial Fulfillment of the

Requirements

for the Degree of

Doctor of Philosophy

in

Sociology

Stony Brook University

May 2015

Stony Brook University

The Graduate School

Eric Shircliff

We, the dissertation committee for the above candidate for the

Doctor of Philosophy degree, hereby recommend

acceptance of this dissertation.

John Shandra – Dissertation Advisor
Associate Professor, Department of Sociology

Ian Roxborough – Chairperson of Defense
Professor, Department of Sociology

Michael Schwartz
Distinguished Teaching Professor Emeritus
Department of Sociology

Bruce London
Professor, Department of Sociology
Clark University

This dissertation is accepted by the Graduate School

Charles Taber
Dean of the Graduate School

Abstract of the Dissertation

The Global Determinants of Health: A Cross-National Study of Child Mortality in Less-Developed Countries, 1985-2005

by

Eric Shircliff

Doctor of Philosophy

in

Sociology

Stony Brook University

2015

Rates of child mortality vary greatly across the globe. The lowest rates are found in developed countries, with the lowest located in Iceland at 3 deaths per 1,000 live births. The highest rates exist in less-developed countries, the highest of which located in Niger at 305 deaths per 1,000 live births. Since 1990, the global rate of child mortality has been declining. However, for many less-developed countries this progress is either slow or stopped. Furthermore, the total number of child deaths in less-developed countries overwhelms that of developed nations, accounting for approximately 99% of global child mortality. The purpose of this dissertation therefore, is to examine what factors may accelerate the reduction of child mortality in less-developed countries where the problem is most severe. To answer this question I use a sample of 83 less-developed countries with data spanning a 20-year period. I analyze these data using generalized least squares models with random-effects. I examine variables of interest in three main areas – economics, the environment, and global civil society. First, I consider the impact of International Monetary Fund structural adjustment loans. In these models, I find that less-developed countries undergoing International Monetary Fund structural adjustment are associated with higher rates of child mortality than less-developed countries not under such loans. Second, I examine the function of access to improved water sources and sanitation facilities. In this regard, I find that greater access to both improved water sources and improved sanitation facilities are associated with lower rates of child mortality in less-developed countries. Third, I consider the role of health international non-governmental organizations. Here, my findings indicate that health international non-governmental organizations located in less-developed countries with higher levels of democracy are associated with lower rates of child mortality more so than health international non-governmental organizations located within less-developed countries with lower levels of democracy. These findings are net of a number of theoretically relevant control variables and robust across all models.

Dedication Page

Dedicated to the memory of my grandparents, Dorothy and Jack Kahrs.

Table of Contents

List of Tables vi

Acknowledgements vii

Chapter 1: Introduction: The Problem of Child Mortality 1

Chapter 2: International Monetary Fund Structural Adjustment and Child Mortality 6

Chapter 3: The Natural Environment and Child Mortality: The Impact of Water and Sanitation Access 34

Chapter 4: The Role of Health International Non-Governmental Organizations in Reducing Child Mortality 65

Chapter 5: Summary and Conclusion 99

Bibliography 113

Appendix A: Vaccination Index 124

Appendix B: List of Countries 125

List of Tables

Table 1: Descriptive Statistics and Bivariate Correlation Matrix 104

Table 2: Random-Effects Results of International Monetary Fund Structural Adjustment 106

Table 3: Random-Effects Results of Access to Improved Water Source and Sanitation Facility 108

Table 4: Random-Effects Results of Health International Non-Governmental Organizations 110

Acknowledgments

All thanks and praise goes foremost to God. Surely, it is He who grants success, and without His mercy I would not have had the wherewithal to make it this far, nor would I have the following people to thank. Firstly, I would like to thank my Mom, who has always believed in me no matter how much I doubted myself or how much I failed. She taught me to question, to allow myself to make mistakes, and to always strive to improve. Thank you to my Dad, for showing me the value of struggle and the importance of both science and faith. A huge amount of thanks goes to my wife, Firdos, for supporting me through the most arduous time of my life in graduate school. Without her love and sacrifice I might not have reached the finish line. I also want to thank all of my wonderful family – my son Zaid, for making me laugh and reminding me that I have more to offer than can fit on any resume; the Shircliff, Trammel, Davis, and Kahrs families for raising me and shaping me into the person I am today; and the Abdul-Munim and Kinge families, for accepting me with all my many idiosyncrasies.

A special thank you goes to my advisor John Shandra, for taking a bright-eyed young Hip-Hopper under his wing and teaching me the skills necessary to succeed in academia. In addition, I owe thanks to Michael Schwartz, who taught me to stay young, think outside the box, and that a little bit of crazy never hurt anyone; to Ian Roxborough for reminding me that thinking is hard and thus requires much patience and effort; to Diane Barthel-Bouchier for teaching me the value of scientific rigor even in the study of box of chocolates; and to all those with whom I had the pleasure of working, teaching, or just existing with – Wanda Vega, Sharon Worksman, Pat Bremer, Linda Wicks, Norm Goodman, Carrie Shandra, Ivan Chase, Arnout van de Rijt, and Tim Moran – thank you for making Stony Brook a home away from home.

CHAPTER 1

Introduction: The Problem of Child Mortality

In 2005, 9.7 million children died before reaching their fifth birthday. 99 percent of those deaths occurred in less-developed countries (United Nations 2008). Each day in less-developed countries over 25,000 children lose their lives. Most of these deaths are preventable, from such causes as pneumonia, diarrhea, malaria, or lack of oxygen at birth. Other common causes are measles, tetanus, and HIV. As a result, a child born in a less-developed country is 13 times more likely to die within the first five years of their life than a child born in a developed countries (United Nations Children's Fund 2008). There is even tremendous variation within the less-developed world, however. Niger for example, has the highest rate of child mortality at 305 deaths per 1,000 live births (ibid). On the other hand, the lowest rate for a less-developed country is that of Chile, at a rate of only 9 deaths per 1,000 live births (ibid). Global attention to this problem has resulted in an overall reduction of child mortality since 1990. However, progress in less-developed countries is slow at best, and there remain over 25 countries in which the rate of child mortality is either stagnant or worsening (ibid). The question that arises from these trends is, what accounts for such high levels of variation of child mortality rates within less-developed countries?

To answer this question, I gather data from 83 less-developed countries over a 20-year time span. These data are largely collected from the World Bank, the United Nations, and the World Health Organization. I analyze these data using generalized

least-squares regression models with random-effects. This strategy allows me to compare changes across countries and over time. In all models throughout the dissertation, I consider variables commonly associated with health-related outcomes as well as variables typical to cross-national research. These variables include gross domestic product per capita, multi-lateral debt service, multinational corporate investment, international trade, democracy, gross and female rates of secondary school enrollments, and vaccination rates for diseases prevalent in less-developed countries (e.g. tuberculosis, polio, and measles). The dissertation is organized into five chapters. This first chapter serves to introduce the general problem of child mortality and describe the direction of the dissertation as a whole. Each subsequent chapter comprises a stand-alone article that examines a unique research question pertaining to the disparity in child mortality rates throughout the less-developed world.

Chapter 2 examines the potential impact of International Monetary Fund structural adjustment lending. Dependency theorists hypothesize that this type of lending reduces a country's ability to respond to health crises by striping away much-needed capital in order to comply with the stringent austerity terms attached to structural adjustment loans. In this respect, I find that less-developed countries under the terms of International Monetary Fund structural adjustment loans are associated with higher rates of child mortality than less-developed countries not undergoing such loans.

Chapter 3 addresses concerns from Environmental Sociology that the natural environment plays a key role in determining human health. Building upon the models and findings from Chapter 2, I add new measures for each country's level of access to

improved water source and improved sanitation facility. Both these measures, or rather the lack thereof, have been identified by environmental and public health scholars as key determinants of the many diseases that lead to child death in the less-developed world. Here, I show that both access to an improved water source and access to improved sanitation facility are associated with lower levels of child mortality in less-developed countries.

Chapter 4 explores claims from World Society Theory that predict a relationship between global civil society groups and health outcomes. Specifically, I consider the role of health-related international non-governmental organizations in increasing child health and survival, thereby reducing child mortality rates at the national level. The new indicators for number of health international non-governmental organizations per capita are added to the previous models from Chapter 3, which include measures for water and sanitation access, as well as the International Monetary Fund variable from Chapter 2. I find that on average and across less-developed countries, health international non-governmental organizations are not associated with child mortality rates. However, testing for the effects of each country's "political opportunity structure" reveals that level of democracy moderates the effect of health international non-governmental organizations on child mortality. Specifically, I show that health international non-governmental organizations are more effective at reducing rates of child mortality in less-developed countries with higher levels of democracy than within countries with lower levels of democracy.

Finally, Chapter 5 concludes with a summary of the previous chapters in order to weave the various findings into a cohesive whole. The common thread that runs through

each chapter is the consideration of not only debt service, but also International Structural adjustment lending. I first consider the addition of this variable to a standard cross-national model of health. I then show that International Monetary Fund structural adjustment lending remains a statistically significant predictor of child mortality across various model specifications in the following chapters. While each chapter presents data and findings from different key variables related to child health, together they provide an overarching argument for the standard inclusion of International Monetary Fund structural adjustment lending in cross-national research. Overall, the chapters seek to answer the following question: After controlling for national-level development indicators such as gross domestic product per capita, education, debt, and trade, what factors contribute to the increase or reduction of child mortality in less-developed countries?

References

United Nations Children's Fund. 2008. *The State of the World's Children 2008: Child Survival*.

United Nations. 2008. "The Millenium Development Goals Report 2008."

CHAPTER 2

International Monetary Fund Structural Adjustment and Child Mortality

The onset of the 1980s brought with it the rising cost of oil, falling commodity prices, and spiked interest rates. These economic hardships prevented many heavily indebted less-developed countries from generating the revenue necessary to make payments on the mounting foreign debts accrued from loans taken during the prior two decades (Sweezy 1989). The International Monetary Fund (IMF) responded to this "debt crisis" by providing less-developed countries with new "structural adjustment" loans (McMichael 2001). These loans were designed to resolve balance of payment issues by requiring indebted nations to institute a variety of macro-economic policy reforms in return for capital (Rich 1994). These austerity measures include devaluing currency, reducing government spending, encouraging free trade, and privatizing government assets (Peet 2003). The purpose of these reforms is to stimulate economic growth and therefore generate the needed currency for debt repayment by increasing exports, liberalizing trade, and cutting government spending (Bradshaw 1991a).

While this method of adjustment may facilitate debt repayment, dependency theory predicts that structural adjustment programs (SAPs) and debt service adversely affect the health of people in less-developed countries (Buchmann 1996). There are several reasons why this may be the case. First, International Monetary Fund structural adjustment loans require cuts to government spending for health, education and family

planning (Peet 2003). These loans also require governments to devalue their currency, which often leads to increases in the prices of drugs, medical supplies, and food within debtor nations (Buchmann 1996). It also means that health facilities close or suffer major losses to staff. Second, indebted nations must liberalize trade by providing economic incentives (e.g., tax breaks) and regulatory concessions (e.g., labor law exemptions) to foreign investors (Bryant 1997). However, the economic concessions and regulatory exemptions deprive governments of revenue which could be invested in health services (George 1992). Third, the International Monetary Fund requires less-developed countries to privatize government assets, which reduces access to essential services (e.g., health, water, sanitation, electricity, and education). Finally, debt service reduces the amount of money that governments have to invest spend on health, education, family planning, and nutrition (Bryant 1997). This capital loss also reduces the strength and flexibility of a government, making it difficult to respond to public health problems (e.g., human immunodeficiency virus prevalence, malaria prevalence, tuberculosis prevalence, etc.) (McMichael 2001). I provide a detailed review of dependency theory and its predictions regarding debt and structural adjustment below.

There have been a number of comparative studies that cite evidence to support dependency theory's predictions on the effects of debt service on health in less-developed countries. Bradshaw and Wahl (1991a) and Frey (2000) for example find support for the hypothesis that higher levels of debt service are associated with higher levels of infant and child mortality. Nevertheless, there has been little cross-national research that considers how International Monetary Fund structural adjustment lending specifically affects child mortality. This paper extends the current cross-national

literature by empirically evaluating the impact over time of International Monetary Fund structural adjustment on levels of child mortality in less-developed countries net of GDP, debt service, and international trade. Let me now turn to a discussion of dependency theory and its predictions regarding the harmful effects of debt repayment and structural adjustment for children. I will then describe my sample, dependent variable, independent variables, and statistical models. It is important to note that I also include other factors in my models that have been found to influence child mortality in previous cross-national research. These include gross domestic product per capita, domestic investment, multinational corporate investment, democracy, gross secondary school enrollments, gross and female secondary school enrollments (See Table 1 for descriptive statistics and bivariate correlations). I conclude by discussing my findings and possible directions for future research.

Dependency Theory and the Health Effects of Structural Adjustment

I describe previously that the International Monetary Fund and World Bank responded to the debt crisis of the 1980s by providing less-developed countries with structural adjustment loans. These loans were designed to resolve balance of payment issues by requiring indebted nations to institute a variety of macro-economic policy reforms (e.g., devaluing currency, reducing government spending, and privatizing government assets) in return for the money (Rich 1994). According to dependency theory, the links between structural adjustment and child mortality are complex. However, I review four of the most common explanations for why such a

relationship is thought to exist.

First, International Monetary Fund structural adjustment loans usually require widespread cuts in government spending to correct for budgetary imbalances (Rich 1994). The nature of the cuts varies from nation to nation, but a common theme has been the reduction in the budgets and staffs of healthcare and other social service facilities (Mohan 2001). This has led to widespread closing of healthcare facilities, with the locations which remain open often understaffed and without essential medical supplies (Ismi 2004). For example, Stuckler et al. (2011) find that nations that are under International Monetary Fund structural adjustment grow their health systems at half the rate compared to nations that are not under International Monetary Fund structural adjustment policies. Specifically, they suggest that International Monetary Fund conditionality leads to development assistance earmarked for public health spending, being misused or displaced to other seemingly more important issues like paying down external debt or shoring up foreign currency reserves to try and lower inflation. In this regard, structural adjustment weakens the regulatory capacity of a government to provide health services to its population. This has left diseases that contribute to child mortality in less-developed countries (e.g., malaria, cholera, schistosomiasis, hookworm, and tuberculosis) to continue unabated (Ismi 2004).

Similarly, the International Monetary Fund has forced many less-developed countries to eliminate subsidies for food, petroleum, pesticides, and fertilizers (Riddell 1992). As the prices of these goods increase, people have less money to spend on health, education, and social security (George 1992). A good example of this comes from Zambia. The International Monetary Fund required the government to eliminate

subsidies for fertilizers and pesticides after signing a structural adjustment loan agreement in 2002 (Petifor 2002). In 2003, the prices of these inputs skyrocketed, forcing farmers to leave their fields fallow. According to Petifor (2002), this process contributed to seven million people being short on food, a factor that contributes to child mortality.

Second, structural adjustment programs require that governments promote economic activity consonant with their "comparative advantage" (Peet 2003). This pushes indebted nations to attempt to increase export earnings in order to finance interest and principal payments (McMichael 2001). The most common way to achieve this is currency devaluation, which makes a country's exports cheaper, thereby creating a demand for them on the global market (Mohan 2001). However, currency devaluations often adversely affect the health of a country's population. This is because the cost of medicines and other medical supplies considerably increases, reducing access for much a country's populace in a less-developed country (Peet 2003). Currency devaluations also increase the prices of other essential items imported from abroad, which further decreases money available for healthcare (George 1994).

For example, the devaluation of the Rupiah, Indonesia's national currency, during the 1997-98 East Asian economic crisis adversely affected public health in a number of ways. First, spending on public healthcare fell more than 20% (United Nations Fund for Population Assistance 1998). This resulted in a shortage of key medical supplies such as antibiotics and vitamin supplements at healthcare facilities throughout Indonesia. Second, average costs for treatment at government health centers rose 67% (Hotchkiss 1999). As a result, Waters et al (2003) found dramatic decreases in numbers of people

visiting these facilities, the most pronounced being a 60% drop in use of primary health care for children under the age of 5. The same study also noted an overall increase in morbidity during the period of devaluation by 14.4% in rural areas, and 21.4% for urban zones. (Waters 2003). It is clear that these resulting changes in health care could also have strong consequences for child mortality.

Third, International Monetary Fund structural adjustment loans require governments to liberalize trade by removing barriers to foreign investment. This tends to involve a variety of regulatory concessions and financial incentives (McMichael 2001). The most notable financial incentives are "tax holidays" that involve corporate exemptions from export duties, import duties, and income taxes (Leonard 1988). Some common regulatory concessions include eliminating the minimum wage, firing workers, and outlawing worker unions (London 1995). The purpose of the these concessions and incentives is generate currency for debt repayment by stimulating foreign corporate investment (Clapp 1998).

However, these special corporate allowances may well translate into increased child mortality in less-developed countries. Tax breaks and selling of public enterprises may lead to additional reductions in social service spending by eroding a nation’s tax base. This results from the little new revenue being collected by the government, which hampers its capacity to provide health and other social services. Again, it is important to note that health services are already limited by the mandated cuts discussed above (Bradshaw 1991b). Further, foreign investors tend to repatriate their profits and displace local business, which slows true economic growth within a less-developed country, increases unemployment, and reduces money available for investment by governments

for healthcare and education (Evans 1979). Finally, trade liberalization involving foreign investment does generate some higher paying jobs. However, the economic benefits of foreign capital are often concentrated among a small fraction of the local population, further exacerbating economic inequality, poverty, and child mortality within less-developed countries (Evans 1979).

Fourth, the International Monetary Fund often requires less-developed countries to privatize government key assets (Rich 1994). The selling of assets generates cash for governments to pay off their debt in the short term. However, it also reduces the ability of a country to generate revenues, thereby offering further impediments to investments in health, education, and other social services in the long term (Mohan 2001). Additionally, privatizing government services often reduces access to them (e.g., water, sanitation, and electricity) for much of a country's population, because profit-seeking companies raise user fees and focus delivery of services away from poor, rural sectors who can not afford to pay these higher fees (Barlow 2002). This process is often referred to as "full cost recovery" and may contribute to child mortality in less-developed countries.

The possible effects of structural adjustment are many. However, as structural adjustment programs are closely associated with less-developed countries' indebtedness, they should not be examined without incorporating previous research that has found support for the relationship between debt service and child mortality. While there have been numerous accounts describing this linkage, there have been few that examine structural adjustment. Accordingly, I extend prior research in the field by including variables for structural adjustment alongside debt service in models of child

mortality.

I draw on dependency theory to formulate two hypotheses. First, I hypothesize that less-developed countries with higher levels of debt service should be associated with higher levels of child mortality. This is because debt repayment reduces the amount of money governments have to invest in health, education, nutrition, and family planning. Second, I hypothesize that less-developed countries that have received an International Monetary Fund loan should have higher levels of child mortality than less-developed countries not under such adjustment loans. This most likely occurs because structural adjustment requires governments to cut spending on health services, remove subsidies for essential goods, liberalize trade, and boost exports.

In testing these hypotheses, I will also address a methodological shortcoming in the literature. Most cross-national research on child mortality tend to use cross-sectional data (Boehmer 1996, Frey 2000, Jorgenson 2004, Shandra 2010a, Shandra 2004). This is somewhat surprising because data are available on all independent variables for several time points. Further, the analysis of cross-sectional data is a problem for a couple of reasons. First, cross-sectional models are unable to determine causal ordering, as they do not allow for change over time. Second, cross-sectional models lack the ability to control for individual level (i.e. country level) heterogeneity. I will address these potential issues by analyzing data for multiple time points using random effects regression models.

Research Design

The sample includes all nations not classified as "high" income according to the World Bank's income classification scheme. I also do not include nations formed following the collapse of the Soviet Union because there are no data for these nations in 1990. I exclude high-income nations for a few reasons. First, they are they are not recipients of structural adjustment loans. Second, child mortality is most pronounced in the less-developed countries of the world.

I collect data cross-national data at multiple time points (i.e., 1985, 1990, 1995, 2000, and 2005). I analyze these data in Stata version 10 statistical software, using random effects regression models. The advantage of these models is that it permits me to compare changes across countries over time on the predictors of interest (Woolridge 2002). Random-effects models also control for time invariant factors (e.g. geography, climate, or historical legacy) that are typically omitted from standard regression models. This is accomplished by treating such factors as case-specific intercepts and estimating them as a random component of the error term (Frees 2004). Therefore, random-effects models make use of the most valuable variance that exists in my data, that *between* nations rather than within them over time. In a fixed-effects model, this variance would be discarded from the analysis. Further, random-effects models are a fitting strategy given my theoretical approach. Driven by dependency theory, my hypotheses are aimed at explaining the variation between national rates of child mortality in less-developed countries.

The notation for the generalized least squares model with random-effects is as follows $y_{it} = u_t + \beta x_{it} + yz_i + \alpha_i + \varepsilon_{it}$

where

i = each country in the analysis,

t = each time period in the analysis,

y_{it} = dependent variable for each country at each time period,

u_t = period-specific intercept,

βx_{it} = vector of coefficients for each predictor for country i at time t,

yz_i = vector of time-invariant predictors for each country i,

a_i = case-specific error estimated as a random variable,

ε_{it} = pure random variation at each country-year.

I evaluate the appropriateness of the models by considering the substantive reasons (e.g., importance of time invariant measures) and regression diagnostics when making this decision. I consider variance inflation factor scores to ensure that excessive multicollinearity is not present in the analysis. I also establish that the random-effects model was methodological sound in that it does not result in overly biased coefficients relative to a fixed-effects model. To do so, I conducted the statistical test suggested by Hausman (1978) to test the null hypothesis that the random-effects coefficients are unbiased compared the fixed-effects estimator. The resulting *p*-values of these tests were non-significant for all equations. This suggests that random-effects coefficients are more consistent than fixed-effects coefficients in these equations. Accordingly, with no support for favoring fixed-effects over random-effects models, I present random-effects results in each equation.

Dependent Variable

Child Mortality Rate. The first dependent variable for this analysis is child mortality rate. This is the probability of a child dying between birth and the age of five, expressed per 1,000 live births. This indicator is commonly used as a measure of children's well-being and the level of effort being made to maintain child health. This variable is logged for its skewed distribution. The data are available for 1990, 1995, 2000, and 2005 and obtained from the United Nations (United Nations Children's Fund 2009).

Independent Variables

International Monetary Fund Structural Adjustment. To access the effects of economic austerity measures, I include a dummy variable for International Monetary Fund structural adjustment. Each nation undergoing a lending arrangement from the International Monetary Fund during the one of the years being examined coded with a value of one. This includes if a nations has received a “Stand-by”, “Extended”, “Flexible Credit Line”, “Poverty Reduction”, “Growth Trust” and “Exogenous Shocks Facility” loan. The data are available from the International Monetary Fund (2010). The data are measured for 1985, 1990, 1995, and 2000. Please note that all independent variables are measured at these times points. I lag the variables in this way as to avoid simultaneity bias, aid in drawing casual inferences from the analysis, and because it often takes up to five years for a structural adjustment loan to be fully implemented (Rich 1994).

I use a dummy variable to indicate the presence of International Monetary Fund structural adjustment for two reasons. First, it explicitly identifies whether a nation is undergoing an International Monetary Fund loan in a given year. Previous work in the field has relied upon a "conditionality index" first developed by Walton and Ragin (1990). This index summed four key variables related to structural adjustment (debt renegotiation, debt restructurings, utilization of the International Monetary Fund Extended Fund Facility, and number of loans received as a percentage of its quota), however it does not specify the status of any structural adjustment programs for any time point. A dummy variable allows me to clearly differentiate between nations under adjustment and not under adjustment for each year under analysis. Second, I use a dummy variable for theoretical reasons. Structural adjustment loans are typically complex financial instruments with widespread economic impact. A significant finding for a dummy variable would indicate that such loans have an impact on health, specifically child mortality rates, *regardless of the loan type or amount*. Furthermore, including a control for Debt Service (see below) will suffice to determine if the size of a nation's debt is a contributing factor to its rate of child mortality. According to dependency theory, the presence of International Monetary Fund structural adjustment loans should increase rates of child mortality by reducing government funds available for health care in the ways outlined above. I hypothesize therefore, that less-developed countries undergoing International Monetary Fund structural adjustment will be associated with higher levels of child mortality.

Multi-lateral Debt Service. In addition to the pressure to adjust their economies under structural adjustment, indebted nations must continually service their foreign

debts. Therefore, it is also important to control for debt service as well as structural adjustment. This approach has been used previously by Bradshaw and Schafer (2000), Schafer (1999), and Buchman (1996). Thus, I will also include the average sum of principal and interest payments in foreign currency, goods, or services on long-term public and publicly guaranteed private debt with maturity of one year or longer as a percentage of goods and services exports. These data are obtained from the World Bank (2010). According to dependency theory, higher levels of debt service should be associated with higher levels of child mortality.

Multinational Corporate Investment. I also include multinational corporate investment in the models. This variable is the end-of-year stocks of foreign direct investments in a given host country divided by gross domestic product. These stocks involve any long-term relationship reflecting a lasting interest in and control by a foreign direct investor in an economy other than that in which the foreign direct investor is based (United Nations Conference on Trade and Development 2010). This variable is logged for its skewed distribution. This is an important variable to control for because structural adjustment often recommends that less-developed countries boost foreign investment in order to receive a loan. These data may be obtained from the United Nations (2010). I expect that nations with higher levels of multinational corporate investment should be associated with higher levels of child mortality. This may be the case as multinational investment tends to involve foreign corporations expatriating the majority of their profits and requiring regulatory concessions such as the elimination of minimum wage and the outlawing of unions, and exacerbating poverty in less-developed countries (Evans 1979, Leonard 1988).

International Trade. To assess the effects of a nation's level of trade with other nations, I include international trade in all models. The data are available from the World Bank (2010). This is the sum of exports and imports of goods and services measured as a share of gross domestic product (World Bank 2010). By measuring trade flows between nations, this indicator also measures the degree to which a nation is integrated into the world-system. Following dependency theory, I expect that nations with higher levels of international trade may be associated with higher levels of child mortality as resources flow outward from poor to rich nations.

Gross Domestic Product Per Capita. As is standard in cross-national analyses, a nation's level of development must be taken account of to ensure that any effects discovered are independent of a nation's wealth (London 1995). Therefore, I will include measure of gross domestic product per capita in constant United States 2000 dollars. The data may be obtained from the World Bank (2010). This variable is logged for its skewed distribution. I expect that higher levels of gross domestic product per capita should correspond with lower levels of child mortality. This is because higher levels of wealth tend to bring higher standards of living, advanced medical technology, and demographic changes that lower child mortality (Rostow 1990).

Domestic Investment. I estimate effects of domestic investment by including gross capital formation as a percent gross domestic product for each nation. This includes outlays on additions to the fixed assets of the economy (e.g., land improvements, plant and machinery purchases, and the construction of roads, railways, schools, and hospitals) plus net changes in the level of inventories or stocks of goods held by firms to meet unexpected fluctuation in production or sales. The data are

obtained from the World Bank (2010). I expect that higher levels of domestic investment should be associated with lower levels of child mortality. This is most likely the case due to domestic investment increasing capital available for investment by governments for health, education, family planning, and nutrition (Shen 1997).

Democracy. I use the average of Freedom House's (1997) political rights scale and civil liberties index to measure level of democracy. Political rights reflects the degree to which a nation is governed by democratically elected officials, has fair, open, and inclusive elections, and is free of corruption, violence, and political discrimination against minorities. The civil liberties index reflects relative freedom of assembly, association, and expression within a nation. Both civil liberties and political rights have a seven-point scale ranging from 1 (most free) to 7 (least free). For ease of interpretation, I multiply the index by negative one and added eight to each score so that high scores now correspond with a high level of democracy.

I hypothesize that democracy should be associated with lower levels of child mortality. In fact, London and Williams (1990) find that higher levels of democracy are associated with increased basic needs provision measured by the Physical Quality of Life Index and Index of Net Social Progress. Midlarsky (1998) suggests that such a finding can be attributed to freely elected and open governments responding to popular demands for basic needs provision due to political activism and electoral accountability.

Total Government Expenditures. I also include a measure that assesses the impact of a government's expenditures. This is the general government final consumption expenditure as a percentage of total gross domestic product. The data are obtained from the World Bank (2010). This includes all government current

expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation (World Bank 2010). I expect higher levels of government expenditures to be related to lower levels of child mortality with governments investing in elaborate curative care programs and hospitals as well as primary healthcare (e.g., vaccinations, family planning, prenatal care, postnatal care, and nutrition counseling).

Gross Secondary School Enrollment. I include gross secondary school enrollment rates to examine the impact of education on child mortality. This is the total secondary school enrollment of both sexes, regardless of age, expressed as a percentage of the secondary school-aged population. This ratio can exceed 100 percent due to the inclusion of over-aged and under-aged students. The data are available from the World Bank (2010). It is generally thought that education results in higher earnings in the wage labor market, thereby increasing economic growth (Shen 1997, Shen 1999). The economic growth augments standards of living and access to advanced medical technology, leading to lower levels of child mortality (Rostow 1990). Thus, I expect that higher levels of gross secondary school enrollments should be associated with lower levels of child mortality in less-developed countries.

Female Secondary School Enrollment. I also include female secondary school enrollment in the analysis. I do so because female education may have a unique impact on child mortality. This is the total female secondary school enrollment, regardless of age, expressed as a percentage of the female secondary school-aged population. As with gross enrollments, this metric may exceed 100 percent due to the inclusion of over-

aged and under-aged students. The data are available from the World Bank (2010). I expect that nations with higher levels of female secondary school enrollment should be associated with lower levels of child mortality. This may well be because female education is associated with wider use of health services. It also improves access to information about nutrition, birth spacing, reproductive health, and immunizations (Shen 1999).

Vaccination Index. As a more specific measure of government health care performance within nations, especially relating to children's well being, I include an index of vaccination rates for BCG, DPT, Polio, and Measles (See Appendix A for a brief description of each disease and its respective vaccine). I combine the rates of vaccination for each disease and average them to create the index. All vaccination data are obtained from the World Bank (2010). According to Buchmann (1996), vaccination rates may serve as a proxy for the estimation of government spending on basic health services. As many diseases disproportionally affect young children in less-developed countries and are preventable by vaccination (World Health Organization 2010a), I expect less-developed countries with higher average vaccination rates to be associated with lower rates of child mortality.

Findings

In Table 2, I present random-effects regression estimates of child mortality for eighty-three nations in the developing world (See Appendix B for a complete list of countries). I begin with a baseline model (Equation 2.1), including only International

Monetary Fund structural adjustment and debt service as independent variables. I then proceed in a stepwise fashion, integrating the other independent variables under analysis. In equation 2.2, I add gross domestic product per capita. In equation 2.3, I add the other dependency related economic variables of international trade, foreign investment, and domestic investment. Next, in equation 2.4 I add political variables democracy and government consumption. In equation 2.5 I include basic needs variables, secondary school enrollments and the vaccination index, to form the fully specific model. Finally, in equation 2.6 I add female secondary school enrollments in place of the gross enrollments.

I organize my analysis in this way for three important reasons. First, I want to avoid potential problems with multicollinearity. For example, I first include gross-domestic product per capita separately, apart from other correlated development indicators such as secondary school enrollments. In this way I am able to distinguish the unique ways each variable impacts the analysis, especially the key indicator.

Let me begin by discussing the significant findings from each equation, starting with the baseline model. In equation 2.1 the only coefficient that reaches statistical significance is that of International Monetary Fund structural adjustment. The direction of its coefficient is positive. This provides initial support for my dependency hypothesis that International Monetary Fund International Monetary Fund structural adjustment adversely affects child mortality in less-developed countries. Specifically, less-developed countries under International Monetary Fund structural adjustment loans are more likely to experience higher rates of child mortality than less-developed countries not under such adjustment. I argue that this may be the case because structural

adjustment often requires nations to cut spending for health services as I previously describe. In equation 2.2, with the addition of gross-domestic product per capita, the International Monetary Fund coefficient maintains its direction and level of significance. In this model, the coefficient for gross-domestic product per capita is also significant, though negative in direction. Thus, gross-domestic product per capita is inversely correlated with child mortality – less-developed countries with higher levels of gross-domestic product per capita are more likely to have lower rates child mortality rates than less-developed countries with lower levels of gross-domestic product per capita. This follows my hypothesis and is consistent with previous research. It is also important to point out the overall R^2 value for this model jumps up substantially from .116 in the equation 2.1 to .767 in equation 2.2. Next, in equation 2.3 and 2.4 I include three economic variables (International trade, foreign investment, and domestic investment), followed by two political variables (Democracy and total government consumption), respectively. In these equations the results for International Monetary Fund structural adjustment, debt service, and gross-domestic product remain consistent with the previous equations. Of the newly added variables, only international trade provides a significant result. In both equations 2.3 and 2.4, the coefficients for international trade are negative and significant. Thus, contrary to my stated hypothesis, nations with higher levels of international trade are correlated with lower levels of child mortality in less-developed countries than less-developed countries with lower levels of international trade. This is likely due to an increase in gross-domestic product due to rising levels of trade. Lastly, I turn to the fully specified models, equation 2.5 and 2.6. In these equations I add the final three basic needs variables, the vaccinations index, and both

gross and female secondary school enrollments. In both final models, the coefficients for International Monetary Fund structural adjustment, gross-domestic product per capita, and International trade maintain their significance and direction. Further, the coefficients for each of the newly added basic needs variables are all statistically significant and in the expected direction. In both equations 2.5 and 2.6, the vaccination index is negatively associated with child mortality. Thus less-developed countries with higher vaccination rates are associated with lower rates of child mortality. This is expected because many diseases linked with child mortality in less-developed countries are preventable by vaccination (World Health Organization 2010b).

There are also some non-significant results of note. First, many of the other dependency indicators produced statistically significant results, contrary to my expectations. Foreign investment, domestic investment, and perhaps most notably, debt service remained non-significant in every equation. While prior research has shown a relationship between debt and health in less-developed countries, this research does not support that finding. In fact it shows that the presence of International Monetary Fund structural adjustment loans, not the level of debt, is the determining factor in affecting child mortality in less-developed countries. This is expected due to the many austerity measures attached to International Monetary Fund structural adjustment loans that weaken a government's ability to adequately provide health care.

Discussion and Conclusion

This study extends cross-national research on child mortality in the following ways. First, I conduct a study that considers the impact of International Monetary Fund structural adjustment loans on child mortality net of debt service and other dependency related measures. I further consider the effects of these variables on the dependent variable over a twenty year time period. I also extend the analysis to include less-developed countries from every region of the globe. I find substantial support for dependency theory that less-developed countries receiving an International Monetary Fund structural adjustment loan tend to correspond to higher rates of child mortality than less-developed countries not receiving such loans. The coefficients for this variable are positive and significant in every equation of Table 2. This is likely the case because the International Monetary Fund requires recipient nations to cut government spending which commonly results in cuts in the provision of health care and education. Consequently, the coefficients for government consumption (i.e. spending) fail to reach a level of statistical significance in any equation of Table 2. However, government spending in the form of child vaccination rates corresponds to lower rates of child mortality.

I also note that a number of other factors are related to child mortality in less-developed countries. First, I find that gross and female secondary school enrollments are negatively correlated with child mortality. Less-developed countries with higher enrollment rates in secondary schools, over the total population, and for women and girls in particular, are associated with lower rates of child mortality. Second, I find that

the greater the averaged percentage of the population vaccinated against major diseases is associated with lower rates of child mortality.

There are some methodological and theoretical implications that correspond with these findings. In general, cross-national research on child mortality has been limited by cross-sectional modeling. By using longitudinal data and random effects models this research extends the existing literature by better addressing causality and limiting errors due to heterogeneity bias. Examining change over time is especially important for development issues and structural adjustment loans in particular as their effects may take several years to take hold. By measuring International Monetary Fund structural adjustment directly as opposed to the prior use of a "conditionality index", I am able to more accurately capture its effects. The corresponding results show the presence of an International Monetary Fund structural adjustment loan in a less-developed country is associated with increased rates of child mortality, regardless of the individual loan type or amount. Thus, my findings bolster the position of dependency theorists and public health scholars (Baker 2010, Farmer 1999, Rowden 2010) that International Monetary Fund structural adjustment lending *writ large* is damaging to global health. This result may also lend support to similar claims with regard to the negative externalities of structural adjustment lending on the natural environment. The conditions of many International Monetary Fund loans rarely give specific instructions for the reduction of public health spending, nor are they often given specifically for nation's health care sector. My results show therefore, that there is no need to include only health-related loans when looking for effects on health outcomes. This would only limit the

generalizability of the findings, and suggest that only loans made for the health sector or those with specific health regulations would have an impact on a population's health.

I can also offer some policy suggestions based on the results. The findings suggest that International Monetary Fund structural adjustment contributes to child mortality in less-developed countries. Therefore, non-governmental organizations, social movements, and concerned citizens should lobby International Monetary Fund officials to change or eliminate their structural adjustment lending policies. Some changes may include debt relief or eliminating some macro-economic policy reforms, especially the privatization of government assets, which limit access healthcare, water, and education via increases in user fees (Rich 1994). I conclude with some possible directions for future research. First, I examine the impact of International Monetary Fund structural adjustment lending on child mortality. It may well be that the International Monetary Fund also contributes to other health problems in less-developed countries. Furthermore, given the inclination of many less-developed countries to privatize key public goods like water and sanitation facilities, and the concurrent reduction in access to at risk demographics, future research should examine the relationship between access to clean drinking water and adequate sanitation facilities and child mortality in less-developed countries. Second, on the subject of water access, Bradshaw and Schafer (2000) find that higher levels of non-governmental organizations are associated with higher levels of access to safe drinking water. This should not be surprising given that structural adjustment weakens the ability of governments to provide such a social service and non-governmental organizations are increasingly filling this void. Thus, researchers should more fully examine the impact of non-governmental organizations

on health issues in less-developed countries. Third, I examine data at the cross-national level. This research should be augmented with case studies and fieldwork to untangle exactly how International Monetary Fund structural adjustment affects child mortality in specific nations (Gellert 2009).

References

Baker, Brook K. 2010. "The Impact of the International Monetary Fund's Macroeconomic Policies on the Aids Pandemic." *International Journal of Health Services: Planning, Administration, Evalualation* 40(2):347-63.

Barlow, Maude, and Tony Clark. 2002. *Blue Gold: The Fight to Stop the Corporate Theft of the World's Water*. New York: The New Press.

Boehmer, Ulrike, and Williamson, J.B. 1996. "The Impact of Women's Status on Infant Mortality Rate: A Cross-National Study." *Social Indicators Research* 37:333-60.

Bradshaw, York, and Ana-Maria Wahl. 1991a. "Foreign Debt Expansion, the International Monetary Fund, and Regional Variation in Third World Poverty." *International Studies Quarterly* 35:251-72.

Bradshaw, York, and J. Huang. 1991b. "Intensifying Global Dependency: Foreign Debt, Structural Adjustment, and Third World Underdevelopment." *The Sociological Quarterly* 32:321-42.

Bradshaw, York, and M. J. Schafer. 2000. "Urbanization and Development: The Emergence of International Non-Governmental Organizations Amid Declining States." *Sociological Perspectives* 43:97-116.

Bryant, Raymond L. and S. Bailey. 1997. *Third World Political Ecology*. New York: Routledge.

Buchmann, Claudia. 1996. "The Debt Crisis, Structural Adjustment, and Women's Education: Implications for Status and Development." *International Journal of Comparative Sociology* 37:5-30.

Clapp, Jennifer. 1998. "Foreign Direct Investment in Hazardous Industries in Developing Countries: Rethinking the Debate." *Environmental Politics* 7:92-113.

Evans, Peter. 1979. *Dependent Development: The Alliance of Multinational, State, and Local Capital in Brazil*. Princeton: Princeton University Press.

Farmer, Paul. 1999. *Infections and Inequalities: The Modern Plagues*. Berkeley: University of California Press.

Freedom House. 1997. *Freedom in the World: 1996-1997*. New York: Freedom House.

Frees, Edward. 2004. *Longitudinal and Panel Data: Analysis and Applications in the Social Sciences*. New York: Cambridge University Press.

Frey, R.S. and Field, C. 2000. "The Determinants of Infant Mortality in the Less Developed World: A Cross-National Test of Five Theories." *Social Indicators Research* 52:215-35.

Gellert, Paul K. and John Shefner. 2009. "People, Place, and Time: How Structural Fieldwork Helps World Systems Analysis.". *Journal of World Systems Research* 25:193-218.

George, Susan. 1992. *The Debt Boomerang*: Pluto Press.

George, Susan and Fabrizio Sabelli. 1994. *Faith & Credit: The World Bank's Secular Empire*. Boulder: Westview Press.

Hausman, J. A. 1978. "Specification Tests in Econometrics." *Econometrica* 46(6):1251-71.

Hotchkiss, DR and Jacobalis S. 1999. "Indonesian Health Care and the Economic Crisis: Is Managed Care the Needed Reform?". *Health Policy* 46:195-216.

International Monetary Fund. 2010, "IMF Lending Arrangments". (http://www.imf.org/external/np/fin/tad/extarr1.aspx).

Ismi, Asad. 2004. *Impoverishing a Continent: The World Bank and International Monetary Fund in Africa*. Toronto: Canadian Center for Policy Alternatives.

Jorgenson, Andrew K. 2004. "Global Inequality, Water Pollution, and Infant Mortality." *The Social Science Journal* 41:279-81.

Leonard, H. Jeffrey. 1988. *Pollution and the Struggle for World Product: Multinational Corporations, the Environment, and International Comparative Advantage*. Cambridge: Harvard University Press.

London, Bruce, and B. Williams. 1990. "National Politics, International Dependency, and Basic Needs Provision: A Cross-National Analysis." *Social Forces* 69:564-84.

London, Bruce, and R. J. S. Ross. 1995. "The Political Sociology of Foreign Direct Investment: Global Capitalism and Capital Mobility, 1965-1980." *International Journal of Comparative Sociology* 36:198-219.

McMichael, Phillip. 2001. *Development and Social Change: A Global Perspective*: Pine Forge Press.

Midlarsky, M. 1998. "Democracy and the Environment: An Empirical Assessment." *Journal of Peace Research* 35:341-61.

Mohan, Giles. 2001. "The Environmental Impacts of Adjustment." Pp. 95-117 in *Structural Adjustment: Theory, Practice, and Impacts*, edited by E. B. G. Mohan, B. Milward, and A. B. Zack-Williams. New York: Routledge.

Peet, Richard. 2003. *Theories of Development*. New York: The Guilford Press.

Petifor, A. 2002. *Debt Is Still the Linchpin: The Case of Malawi*. London: Zed Books.

Rich, Bruce. 1994. *Mortgaging the Earth: The World Bank, Environmental Impoverishment, and the Crisis of Development*. Boston: Beacon Press.

Riddell, J. B. 1992. "Things Fall Apart Again: Structural Adjustment in Sub-Saharan Africa." *Journal of Modern Africa Studies* 30:53-68.

Rostow, Walter W. 1990. *The Stages of Economic Growth: A Non-Communist Manifesto*. New York: Cambridge Univeristy Press.

Rowden, Rick. 2010. "International Monetary Fund Sacrifices Higher Growth, Employment, Spending, and Public Investment in Health Systems in Order to Keep Inflation Unnecessarily Low." *International Journal of Health Services: Planning, Administration, Evalualation* 40(2):333-38.

Schafer, Mark J. 1999. "International Non-Governmental Organizations and Third World Education in 1990: A Cross-National Study." *Sociology of Education* 72:69-88.

Shandra, John M., Carrie L. Shandra, and Bruce London. 2010a. "Do Non-Governmental Organizations Impact Health?: A Cross-National Analysis of Infant Mortality." *International Journal of Comparative Sociology* 51(Feb. 2010):137-64.

Shandra, John M., Jenna Nobles, Bruce London, and John B. Williamson. 2004. "Dependency, Democracy, and Infant Mortality: A Quantitative, Cross-National Analysis of Less Developed Countries." *Social Science & Medicine* 59:321-33.

Shen, Che, and John B. Williamson. 1999. "Maternal Mortality, Women's Status, and Economic Dependency in Less Developed Countries: A Cross-National Analysis." *Social Science & Medicine* 49:197-214.

Shen, Che, and John B. Williamson. 1997. "Child Mortality, Women's Status Economic Dependency, and State Strength: A Cross-National Analysis." *Social Forces* 76(2):667-700.

Stuckler, David, Sanjay Basu, and Martin McKee. 2011. " International Monetary Fund and Aid Displacement." *International Journal of Health Services* 41(1):67-76.

Sweezy, Paul M., and Harry Magdoff. 1989. *The Irreversible Crisis*. New York: Monthly Review Press.

United Nations Children's Fund. 2009. *The State of the World's Children 2009: Maternal and Newborn Health*.

United Nations Conference on Trade and Development. 2010. (http://unctadstat.unctad.org).

United Nations Fund for Population Assistance. 1998. *Southeast Asian Populations in Crisis - Challenges to the Implementation of the Ipcd Programme of Action*. Canberra: Australian National University.

Walton, John, and Charles Ragin. 1990. "Global and National Sources of Political Protest: Third World Responses to the Debt Crisis." *American Sociological Review* 55(6):876-90.

Waters, Hugh, Fadia Saada, and Menno Pradhan. 2003. "The Impact of the 1997-98 East Asian Economic Crisis on Health and Health Care in Indonesia." *Health Policy and Planning* 18(2):172-81.

Woolridge, Jeffrey. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge: MIT Press.

World Bank. 2010. *World Development Indicators*. Washington, DC: World Bank.

World Health Organization. 2010a. (http://www.who.int/topics/vaccines/en/).

World Health Organization. 2010b. "The World Health Report." Geneva.

CHAPTER 3

The Natural Environment and Child Mortality: The Impact of Water and Sanitation Access

Insights from environmental sociology have indicated the important relationship between the natural environment and human health. That is, changes in the natural environment can affect changes in human health. Frederick Buttel (1976) and the team of Riley Dunlap and William Catton Jr. (1980, 1979) brought this relationship to the foreground in sociology, noting that until the late 1970s, sociologists had largely only considered the social environment and its effects to the detriment and exclusion of the role of the natural environment. Since, there have been many studies examining the possible ways the natural environment can affect human societies. One major theme in this area focuses on the health effects of global warming and ozone depletion. John Last (1993) elaborates on multiple phenomena related to global warming may have adverse consequence for health. Examples of such are increased proneness to cancer and ocular damage from rising ultra-violet radiation, respiratory system damage from acid deposits in the atmosphere, and threats to food security from greenhouse warming (ibid). The rapid growth amongst human populations of non-communicable diseases such as various cancers, cardiovascular disease, and malnutrition are also associated with continued climate change (Friel 2011). Further biological consequences of changing weather are increased vector-borne diseases such as Malaria, and water-borne diseases such as diarrhea (Patz 2000).

Other studies in the field have examined the specific causes and consequences of environmental factors on child health. Children carry increased health risk for exposure to toxic agents and pollutants found in the natural environment because they typically breathe more air, drink more fluids, and eat more of certain types of foods than adults (National Academy of Sciences 1993). Moreover, studies have shown that children are more susceptible than adults to some chemicals (Guzelian 1992). Children also interact with the environment differently than adults. “The crawling infant and exploring toddler who with great gusto and glee examine everything with hands, toes, and mouths can potentially ingest a potpourri of chemicals exploring the world” (Carlson 2005). Children’s risk of exposure to various chemicals hazards found in the air, ground, or water is increased, therefore. However, few studies examining child health at the cross-national level have explored the impact of environmental variables. Notable exceptions are Jorgenson (2004) and Sattler and Shandra (2012).

This paper extends the current cross-national literature by constructing longitudinal models evaluating the impact of access to safe water and adequate sanitation over a wide sample of less-developed countries. These two indicators are widely accepted as dominant environmental factors in the health of children in the developing world (World Health Organization 2000). It is important to note that I also include other factors in my models that have been found to influence child mortality in previous cross-national research. These include gross domestic product per capita, domestic investment, multinational corporate investment, democracy, gross secondary school enrollments, gross and female secondary school enrollments (See Tabe 1 for descriptive statistics and bivariate correlations). Let me now turn to a discussion of the

harmful effects of unsafe water and poor sanitation on child heath. I will then describe my sample, dependent variable, independent variables, and statistical models. I conclude by discussing my findings and possible directions for future research.

The Health Effects of Access to Safe Drinking Water and Adequate Sanitation

An estimated 748 million people do not have access to an improved water source, and an estimated 2.5 billion people lack access to improved sanitation facilities (WHO/UNICEF 2014). The majority of these people live in less-developed countries. There, children under the age of five are acutely affected, comprising 83% of those without access to safe drinking water (United Nations Childrens Fund 2014). According to the latest United Nations report (2014), in less-developed countries, every day diarrheal diseases attributed to unsafe water and poor sanitation causes an estimated 1,400 child deaths. In fact, the water and sanitation-related burden of disease in less-developed countries can be up to 240 times that found in developed nations (Prüss 2002).

In previous research, access to safe drinking water has been shown to be a strong predictor of infant mortality in the developing world (Cheng 2011, Kick 1995, Kick 1990, Seipel 1994). Prüss-Üstün et al. (2008), estimate that 88% of child deaths (0-5 years) are attributed to unsafe water and poor sanitation. The cases of diarrhea that result from these conditions caused some 1.6 million child deaths in 2004 (World Health Organization 2004). Other common water-related illnesses, schistosomiasis and hookworm disease combine to at least another 20,000 children, annually. Furthermore,

access to water has also been linked to various other tropical diseases that cause child death such as trachoma, dengue fever, and lymphatic filariasis (Nalugwa 2015, Prüss-Üstün 2004). Berkman et al. (2002) linked the lack of access to safe water to hampered growth and limited cognitive development among children. Aside from bacterial, protozoan, and viral pathogens, unsafe water has also been shown to contain harmful levels of pollution that are associated with higher rates of infant mortality (Jorgenson 2004). For example, toxic levels of arsenic are widespread in drinking water supplies in Bangladesh, India, Mexico, China, and many other less-developed countries (Rahman 2001, Smith 2000). Without access to improved water supplies, high child mortality rates are likely to persist in less-developed countries because of the increased risk of exposure to microbes and other contaminants such as these in unsafe water.

An illustrative case study of the disparity of health risks between improved and unimproved water sources comes from two communities in Phnom Penh, Cambodia. Rapid urbanization in Phnom Penh, as in many developing cities in low and middle-income nations, has displaced many urban poor from their central city locations to new habitats on the outskirts of the city. This move often corresponds to a dramatic change in access to water as typically piped water is only provided to urban dwellings (Thomas 2015). After relocation, residents in peri-urban communities lacked access to piped water, and instead typically relied on shallow unprotected wells and tanker truck water (ibid). Comparing two such relocated communities on the outskirts of Phnom Penh, Thomas et al, examined the associated burden of diarrheal disease stemming from *E. Coli* contaminated water from each source against the prior risks from urban piped water. *E. Coli* is one of the most common causal agents of diarrhea in less-developed

countries (World Health Organization 2015). The results showed that the mean risk associated with drinking untreated water from a shallow well was 100 times greater than the mean risk associated with piped water consumption (ibid). Boiling the same well water produced a decrease in risk of disease, however the risk remained 50 times higher than with piped water. It should be noted that even the risk from the piped water in urban Phnom Penh exceeds the acceptable limits sets by the World Health Organization. And yet this is the best-case scenario for the populations inhabiting the peri-urban communities in the study.

To put this risk in context, scholars in environmental health suggest that the mortality rate for diarrheal disease across a population, resulting from microbial infection, can be as low as 0.1%, if proper treatment and hydration are maintained (Haas 1999). Such a percentage risk would translate to a rate of 13.36 deaths per 1,000 births given Cambodia's total 2005 population of 13.36 million, for example. The child mortality rate alone in Cambodia in 2005 however, was *83 deaths* per 1,000 live births (United Nations Children's Fund 2009). In view of this, access to safe water is key to child survival in the prevention of the incidence of diarrhea and also the resulting deaths. Clearly, this points to the need for improved water supply.

Due to their underdeveloped immune systems children are acutely vulnerable, even more so than adults, to the health risks associated with the lack of access to safe water as well as adequate sanitation. Furthermore, the conditions surrounding sanitation facilities present more danger to children between 12 months and 5 years of age. During this period child are more likely to be mobile. Their mobility and natural desire to play and explore increases their chances of coming into contact with deadly

pathogens found in excreta, the primary source diarrheal disease and other potential parasites (Bartlett 2005). After possible exposure, children are also less likely to engage in regular hygienic practices such as washing their hands. However, the safe removal of human excreta remains a much more effective solution for safeguarding against diarrheal and other intestinal diseases than any amount of hand-washing (Curtis 2000). For these reasons, relating to both exposure to environmental harms and their relative level of immunity, children under the age of five are particular at risk for health problems related to poor sanitation.

The health effects on children due to poor sanitation are well documented by case studies in the fields of environmental and public health. For example, in Pakistan, households with soak-pits (covered, porous-walled chambers that allow water to slowly seep into the ground) are associated with a 60 percent increase in the risk of infant death than households using flush toilets connected to working sewer systems (Agha 2000). The highest risk of diarrheal disease for children living in urban slums in Brazil is the lack of sanitation facilities (Vasquez 1999). Similar reports link the lack of adequate sanitation facilities with higher incidences of diarrhea and intestinal parasites among children across the less-developed world, from Brazil, Egypt, Sri-Lanka, to the Philippines (Balthazar 1989, Curtale 1998, Ludwig 1999, Mahfouz 1997, Mertens 1992).

The preceding discussion highlights the many possible detrimental health effects for children who lack of access to safe water and adequate sanitation. While there have been numerous accounts describing this linkage between water and sanitation access and child health, the breadth of this comes from case-study reports, many times limited to micro-level analyses of one country or only one province or city within a country.

Perhaps the most comprehensive comparative study of the impact of water and sanitation access on child mortality rates comes from a World Bank report by Anqing Shi (2000). The study relied on city-level data collected by the Global Urban Observatory of the United Nations Center for Human Settlements in 1993. The results demonstrated that higher percentages of households with piped water and sewerage connections are associated with lower rates of child mortality. However, this study is limited by a variety of factors. First, it relies on only a cross-section of data from one point in time. Secondly, there is concern for specification error. The modeling strategy employed contained only a few control variables such as GDP per capita, urban growth, and the number of household below the poverty line. While these many be important factors, no attention was paid to common predictors of child mortality such as education, vaccination rates, levels of debt, or government health expenditures. Third, there are potential sampling section problems. The author imputed a fair amount of data for key variables like sanitation access from alternate sources to compensate for missing data for some 48 cities in the sample. Even after this correction the sample remained relatively small, ranging from 58 to 92 observations. While the findings presented represent a significant portion of countries in the developing world, issues with data availability and sample size may limit their generalizability.

To the author's knowledge, there is no research that examines the health effects of water and sanitation on child mortality beyond a city or regional level. Sattler and Shandra (2012) use similar indicators in their analysis of child mortality in Sub-Saharan Africa. However, their sample was limited to 29 countries in that region. Accordingly, I construct models of child mortality from a broader sample of 83 less-developed

countries, across all regions of the globe. I also include uniform data for my key indicators of access to safe water and adequate sanitation. In light of previous research, I formulate two main hypotheses. First, I expect that less-developed nations with higher levels of improved water sources will be correlated with lower levels of child mortality. Second, I hypothesize that higher levels of improved sanitation facilities will be correlated with lower levels of child mortality than less-developed countries with lower levels of improved sanitation.

In testing these hypotheses, I will also address a larger methodological shortcoming in the child-mortality literature. Most research on child mortality tends to use cross-sectional data (Boehmer 1996, Frey 2000, Jorgenson 2004, Shandra 2010a, Shandra 2004). The analysis of cross-sectional data is a problem for a two reasons. First, cross-sectional models are unable to determine causal ordering, as they do not allow for change over time. Second, cross-sectional models lack the ability to control for individual level (i.e. country level) heterogeneity. I will address these potential issues by analyzing data for multiple time points using random effects regression models. Of course, a proper test of these hypotheses needs to occur in a fully specified theoretical model. Therefore, I now turn to a discussion my research design, sample, and other theoretically relevant predictors of child mortality. These include gross domestic product per capita, multilateral debt service, International Monetary Fund (IMF) structural adjustment, government expenditures, vaccination rates, democracy, and education (See Table 1 for descriptive statistics and bivariate correlations).

Research Design

The sample includes all nations classified as either “middle” or “low” income according to the World Bank’s income classification scheme. I do not include nations formed following the collapse of the Soviet Union because there are no data for these nations in 1990. I exclude high-income nations for a few reasons. First, they are they are not recipients of structural adjustment loans. Second, child mortality is most pronounced in the less-developed countries of the world.

I collect data cross-national data at multiple time points (1985, 1990, 1995, 2000, and 2005). I analyze these data in Stata version 10 statistical software, using random effects regression models. The advantage of these models is that it permits me to compare changes across countries over time on the predictors of interest (Woolridge 2002). Random-effects models also control for time invariant factors (e.g. geography, climate, or historical legacy) that are typically omitted from standard regression models. This is accomplished by treating such factors as case-specific intercepts and estimating them as a random component of the error term (Frees 2004). Therefore, random-effects models make use of the most valuable variance that exists in my data, that *between* nations rather than within them over time. In a fixed-effects model, this variance would be discarded from the analysis. Further, random-effects models are a fitting strategy given my theoretical approach. My hypotheses are aimed at explaining the disparity in national rates of child mortality among less-developed countries.

My generalized least squares (GLS) model can be represented as follows, where subscript i represents each country under analysis and t represents the time period.

The estimate of child mortality is: $y_{it} = u_t + \beta x_{it} + yz_i + \alpha_i + \varepsilon_{it}$ where y_{it} is the dependent variable for each country at a given period, u_t is a period-specific intercept, βx_{it} is a vector of coefficients for each predictor for country i at time t, and yz_i represents a vector of time-invariant predictors for each country i. The model also estimates two error terms: α_i which represents the case-specific error estimated as a random variable and ε_{it} which represents pure random variation.

I also evaluate the appropriateness of the models by considering regression diagnostics when making this decision. I consider variance inflation factor scores to ensure that excessive multicollinearity is not present in the analysis. I also establish that the random-effects model was methodological sound in that it does not result in overly biased coefficients relative to a fixed effects model. To do so, I conducted the statistical test suggested by Hausman (1978) to test the null hypothesis that the random-effects coefficients are unbiased compared the fixed-effects estimator. The resulting *p*-values of these tests were non-significant for all equations. This suggests that random-effects coefficients are more consistent than fixed-effects coefficients in these equations. Accordingly, with no support for favoring fixed-effects over random-effects models, I present random-effects results in each equation.

Dependent Variable

Child Mortality Rate. The first dependent variable for this analysis is child mortality rate. This is the probability of a child dying between birth and the age of five, expressed per 1,000 live births. This indicator is commonly used as a measure of children's well-being and the level of effort being made to maintain child health. This

variable is logged for its skewed distribution. The data are available for 1990, 1995, 2000, and 2005 and obtained from the United Nations (United Nations Children's Fund 2009).

Independent Variables

Access to Improved Water Source. This is the proportion of the total population with sustainable access to an "improved" water source. The data are gathered by the World Health Organization in collaboration with various partners including the United Nations Children's Fund (UNICEF) and the Water Supply and Sanitation Collaborative Council. The data are measured for 1985, 1990, 1995, and 2000. Please note that all independent variables are measured at these times points. Data are available from the Pacific Institute (2014). This measure represents the percentage of the population who use any of the following types of water supply for drinking: piped water, public tap, borehole or pump, protected well, protected spring or rainwater collection (United Nations Children's Fund 2009). Improved water sources do not include vendor-provided water, bottled water, tanker trucks, unprotected wells and springs, or surface water. These sources are considered "unimproved" because they do not provide access to sufficient quantities of water in a consistent manner. Improved water sources are more likely than unimproved sources to provide safe drinking water. The World Health Organization assumes that water from improved sources meets quality standards and poses no significant threat to health. However, determining the safety of drinking water from harmful chemical and microbiological agents is too costly and impractical to measure for every household. Therefore, an improved supply of water is used a proxy. I

hypothesize that higher levels of access to improved sources of water should be related to lower levels of child mortality in less-developed nations. This is because polluted water exposes individuals to chemical pollutants, infectious agents, and microbes that cause the many diarrheal diseases that kill children (World Health Organization 2010b).

Access to Improved Sanitation Facility. This variable measures the percentage of the population with access to facilities that hygienically separate human excreta from human, animal and insect contact. The data are gathered by the World Health Organization in collaboration with various partners including UNICEF and the Water Supply and Sanitation Collaborative Council. Data are available from the Pacific Institute (2014). Improved sanitation facilities include flush or pour/flush (to piped sewer systems, septic tanks, or pit latrines), ventilated improved pit (VIP) latrine, pit latrine with slab, and composting toilets. An improved sanitation facility is more likely to be sanitary than an unimproved facility. Unimproved facilities include systems that flush or pour-flush to any other place (e.g. street, yard, river), open pit latrines, buckets, hanging toilets, and no facility. I expect that less-developed countries with higher levels of access to an improved sanitation facility should be associated with lower levels of child mortality. This is because unhygienic sanitation facilities can lead to a number of diseases that kill children including diarrhea, intestinal worms, and cholera.

International Monetary Fund Structural Adjustment. To access the effects of economic austerity measures, I include a dummy variable for International Monetary Fund structural adjustment. Each nation undergoing a lending arrangement from the International Monetary Fund during the one of the years being examined coded with a value of one. This includes if a nations has received a “Stand-by”, “Extended”, “Flexible

Credit Line", "Poverty Reduction", "Growth Trust" and "Exogenous Shocks Facility" loan. The data are available from the International Monetary Fund (2010).

I use a dummy variable to indicate the presence of IMF structural adjustment for two reasons. First, it identifies whether a nation is undergoing an IMF loan in a given year. Previous work in the field has relied upon a conditionality index first developed by Walton and Ragin (1990). This index sums four key variables related to structural adjustment (debt renegotiation, debt restructurings, utilization of the IMF Extended Fund Facility, and number of loans received as a percentage of its quota), however it does not specify the status of any structural adjustment programs for any time point. A dummy variable allows me to clearly differentiate between years under adjustment and years not. Second, I use a dummy variable for theoretical reasons. Structural adjustment loans are typically complex financial instruments with widespread economic impact. A significant finding for a dummy variable would indicate that such loans have an impact on health, specifically child mortality rates, regardless of the loan type or amount. According to dependency theory, the presence of IMF structural adjustment loans should increase rates of child mortality by reducing government funds available for health care in the ways outlined above. I hypothesize therefore, that nations should have higher levels of child mortality when undergoing International Monetary Fund structural adjustment than at times not under such a loan.

Multilateral Debt Service. In addition to the pressure to adjust their economies under structural adjustment, indebted nations must continually service their debts to multilateral agencies. Therefore, it is also important to control for debt service as well as structural adjustment. This approach has been used previously by Bradshaw and

Schafer (2000), Schafer (1999), and Buchmann (1996). This measure includes principal and interest repayment to the World Bank, regional development banks, and other multilateral institutions. Payments from debtor nations may be paid in currency, good, or services. These data are obtained from the World Bank (2010). I expect higher levels of debt service should be associated with higher levels of child mortality.

Multinational Corporate Investment. I also include multinational corporate investment in the models. This variable is the end-of-year stocks of foreign direct investments in a given host country divided by gross domestic product. These stocks involve any long-term relationship reflecting a lasting interest in and control by a foreign direct investor in an economy other than that in which the foreign direct investor is based (United Nations Conference on Trade and Development 2010). This is an important variable to control for because structural adjustment often recommends that poor nations boost foreign investment in order to receive a loan. This variable is logged for its skewed distribution. These data may be obtained from the United Nations (2010). I expect that higher levels of multinational corporate investment should be associated with higher levels of child mortality. This may be the case as multinational investment tends to involve foreign corporations expatriating the majority of their profits and requiring regulatory concessions such as the elimination of minimum wage and the outlawing of unions, and exacerbating poverty in poor nations (Evans 1979, Leonard 1988).

International Trade. To assess the effects of a nation's level of trade with other nations, I include international trade in all models. The data are available from the World Bank (2010). This is the sum of exports and imports of goods and services measured as

a share of gross domestic product (World Bank 2010). By measuring trade flows between nations, this indicator also measures the degree to which a nation is integrated into the world-system. Following dependency theory, I expect that higher levels of international trade may be associated with higher levels of child mortality as resources flow outward from poor to rich nations.

Gross Domestic Product Per Capita. As is standard in cross-national analyses, a nation's level of development must be taken account of to ensure that any effects discovered are independent of a nation's wealth (London 1995). Therefore, I will include measure of gross domestic product per capita in constant United States 2000 dollars. The data may be obtained from the World Bank (2010). This variable is logged for its skewed distribution. I expect that higher levels of gross domestic product per capita should correspond with lower levels of child mortality. This is because higher levels of wealth tend to bring higher standards of living, advanced medical technology, and demographic changes that lower child mortality (Rostow 1990).

Domestic Investment. I estimate effects of domestic investment by including gross capital formation as a percent gross domestic product for each nation. This includes outlays on additions to the fixed assets of the economy (e.g., land improvements, plant and machinery purchases, and the construction of roads, railways, schools, and hospitals) plus net changes in the level of inventories or stocks of goods held by firms to meet unexpected fluctuation in production or sales. The data are obtained from the World Bank (2010). I expect that higher levels of domestic investment should be associated with lower levels of child mortality. This is most likely the case due

to domestic investment increasing capital available for investment by governments for health, education, family planning, and nutrition (Shen 1997).

Democracy. I use the average of Freedom House's (1997) political rights scale and civil liberties index in 1990 to measure level of democracy. Political rights reflects the degree to which a nation is governed by democratically elected officials, has fair, open, and inclusive elections, and is free of corruption, violence, and political discrimination against minorities. The civil liberties index reflects relative freedom of assembly, association, and expression within a nation. Both civil liberties and political rights have a seven-point scale ranging from 1 (most free) to 7 (least free). For ease of interpretation, I multiply the index by negative one and added eight to each score so that high scores now correspond with a high level of democracy.

I expect that democracy should be associated with lower levels of child mortality. This is most likely the case because freely elected governments are more likely to respond to popular demands for health care due to political activism and electoral accountability (Midlarsky 1998). In fact, London and Williams (1990) find that higher levels of democracy are associated with increased basic needs provision measured by the Physical Quality of Life Index and Index of Net Social Progress.

Total Government Expenditures. I also include a measure that assesses the impact of a government's expenditures. This is the general government final consumption expenditure as a percentage of total gross domestic product. The data are obtained from the World Bank (2010). This includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but

excludes government military expenditures that are part of government capital formation (World Bank 2010). I expect higher levels of government expenditures to be related to lower levels of child mortality with governments investing in elaborate curative care programs and hospitals as well as primary healthcare (e.g., vaccinations, family planning, prenatal care, postnatal care, and nutrition counseling).

Gross Secondary School Enrollment. I include gross secondary school enrollment rates to examine the impact of education on child mortality. This is the total secondary school enrollment of both sexes, regardless of age, expressed as a percentage of the secondary school-aged population. The data are available from the World Bank (2010). It is generally thought that education results in higher earnings in the wage labor market, thereby increasing economic growth (Shen 1997, Shen 1999). The economic growth augments standards of living and access to advanced medical technology, leading to lower levels of child mortality (Rostow 1990). Thus, I expect that higher levels of gross secondary school enrollments should be associated with lower levels of child mortality in poor nations.

Female Secondary School Enrollments. I also include female secondary school enrollment in the analysis. I do so because female education may have a unique impact on child mortality. This is the total female secondary school enrollment, regardless of age, expressed as a percentage of the female secondary school-aged population. The data are available from the World Bank (2010). I expect that nations with higher levels of female secondary school enrollment should be associated with lower levels of child mortality. This may well be because female education is associated with wider use of health services. It also improves access to information about nutrition, birth spacing,

reproductive health, and vaccinations (Shen 1999).

Vaccination Index. As a more specific measure of government health care performance within nations, especially relating to children's well being, I include an index of vaccination rates, for BCG, DPT, Polio, and Measles (See Appendix A for a brief description of each disease and its respective vaccine). I combine the rates of vaccination for each disease and average them to create the index. All vaccination data are obtained from the World Bank (2010). As many diseases disproportionally affect young children in poor nations and are preventable by vaccination, I expect higher average vaccination rates to be associated with lower rates of child mortality.

Findings

In Table 3, I present random-effects regression estimates of child mortality in 83 less-developed countries (See Appendix B for a complete list of countries). In every equation I include International Monetary Fund structural adjustment, debt service, gross domestic product per capita, international trade, foreign investment, domestic investment, democracy, total government consumption, and the vaccination index. In equation (3.1) and (3.2), I include access to improved water source. In Equations (3.3) and (3.4), I include access to improved sanitation facilities. In the odd-numbered equations, I include gross secondary school enrollments. In the even-numbered equations, I include female secondary school enrollments.

I organize the analysis in this way for three important reasons. First, this modeling strategy allows me to avoid for potential problems with multicollinearity. For

example, when both measures for secondary school enrollments are included in the same equation, variance inflation factor scores for cross-sectional models are great than 10. This is the established limit set by York, Rosa, and Dietz (2003). Separating these highly correlated measures presents models with highest variance inflation scores not exceeding 4.3. The variables for improved water and sanitation are separated for this same reason. Second, the use of "cognate" but "distinct" indicators of independent variables can clarify the complex dynamics involving the issue under investigation (London 1995). Third, the use of multiple indicators can prevent potential problems with measurement error, as several different measure are less likely to present the same error (Paxton 2002).

I will begin by discussing the variables for improved water and sanitation. In Equations (3.1) and (3.2), which contain the water variable, I find support for the hypothesis that less-developed countries with higher levels of access to an improved water source are associated with lower levels of child mortality. The coefficients for the water variable are negative and significant in both equations. This is likely the case as improved water sources present less exposure to water-related illnesses caused by various bacteria, parasites, and toxins commonly found in unimproved sources. In Equations (3.3) and (3.4), I similarly find that higher levels of access to improved sanitation facility are associated with lower levels of child mortality. The corresponding coefficients for improved sanitation facility are negative and significant in both equations.

Aside from my key indicators of water and sanitation, other variables help explain rates of child mortality in less-developed countries. First, I find that the presence of

International Monetary Fund structural adjustment loans is associated with higher levels of child mortality. The coefficients are positive and significant in every equation. Second, the coefficients for gross domestic product per capita are negative and significant in every equation. Third, I find that international trade is inversely correlated with rates of child mortality. In Equations (3.1), (3.2), and (3.4) the coefficients for international trade are negative and significant. This may be explained in a similar way as gross domestic product per capita. Rising levels of international trade often lead to increased levels of economic growth in less-developed countries. Therefore, less-developed countries with higher levels of international trade are associated with lower levels of child mortality than countries with lower levels of international trade. Fourth, the coefficients for total government consumption are positive and significant in every equation. This runs counter to the hypothesized direction, showing less-developed countries whose governments spend more overall have higher rates of child mortality than countries with lower levels of spending. It may be that governments in less-developed nations, especially those undergoing International Monetary Fund structural adjustment programs, appropriate funds away from public health in order to stimulate export growth or facilitate debt repayment (Mohan 2001). As such, greater overall spending might not correspond to more spending in areas that affect child health. Fifth, I find that both gross and female secondary school enrollments are associated with lower levels of child mortality. Sixth, I find mixed results for the vaccination index. In Equations (3.1) and (3.3), the coefficients for the vaccination index are negative and significant. However, in Equations (3.2) and (3.4) the coefficients lose their significance. These equations both include female as opposed to gross secondary school enrollments. It may be that the

effect of female education nullifies the effect of the average overall vaccination rate. Increased access to available vaccinations is one effect of higher levels of female education, specifically, as opposed to the education rates of the general public. However, other factors important for child health that have also been tied to higher rates of female education are nutrition, birth spacing, and overall reproductive health (Shen 1999). It may well be that the combined effects of these factors take precedent over the measurement for only vaccinations.

It is also worth noting the unstandardized coefficients for both water and sanitation in these models. In Eq. 3.3 and 3.4) the unstandardized coefficients for access to improved sanitation facility are very high, (-.409) and (-.422), respectively. This indicates that access to an improved sanitation facility has the greatest impact on child mortality relative to other variables considered in the models. In fact, the unstandardized coefficients are greater than those for gross domestic product per capita (-.230 for Eq. 3.3 and -.243 for Eq. 3.4). In the previous two equations, the unstandardized coefficients for GDP per capita were considerable higher at (-.447, in Eq. 3.1) and (-.478 in Eq. 3.2), and those for water considerably lower, at (-.028 in Eq. 3.1) and (-.041 in Eq. 3.2). In the water equations (3.1 and 3.2), gross domestic product per capita contained the highest unstandardized coefficients of any variable under analysis. This sort of result in consonant with previous work in the field as increases in gross domestic product per capita tends to bring about not only overall economic improvements but specific technological advances in regard to health care such as access to cutting-edge medical equipment and improvements to water and sanitation

facilities. This finding would suggest that improvement to sanitation facilities in less-developed countries is an important factor or outcome of economic growth.

There are also some non-significant findings of note. First, I find no support for the effects of debt service on child mortality. The coefficients are negative and non-significant in every equation. Second, the coefficients for neither foreign investment, nor domestic investment rise to statistical significance in any equation. Therefore, I find no support that a less-developed nation's levels of investments affect their levels of child mortality. Third, I do not find support for the idea that democracy is associated with child mortality. None of the coefficients for the above variables reach a level of statistical significance.

Discussion

The goal of this research is to test for the effects of improved access to water supply and sanitation facilities on child mortality in less-developed countries, over a time span of 20 years. In doing so I find considerable support for the views of environmental and health scholars that water and sanitation provision are both associated with rates of child mortality. Specifically, less-developed countries with higher levels of improved water sources are associated with lower rates of child mortality than less-developed countries with lower levels of access to improved water sources. I find the same inverse relationship for improved sanitation facilities. Less-developed countries in which a greater proportion of the population has access to improved sanitation facilities are correlated with lower levels of child mortality than are less-developed countries with less

access to such facilities. Both water and sanitation have been linked to various health risks, especially for children in the less-developed world (Barlow 2002, Bartlett 2005). My findings in this regard therefore, may be due to the associated risks of water-related illnesses from unsafe water sources containing harmful bacteria, parasites, or other pathogens that cause the many aforementioned diseases responsible for child deaths. My findings connecting poor sanitation faculties (including the absence of any facility) to child mortality may be due to the widespread risk of children coming into contact with human excreta, the main cause a diarrheal disease. Unimproved sanitation facilities do not adequately separate human excreta neither from human contact, nor from contact with animals or insects that could further spread disease.

I also note a number of other factors are related to child mortality in less-developed nations. First, I find that International Monetary Fund structural adjustment lending is positively associated with rates of child mortality. Less-developed countries undergoing International Monetary Fund adjustment loans are associated with higher child mortality rates than less-developed countries not under such loans. This may be the case as the International Monetary Fund often requires debtor nations to privatize public goods such as water and sanitation services (Rich 1994). This process often increases cost and reduces access for much of a country's population, especially the poorer and more rural sectors (Barlow 2002). The example of residents moving away from urban dwellings in Phnom Penh described above, illustrates such a case of reduced access to safe water. Cambodia has been under International Monetary Fund structural adjustment since 1994. Second, I find that gross and female secondary school enrollments are negatively correlated with child mortality. Less-developed

countries with higher enrollment rates in secondary schools, over the total population, and for women and girls in particular, are associated with lower rates of child mortality. Overall, higher levels of education often translate into economic growth for nations. This may bring about higher standards of living and access to more advanced medical technology, thereby leading to lower levels of child mortality (Rostow 1990). Higher levels of female education in particular are associated with wider use of health services and increased access to nutrition, birth spacing, and vaccinations (Shen 1999). This is especially relevant for child mortality as women are the primary caretakers for children throughout the developing world. Educated women are also more likely to delay their first childbirth and exert more control in household decisions, including choices made about contraception use (Shen 2001).

There are some methodological and theoretical implications that correspond with these findings. In general, cross-national research on child mortality has been limited by cross-sectional modeling. By using longitudinal data and random effects models this research extends the existing literature by better addressing causality and limiting errors due to heterogeneity bias. Examining change over time is especially important for development issues as their effects may take several years to take hold (Shandra 2010a). From a theoretical standpoint, cross-national scholars in the field of public health should consider insights from environmental sociology and well as the work of scholars in environmental health. These perspectives naturally overlap; however, sociologists largely exclude the environmental causes of health and illness. The emphasis instead, is placed on such development indicators such as gross-domestic product, economic growth, education, and literacy (Burroway 2010, Shandra 2004,

Shen 2001, Shircliff 2011). This is especially the case for work located in the developing world where the natural environment places a larger role in determining health (Prüss-Üstün 2008).

Finally, I close with some recommendations for future research. First, more specific and technical data on water and sanitation access is becoming available due to the efforts of the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation. Future scholarship on water and sanitation should take advantage of these data in order to develop a more nuanced understanding of the effects of water and sanitation provision on human health. Such an approach may help to shift the current framework beyond the limited concept of 'improved' provision to something more meaningful and practical (Bartlett 2005). Second, many non-governmental organizations work on development issues closely related to child heath as well as improving access to water and sanitation. Such organizations are commonly located where health problems are most acute, namely within the less-developed world. As such, future research in the field would benefit from analyses into the possible ways in which non-governmental organizations may affect child mortality in less-developed countries.

References

Agha, Sohail. 2000. "The Determinants of Infant Mortality in Pakistan." *Social Science and Medicine* 51(199-208).

Balthazar, J.C. and F.S. Solon. 1989. "Disposal of Faeces of Children under Two Years Old and Diarrhoea Incidence: A Case-Control Study." *International Journal of Epidemiology* 18(4):S16-19.

Barlow, Maude, and Tony Clark. 2002. *Blue Gold: The Fight to Stop the Corporate Theft of the World's Water*. New York: The New Press.

Bartlett, Sheridan. 2005. "Water, Sanitation, and Urban Children: The Need to Go Beyond "Improved" Provision." *Children, Youth and Environments* 15(1):115-37.

Berkman, D.S., Lescano, A.G., Gilman, R.H., Lopez, S.L., Black, M.M. 2002. "Effects of Stunting, Diarrhoeal Disease, and Parasitic Infection During Infancy on Cognition in Late Childhood: A Follow-up Study." *The Lancet* 359:564-71.

Boehmer, Ulrike, and Williamson, J.B. 1996. "The Impact of Women's Status on Infant Mortality Rate: A Cross-National Study." *Social Indicators Research* 37:333-60.

Bradshaw, York, and M. J. Schafer. 2000. "Urbanization and Development: The Emergence of International Non-Governmental Organizations Amid Declining States." *Sociological Perspectives* 43:97-116.

Buchmann, Claudia. 1996. "The Debt Crisis, Structural Adjustment, and Women's Education: Implications for Status and Development." *International Journal of Comparative Sociology* 37:5-30.

Burroway, Rebekah. 2010. "Schools against Aids: Secondary School Enrollment and Cross-National Disparitites in Aids Death Rates." *Social Problems* 57:398-420.

Buttel, Frederick H. 1976. "Social Science and the Environment: Competing Theories." *Social Science Quarterly* 57:307-23.

Carlson, Joy E. 2005. "Exposure to Toxicants and Child Health." *Children, Youth and Environments* 15(1):224-33.

Catton William R, and Riley Dunlap. 1980. "A New Ecological Paradigm for Post-Exuberant Sociology." *American Behavioral Scientist* 24(1):15-47.

Cheng, J.J., Schuster-Wallace, J.C., Watt, S., Newbold, K.NB., Mente A. 2011. "An Ecological Quantification of the Relationships between Water, Sanitation, and Infant, Child, and Maternal Mortality." *Environmental Health* 11.

Curtale, F. et al. 1998. "Differenct Patterns of Intestinal Helminth Infection among Young Workers in Urban and Rural Areas of Alexandria Governorate, Egypt." *Parassitologia* 40(3):251-54.

Curtis, V., S. Cairncross and R. Yonli. 2000. "Domestic Hygiene and Diarrhoea - Pinpointing the Problem." *Tropical medicine and international health* 5(1):22-32.

Dunlap, Riley E., and William R. Catton Jr. 1979. "Environmental Sociology." *Annual Review of Sociology* 5:243-73.

Evans, Peter. 1979. *Dependent Development: The Alliance of Multinational, State, and Local Capital in Brazil*. Princeton: Princeton University Press.

Freedom House. 1997. *Freedom in the World: 1996-1997*. New York: Freedom House.

Frees, Edward. 2004. *Longitudinal and Panel Data: Analysis and Applications in the Social Sciences*. New York: Cambridge University Press.

Frey, R.S. and Field, C. 2000. "The Determinants of Infant Mortality in the Less Developed World: A Cross-National Test of Five Theories." *Social Indicators Research* 52:215-35.

Friel, S., Bowen K., D. Campbell-Lendrum, H. Frumkin, A.J. McMichael, and K. Rasanathan. 2011. "Climate Change, Noncommunicable Diseases, and Development: The Relationships and Common Policy Opportunities." *Annual Review of Public Health* 32:133-47.

Guzelian, P.S., C.J. Henry, and S.S. Olin. 1992. *Similarities and Differences Betweeen Children and Adults: Implications for Risk Assessment*. Washington, D.C.: ILSI Press.

Haas, C.N., Rose, J.B., and Gerba, C.P. 1999. *Quantitative Microbial Risk Assessment*. New York: John Wiley & Sons.

Hausman, J. A. 1978. "Specification Tests in Econometrics." *Econometrica* 46(6):1251-71.

International Monetary Fund. 2010, "IMF Lending Arrangments". (http://www.imf.org/external/np/fin/tad/extarr1.aspx).

Jorgenson, Andrew K. 2004. "Global Inequality, Water Pollution, and Infant Mortality." *The Social Science Journal* 41:279-81.

Kick, E. L., Davis, B.L., Burns, T.J., and Li, L.Y. 1995. "World-System and National Institutional Effects on Infant Mortality in Third World Countries." *International Third World Journal and Review* 7:61-67.

Kick, E. L., Nasser, R., Davis, B.L., and Bean, L. 1990. "Militarization and Infant Mortality in the Third World." *Journal of Political and Military Sociology* 18(2):285-305.

Last, John M. 1993. "Global Change: Ozone Depletion, Greenhouse Warming, and Public Health." *Annual Review of Public Health* 14:115-36.

Leonard, H. Jeffrey. 1988. *Pollution and the Struggle for World Product: Multinational Corporations, the Environment, and International Comparative Advantage*. Cambridge: Harvard University Press.

London, Bruce, and B. Williams. 1990. "National Politics, International Dependency, and Basic Needs Provision: A Cross-National Analysis." *Social Forces* 69:564-84.

London, Bruce, and R. J. S. Ross. 1995. "The Political Sociology of Foreign Direct Investment: Global Capitalism and Capital Mobility, 1965-1980." *International Journal of Comparative Sociology* 36:198-219.

Ludwig, K.M. et al. 1999. "[Correlation between Sanitation Conditions and Intestinal Parasitosis in the Population of Assis, State of Sao Paulo]." *Revista da Sociedade Brasileira de Medicina Tropical* 32(5):547-55.

Mahfouz, Ahmed A.R. el al. 1997. "Ecological Determinants of Intestinal Parasitesitic Infections among Pre-School Children in an Urban Squatter Settlement of Egypt." *Journal of Tropical Pediatrics* 43:341-44.

Mertens, T.E. et al. 1992. "Excreta Disposal Behaviour and Latrine Ownership in Relation to the Risk of Childhood Diarrhoea in Sri Lanka." *International Journal of Epidemiology* 21(6):1157-64.

Midlarsky, M. 1998. "Democracy and the Environment: An Empirical Assessment." *Journal of Peace Research* 35:341-61.

Mohan, Giles. 2001. "The Environmental Impacts of Adjustment." Pp. 95-117 in *Structural Adjustment: Theory, Practice, and Impacts*, edited by E. B. G. Mohan, B. Milward, and A. B. Zack-Williams. New York: Routledge.

Nalugwa, A., Olsen, A., Tukahebwa, M.E., Nuwaha, F. 2015. "Intestinal Schistosomiasis among Preschool Children Along the Shores of Lake Victoria in Uganda." *Acta Tropica* 142:115-21.

National Academy of Sciences. 1993. *Pesticides in the Diets of Infants and Children*. Washington, D.C.: National Academy Press.

Pacific Institute. 2014, "The World's Water". (http://worldwater.org/water-data/).

Patz, Jonathan A., David Engelberg, and John Last. 2000. "The Effects of Changing Weather on Public Health." *Annual Review of Public Health* 21:271-307.

Paxton, P. 2002. "Social Capital and Democracy: An Interdependnt Relationship." *American Sociological Review* 67:254-77.

Prüss, Annete et al. 2002. "Estimating the Burden of Disease from Water, Sanitation and Hygiene at a Global Level." *Environmental Health Perspectives* 110(5):537-42.

Prüss-Üstün, A., Bos, R., Gore, F., Bartram, J. 2008. "Safer Water - Better Health: Costs, Benefits, and Sustainability of Interventions to Protect and Promote Health." edited by W. H. Organization. Geneva.

Prüss-Üstün, A., Kay, D., Fewtrell, L. 2004. "Unsafe Water, Sanitation, and Hygiene." in *Comparative Quantification of Health Risks: Global and Regional Burden of Disease*, edited by M. Ezzati, Lopez, D.A., Rodgers, A., Murray, J.C.L. Geneva: World Health Organization.

Rahman, M.M., Chowdury, U.K., Mukherfee, S.C., Mondal, B.K., Paul, K., Lodh, D., Biswas, B.K., Chanda, C.R., Basu, G.K., Saha, K.C., Roy, S., Das, R., Palit, S.K., Oumruzzaman, Q., and Chakraborti, D. 2001. "Chronic Arsenic Toxicity in Bangladesh and West Bengal, India - a Review and Commentary." *Journal of Toxicology, Clinical Toxicology* 39(7):683-700.

Rich, Bruce. 1994. *Mortgaging the Earth: The World Bank, Environmental Impoverishment, and the Crisis of Development*. Boston: Beacon Press.

Rostow, Walter W. 1990. *The Stages of Economic Growth: A Non-Communist Manifesto*. New York: Cambridge Univeristy Press.

Sattler, Christopher, and John M. Shandra. 2012. "Do Health Nongovernmental Organizations Improve Child Mortality." *International Journal of Sociology* 42(2):28-46.

Schafer, Mark J. 1999. "International Non-Governmental Organizations and Third World Education in 1990: A Cross-National Study." *Sociology of Education* 72:69-88.

Seipel, M. M. 1994. "Toward Effective Health Care Investment in Developing Countries." *Social Development Issues* 16:13-22.

Shandra, John M., Carrie L. Shandra, and Bruce London. 2010a. "Do Non-Governmental Organizations Impact Health?: A Cross-National Analysis of Infant Mortality." *International Journal of Comparative Sociology* 51(Feb. 2010):137-64.

Shandra, John M., Jenna Nobles, Bruce London, and John B. Williamson. 2004. "Dependency, Democracy, and Infant Mortality: A Quantitative, Cross-National Analysis of Less Developed Countries." *Social Science & Medicine* 59:321-33.

Shen, Che, and John B. Williamson. 2001. "Accounting for Cross-National Differences in Infant Mortality Decline (1965-1991) among Less Developed Countries: Effects of Women's Status, Economic Dependency, and State Strength." *Social Indicators Research* 53:257-88.

Shen, Che, and John B. Williamson. 1999. "Maternal Mortality, Women's Status, and Economic Dependency in Less Developed Countries: A Cross-National Analysis." *Social Science & Medicine* 49:197-214.

Shen, Che, and John B. Williamson. 1997. "Child Mortality, Women's Status Economic Dependency, and State Strength: A Cross-National Analysis." *Social Forces* 76(2):667-700.

Shi, Anqing. 2000. "How Access to Urban Potable Water and Sewerage Connections Affects Child Mortality." in *Development Research Group*, edited by W. Bank. Washington, C.C.

Shircliff, Eric J., and John M. Shandra. 2011. "Non-Governmental Organizations, Democracy, and HIV Prevalence: A Cross-National Analysis." *Sociological Inquiry* 81(2):143-73.

Smith, A.H., Lingas, E.O., and Rahman, M. 2000. "Contamination of Drinking-Water by Arsenic in Bangladesh: A Public Health Emergency.". *A Bulletin of the World Health Organization* 78:1093-103.

Thomas, K., McBean, E., Shantz, A., and H.M. Murphy. 2015. "Comparing the Microbial Risks Associated with Household Drinking Water Supplies Used in Peri-Urban Communities of Phnom Penh, Cambodia." *Journal of Water & Health* 13(1):243-58.

United Nations Children's Fund. 2014. *The State of the World's Children 2014: Every Child Counts*.

United Nations Children's Fund. 2009. *The State of the World's Children 2009: Maternal and Newborn Health*.

United Nations Conference on Trade and Development. 2010. (http://unctadstat.unctad.org).

Vasquez, M.L. et al. 1999. "[Incidence and Risk Factors for Diarrhoea and Acture Respitory Infections in Urban Communities of Pernambuco, Brazil]." *Cadernos de Saúde Pública* 15(1):163-71.

Walton, John, and Charles Ragin. 1990. "Global and National Sources of Political Protest: Third World Responses to the Debt Crisis." *American Sociological Review* 55(6):876-90.

WHO/UNICEF. 2014. "Progess on Drinking-Water and Sanitation - 2014 Update." Geneva.

Woolridge, Jeffrey. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge: MIT Press.

World Bank. 2010. *World Development Indicators*. Washington, DC: World Bank.

World Health Organization. 2015, "Diarrhoeal Disease Factsheet". (http://www.who.int/mediacentre/factsheets/fs330/en/).

World Health Organization. 2010b. "The World Health Report." Geneva.

World Health Organization. 2004, "Water, Sanitation and Hygiene Links to Health". (http://www.who.int/water_sanitation_health/publications/factsfigures04/en/).

World Health Organization. 2000. "Global Water Supply and Sanitation Assessment 2000 Report." edited by World Health Organization. Geneva, Switzerland.

York, R., E. A. Rosa, and T. Dietz. 2003. "Footprints on the Earth: The Environmental Consequences of Modernity." *American Sociological Review* 68:279-300.

CHAPTER 4

The Role of Health International Non-Governmental Organizations in Reducing Child Mortality

Recent accounts have documented the influences of international organizations on behaviors of nations in a global context (Boli 1997, Boli 1999). A key assumption of this approach is that state behavior cannot be understood outside of a broader institutional context. It is international institutions, especially international non-governmental organizations, that determine how nations define their interests and act according to those interests. Thus, the interactions among states and these actors are constrained by certain institutional contexts (Boli 1999). In this regard, health international non-governmental organizations use several different methods to bring about social change. Such methods as they relate to child health and mortality include providing health services, setting standards, conducting research, and lobbying for change in the area of health, broadly construed (Ainsworth 2000, Gomez-Jauregui 2004, Sanders 2005). These methods however, are scrutinized by a number of scholars for being ineffective for a variety of reasons (Fisher 1997, Newell 2000). These factors include projects being small-scale, bending to whims of donors, or being limited by political opportunity structures (Edwards 1996, Fisher 1997, Livernash 1992, McAdam 1982, Newell 2000). They may even have their operations and assets frozen by a government (Chapin 2004, Wiktorowicz 2002). Nevertheless, there has been no

longitudinal cross-national research that empirically evaluates how international non-governmental organizations impact child mortality in less-developed countries.

Existing cross-national work, however, has demonstrated the beneficial effects of health international non-governmental organizations. For example, Shandra, Shandra and London (2010a) find that health non-governmental organizations are associated with lower rates of infant mortality. In a similar study, the same researchers find that in a sample of 74 poor nations, increased numbers of health and women's non-governmental organizations are associated with lower rates of maternal mortality (Shandra 2010b). In a study on sub-Saharan Africa, Sattler and Shandra (2012) find that higher levels of international health non-governmental organizations correspond with lower levels of child mortality. In this particular study, the authors employ a two-way fixed-effects modeling strategy. These sorts of models examine change over time, but within nations rather than between them. While this represents an improvement upon typical cross-sectional strategies in this type of research, their sample only contains 29 nations from sub-Saharan Africa, thereby limiting the generalizability of their findings. The extent to which non-governmental organizations affect child mortality in other regions of the globe remains untested. To the author's knowledge, there are no longitudinal studies in cross-national research that examine the contested relationship between child mortality and non-governmental organizations in a truly global context.

I address this gap in the literature by conducting a longitudinal study that examines how health international non-governmental organizations affect child health and survival in less-developed countries over a span of 20 years. I begin by reviewing the arguments suggested by world society theory that these international actors should

help decrease child mortality. I then consider ideas that suggest why this may not be the case. Next, I elaborate upon the reasons for including other theoretically relevant predictors in the models. I conclude with a discussion of the findings, some policy implications, and directions for future research.

World Society Theory, Health International Non-Governmental Organizations, and Child Mortality

First, health international non-governmental organizations provide health services at the local level (Smith 1995). For example, to help protect child under the age five in sub-Saharan Africa from Malaria, Doctors Without Borders implemented a new treatment approach called “seasonal malaria chemoprevention” (Doctors Without Borders 2014) This new technique involves treating all children within a given location during specific times when malaria is most likely to proliferate. During the rainy season in countries like Mali and Chad, when the carrier of malaria, the Anopheles mosquito thrives, Doctors Without Borders ramps up their efforts to treat new cases and prevent new ones (ibid). In 2012, Doctors Without Borders used the technique to treat 160,000 children in Mail and another 10,000 in Chad, affecting a significant drop in malaria cases, as well as a 70% decrease in blood transfusions in the main hospital in Mali following the treatment (ibid). Malaria is a leading cause of death in many less-developed countries, and in sub-Saharan Africa it is responsible for almost half a million child deaths (World Health Organization 2014), and efforts such as these can reduce the possible health risks and overall child deaths that result every year.

Second, health international non-governmental organizations fund educational programs. For example, after the 2010 earthquake in Haiti, CARE International stepped in to provide educational programs to the most devastated areas where basic hygiene is difficult to maintain. In Aujecad, a camp for some 2,300 Haitians displaced from their homes following the earthquake, CARE built a number of sanitary facilities including multiple hand washing stations and 14 latrines for both men and women. Each was also maintained with the necessary soap for hand washing, and brooms, gloves, and detergent to keep the latrines clean. To ensure proper usage of the new facilities, CARE engaged in a various educational programs to reach out to the local residents. They make house visits, host hygiene workshops, help form mothers and children's hygiene and safety clubs, send radio messages, and train local educators (CARE International 2014). Each method shares the same three goals - to explain proper bodily hygiene, to safely collect and store water, and to avoid diseases such as malaria and diarrhea. As diarrhea kills more children every year than AIDS, malaria, and measles combined, such efforts to reduce the health risks of water-born diseases through education, especially as related to health, may well translate to lower levels of child mortality.

Third, health international non-governmental organizations actively lobby government officials to push for more effective policies (Rugendyke 2007). This lobbying takes several different forms. To begin, health international non-governmental organizations can press for government reforms by publicly criticizing faults and failures with current policies (Boli 1999, Willets 1982). Further, health international non-governmental organizations can form coalitions with other international or domestic non-governmental organizations, or intergovernmental organizations such as the United

Nations, to increase public outcry against their policies (Haque 2002). This tends to involve international health international non-governmental organizations employing frames and discourses that encourage the formation and maintenance of domestic social movements around health issues (Frank 2000). The resulting social movements, in turn, apply pressure on nations to adequately respond to health concerns (Smith 1999). Thus, governments are 'squeezed' from above and below to attend to public health problems (Schofer 2005). In fact, Keck and Sikkink (1998) refer to this dual process as a "boomerang effect."

For example, Cordaid, together with partner regional and national non-governmental organizations have engaged with the Ugandan government to push for the inclusion of performance based financing (PBF) in their national health strategy (Cordaid 2014). Performance based financing is a somewhat new and innovative technique that is directed at solving the major weaknesses of health care delivery in less-developed countries such as the wasteful use of resources, low quality of services and an unmotivated work force. This is achieved by switching the focus from inputs to outputs, and finally outcomes in health services like improved hygiene practices, access to safe water systems, or the provision of nutritional supplements. The solution is simple and low cost, wherein the delivery of services is improved by contracting out their provision and linking the payment of any subsidies to the delivery of services to targeted groups. According to a World Bank report, the emphasis on delivered results represents a shift toward "the Holy Grail of development outcomes," with "the potential to improve incentives and accountability, while also expanding opportunities for mobilizing private financing" (Brook 2001:91). It has had proven success in other sub-Saharan nations

such as Rwanda (Meessen 2011, Rusa 2009) and Congo (Soeters 2011). According to Cordaid and its partners, PBF can similarly increase efficiency in Uganda's health sector and be an effective means to achieve quality universal health coverage across the country. The team of non-governmental organizations aims to directly influence policy makers at the national and district level, as well as influential donor agencies like the World Bank, UNICEF, and USAID. The implementation of such policies that seek to increase quality and efficiency of health care across entire populations may have exactly the sort of impact necessary to achieve measurable results for child mortality at the national level.

In addition to the sociological work cited above, prior research in public health has also demonstrated the success of non-governmental organization activities on health outcomes. Several studies comparing non-governmental organization and state run services for example, have found that primary health care delivery and nutrition services from non-state actors such as non-governmental organizations was more effective than government provided services and increased coverage areas, especially in remote, poor areas (Karim 2003, La Forgia 2004, Mahmud 2002, Schwartz 2004). In a review of public health literature in this vein, Dr. Loevinsohn and April Harding write in *The Lancet,* that case studies from Pakistan, Bangladesh, Hyderabad, India, and Cambodia "indicated that non-governmental entities did better even when they had the same or fewer resources than public institutions" (2005:679). For example, a study on Tuberculosis control in Hyderabad, India, found the treatment completion rate of one non-governmental organization to be 14 percentage points higher than state-provided services in a nearby area, while offered at a lower cost (Murthy K.J.R. 2001). Despite

these successes, however, there are a number of factors that may limit the ability of health international non-governmental organizations to reduce rates of child mortality.

Limitations of Health International Non-Governmental Organizations

The preceding discussion highlights several different tactics that health international non-governmental organizations use to improve health and reduce rates of child mortality. These include the provision medical care and supplies, offering health education, and advocating for national change in health policy. However, there are several factors that may limit their effectiveness. Thus, I now turn to a discussion of these limitations.

First, non-governmental organization projects can first be criticized for being too small in scale and narrow in geographical focus (Livernash 1992). For example, the provision of medical care and educational services by international non-governmental organizations like Cordaid can be criticized for limiting their services to only the needy populations that surround their individual diocese. Any positive effects of such treatment would likely only extend to a small geographical radius around their facilities. Ainsworth and Teokul, note in *The Lancet* that few efforts in low and middle-income nations are implemented “on a scale that would register an effect” (Ainsworth 2000). Even lobbying and advocacy attempts such as those described above, that reach the national scale, may still be seen as limited on the international scale. Consequently, critics such as Princen (1994:32) may rightly conclude about such non-governmental organization

activity that, “Without a strong multiplier effect, they are unlikely to add up to significant change”.

Second, the tactics health non-governmental organizations engage in may be less than effective owing to constraints placed upon them as they receive increasing amounts of funding from their various benefactors, donors, and political supporters, thus raising issues of accountability and legitimacy (Powell 1997). Perhaps the most well known example of this in the last decade comes from the 2003 President’s Emergency Plan For AIDS Relief. Put forward by former United States President George W. Bush in his State of the Union address in January 2003, this plan offered a $15 billion commitment to global AIDS relief over a 5-year period. According to data from the WHO, HIV/AIDS is one of six conditions that account for roughly 70% of all child deaths, and its relative contribution to child mortality is steadily increasing (WHO 2014). However, the President’s plan set forth a number of stipulations that strictly limited the kind and number of organizations eligible to receive funds to fight HIV/AIDS through this new legislation. Known as the ‘‘Global Gag Rule,’’ no agency receiving USAID could offer abortion services or contraception counseling, ‘‘including the use of condoms as a method to avoid contracting AIDS’’ (Ruether 2005). Guided by a highly criticized rhetoric of ‘‘Abstinence Before Condoms,’’ health non-governmental organizations throughout the world were cut off from previous funding for providing or refusing to deny contraception services to the communities they served (Walgate 2004). Until the Obama administration lifted the ban, non-governmental organizations in at least 50 nations were receiving funding from USAID under constraints of the Gag Rule (Crane 2004). Similar scenarios are likely to occur as many non-governmental organizations lack the financial

stability to deny funding from large donors and can therefore be easily swayed away from even the most effective strategies (Ainsworth 2000).

Third, non-governmental organizations may be affected by the “political opportunity structure” of the nation within which they operate (McAdam 1982, Tarrow 1994). That is, governments may be able to enhance or restrict the effectiveness of non-governmental organizations. In repressive nations, non-governmental organizations are often tolerated only if they meet with the approval of government officials (Bryant 1997). In this regard, a repressive government can use its law-making powers to "dull the sharp edge of non-governmental organization criticism" (Clark 1991). For instance, Indonesia requires all non-governmental organizations working in the country to register members and seek approval of funding for any project. The law also permits the government to ban any non-governmental organization without explanation (Hurst 1990). In 2014, Doctors Without Borders fell victim to just such a law. After 22 years of working in the strife-torn Myanmar state of Rakhine, the national government expelled them from the country. They were accused of “consistently showing favoritism” toward the Muslim minority, despite running clinics in 9 townships across the state and having provided essential health care to tens of thousands of patients. Doctors Without Borders maintained that they do not exclude any group from treatment but offer care “based on need alone, not ethnicity or religion” (Doctors Without Borders 2014). Government powers exercised in this way have the power to forestall even the most effective of non-governmental organization activities.

However, democracy may enhance the ability of health non-governmental organizations to increase child health (Payne 1995). In part, this may be the result of

democratic nations providing citizens with ‘‘political opportunity structures’’ to engage in public policy debates, including protections of speech, press, and assembly (Tarrow 1994). It may also be due to democratic leaders being more likely to tolerate such activism in order to maintain legitimacy (Midlarsky 1998). The responsiveness of public officials is partially based on the need for them to win popular elections to maintain their positions. The officials who fail to address the needs of citizens or at least give the impression of concern face the risk of losing their position in subsequent elections (Lewis 2000). Thus, democracy may enhance the effectiveness of health international non-governmental organizations to provide services that may decrease child mortality rates.

Yet even governments of more democratic nations can also interfere with non-governmental organization operation. The multiplicity of health international non-governmental organizations working in any given nation has caused international donors to become increasing dependent on governments as intermediaries. However, few governments in the developing world possess the disbursement capacity to handle the large amounts of funding being channeled through their hands (Halmshaw 2004). The few that do may then use their power advantage to withhold funding from non-governmental organizations that might be critical of their policies (Bryant 1997). The resulting bottlenecking of funds for health projects can be so severe that non-governmental organizations working in places like Burkina Faso where millions of dollars of aid are ‘‘pouring in’’ cannot expand their efforts because of poor government distribution (Halmshaw 2004).

There is clearly some debate regarding the ability of non-governmental

organizations to decrease child mortality rates. The majority of published cross-national research however, documents many of the beneficial impacts of non-governmental organizations in less-developed countries. For instance, Shandra, Shor, and London (2008a) find that environmental non-governmental organizations decrease organic water pollution, while Shandra (2007) finds that higher levels of environmental non-governmental organizations are associated with lower rates of deforestation. Schofer and Hironaka (2005) find a similar patter for carbon dioxide emissions. Bradshaw and Schafer (2000) examine the relationship between international non-governmental organizations, over urbanization, economic growth, and access to clean drinking water. Frank, Hironaka, and Schofer (2000) find that higher levels of international non-governmental organizations are associated with increased protected land area and greater likelihood of passing nation environmental laws. Schafer (1999) finds higher levels of international non-governmental organizations are associated with higher levels of education attainment. Mercer et al. (2006) found international non-governmental organizations were effective in reducing infant mortality rates by identifying underserved areas in Bangladesh and providing much needed health services to poor mothers.

Drawing on the previous research in the world society tradition, I seek to empirically assess the contested impact of international non-governmental organizations on child health. Further adding insights from social movement theory, I aim to test the following hypotheses:

H_1 = Higher levels of Health International Non-governmental Organizations will be associated with lower rates of child mortality.

H_2 = The Effect of Health International Non-governmental Organizations in more democratic nations will be greater than the effect of Health international non-governmental organizations in less democratic nations.

I do so by conducting a cross-national study that includes health international non-governmental organizations in models of child mortality using random effects regression models. However, a proper test of this hypothesis needs to occur in a fully specified theoretical model. Therefore, I now turn to a discussion of my general research design, sample, and other theoretically relevant predictors of child mortality. These include gross domestic product, multilateral debt service, International Monetary Fund (IMF) structural adjustment, government expenditures, vaccination rates, democracy, education, and access to clean water and adequate sanitation facilities (See Table 1 for descriptive statistics and bivariate correlations).

Research Design

The sample includes all nations classified as either “middle” or “low” income according to the World Bank’s income classification scheme. I do not include nations formed following the collapse of the Soviet Union because there are no data for these nations in 1990. I exclude high-income nations for a few reasons. First, they are they are not recipients of structural adjustment loans. Second, child mortality is most pronounced in the less-developed countries of the world.

I collect data cross-national data at multiple time points (1985, 1990, 1995, 2000, and 2005). I analyze these data in Stata version 10 statistical software, using random

effects regression models. The advantage of these models is that it permits me to compare changes across countries over time on the predictors of interest (Woolridge 2002). Random-effects models also control for time invariant factors (e.g. geography, climate, or historical legacy) that are typically omitted from standard regression models. This is accomplished by treating such factors as case-specific intercepts and estimating them as a random component of the error term (Frees 2004). Therefore, random-effects models make use of the most valuable variance that exists in my data, that *between* nations rather than within them over time. In a fixed-effects model, this variance would be discarded from the analysis. Further, random-effects models are a fitting strategy given my theoretical approach. Driven by world society theory, my hypotheses are aimed at explaining the disparity in national rates of child mortality among less-developed countries.

My generalized least squares (GLS) model can be represented as follows, where subscript i represents each country under analysis and t represents the time period. The estimate of child mortality is: $y_{it} = u_t + \beta x_{it} + yz_i + \alpha_i + \varepsilon_{it}$ where y_{it} is the dependent variable for each country at a given period, u_t is a period-specific intercept, βx_{it} is a vector of coefficients for each predictor for country i at time t, and yz_i represents a vector of time-invariant predictors for each country i. The model also estimates two error terms: α_i which represents the case-specific error estimated as a random variable and ε_{it} which represents pure random variation. I also include a linear interaction term between democracy and health international non-governmental organizations to test for potential moderation.

I also evaluate the appropriateness of the models by considering regression diagnostics when making this decision. I consider variance inflation factor scores to ensure that excessive multicollinearity is not present in the analysis. I also establish that the random-effects model was methodological sound in that it does not result in overly biased coefficients relative to a fixed effects model. To do so, I conducted the statistical test suggested by Hausman (1978) to test the null hypothesis that the random-effects coefficients are unbiased compared the fixed-effects estimator. The resulting *p*-values of these tests were non-significant for all equations. This suggests that random-effects coefficients are more consistent than fixed-effects coefficients in these equations. Accordingly, with no support for favoring fixed-effects over random-effects models, I present random-effects results in each equation.

Dependent Variable

Child Mortality Rate. The first dependent variable for this analysis is child mortality rate. This is the probability of a child dying between birth and the age of five, expressed per 1,000 live births. This indicator is commonly used as a measure of children's well-being and the level of effort being made to maintain child health. The data are available for 1990, 1995, 2000, and 2005 and obtained from the United Nations (United Nations Children's Fund 2009). This variable is logged for its skewed distribution.

Independent Variables

Health International Non-Governmental Organizations Per Capita. Inoue and Drori (2006) compiled the data from The Yearbook of International Associations. To standardize the measure across nations, I divide the number of health non-governmental organizations by the nation's population in millions. The population data come from the World Bank (2007). The data are measured for 1985, 1990, 1995, and 2000. Please note that all independent variables are measured at these times points. This measure is lagged five years in order to allow for the effects of health non-government organizations to surface on a national level. Shandra, Shandra, and London (2010a) found this to be the case using a similar lag in their study on the effects of health non-governmental organizations on infant mortality. I apply this lag to all independent variables in this analysis for sake of consistency. I log the variable to deal with its skewed distribution.

International Monetary Fund Structural Adjustment. To access the effects of economic austerity measures, I include a dummy variable for International Monetary Fund structural adjustment. Each nation undergoing a lending arrangement from the International Monetary Fund during the one of the years being examined coded with a value of one. This includes if a nations has received a "Stand-by", "Extended", "Flexible Credit Line", "Poverty Reduction", "Growth Trust" and "Exogenous Shocks Facility" loan. The data are available from the International Monetary Fund (2010).

I use a dummy variable to indicate the presence of International Monetary Fund structural adjustment for two reasons. First, it identifies whether a nation is undergoing an International Monetary Fund loan in a given year. Previous work in the field has

relied upon a conditionality index first developed by Walton and Ragin (1990). This index sums four key variables related to structural adjustment (debt renegotiation, debt restructurings, utilization of the International Monetary Fund Extended Fund Facility, and number of loans received as a percentage of its quota), however it does not specify the status of any structural adjustment programs for any time point. A dummy variable allows me to clearly differentiate between years under adjustment and years not. Second, I use a dummy variable for theoretical reasons. Structural adjustment loans are typically complex financial instruments with widespread economic impact. A significant finding for a dummy variable would indicate that such loans have an impact on health, specifically child mortality rates, regardless of the loan type or amount. I expect the presence of International Monetary Fund structural adjustment loans should increase rates of child mortality by reducing government funds available for health care in the ways outlined above. I hypothesize therefore, that nations should have higher levels of child mortality when undergoing International Monetary Fund structural adjustment than at times not under such a loan.

Multilateral Debt Service. In addition to the pressure to adjust their economies under structural adjustment, indebted nations must continually service their debts to multilateral agencies. Therefore, it is also important to control for debt service as well as structural adjustment. This approach has been used previously by Bradshaw and Schafer (2000), Schafer (1999), and Buchmann (1996). This measure includes principal and interest repayment to the World Bank, regional development banks, and other multilateral institutions. Payments from debtor nations may be paid in currency, good, or

services. These data are obtained from the World Bank (2010). I expect higher levels of debt service should be associated with higher levels of child mortality.

Multinational Corporate Investment. I also include multinational corporate investment in the models. This variable is the end-of-year stocks of foreign direct investments in a given host country divided by gross domestic product. These stocks involve any long-term relationship reflecting a lasting interest in and control by a foreign direct investor in an economy other than that in which the foreign direct investor is based (United Nations Conference on Trade and Development 2010). This variable is logged for its skewed distribution. This is an important variable to control for because structural adjustment often recommends that less-developed countries boost foreign investment in order to receive a loan. These data may be obtained from the United Nations (2010). I expect that higher levels of multinational corporate investment should be associated with higher levels of child mortality. This may be the case as multinational investment tends to involve foreign corporations expatriating the majority of their profits and requiring regulatory concessions such as the elimination of minimum wage and the outlawing of unions, and exacerbating poverty in less-developed countries (Evans 1979, Leonard 1988).

International Trade. To assess the effects of a nation's level of trade with other nations, I include international trade in all models. The data are available from the World Bank (2010). This is the sum of exports and imports of goods and services measured as a share of gross domestic product (World Bank 2010). By measuring trade flows between nations, this indicator also measures the degree to which a nation is integrated into the world-system. I expect that higher levels of international trade may be

associated with higher levels of child mortality as resources flow outward from poor to rich nations.

Gross Domestic Product Per Capita. As is standard in cross-national analyses, a nation's level of development must be taken account of to ensure that any effects discovered are independent of a nation's wealth (London 1995). Therefore, I will include measure of gross domestic product per capita in constant United States 2000 dollars. The data may be obtained from the World Bank (2010). This variable is logged for its skewed distribution. I expect that higher levels of gross domestic product per capita should correspond with lower levels of child mortality. This is because higher levels of wealth tend to bring higher standards of living, advanced medical technology, and demographic changes that lower child mortality (Rostow 1990).

Domestic Investment. I estimate effects of domestic investment by including gross capital formation as a percent gross domestic product for each nation. This includes outlays on additions to the fixed assets of the economy (e.g., land improvements, plant and machinery purchases, and the construction of roads, railways, schools, and hospitals) plus net changes in the level of inventories or stocks of goods held by firms to meet unexpected fluctuation in production or sales. The data are obtained from the World Bank (2010). I expect that higher levels of domestic investment should be associated with lower levels of child mortality. This is most likely the case due to domestic investment increasing capital available for investment by governments for health, education, family planning, and nutrition (Shen 1997).

Democracy. I use the average of Freedom House's (1997) political rights scale and civil liberties index in 1990 to measure level of democracy. Political rights reflects

the degree to which a nation is governed by democratically elected officials, has fair, open, and inclusive elections, and is free of corruption, violence, and political discrimination against minorities. The civil liberties index reflects relative freedom of assembly, association, and expression within a nation. Both civil liberties and political rights have a seven-point scale ranging from 1 (most free) to 7 (least free). For ease of interpretation, I multiply the index by negative one and added eight to each score so that high scores now correspond with a high level of democracy.

I hypothesize that democracy should be associated with lower levels of child mortality. This is most likely the case because freely elected and open governments respond to popular demands for health care due to political activism and electoral accountability. In fact, London and Williams (1990) find that higher levels of democracy are associated with increased basic needs provision measured by the Physical Quality of Life Index and Index of Net Social Progress. Midlarsky (1998) suggests that such a finding can be attributed to freely elected and open governments responding to popular demands for basic needs provision due to political activism and electoral accountability.

Total Government Expenditures. I also include a measure that assesses the impact of a government's expenditures. This is the general government final consumption expenditure as a percentage of total gross domestic product. The data are obtained from the World Bank (2010). This includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation (World Bank 2010). I expect higher levels of government expenditures to be related to

lower levels of child mortality with governments investing in elaborate curative care programs and hospitals as well as primary healthcare (e.g., vaccinations, family planning, prenatal care, postnatal care, and nutrition counseling).

Gross Secondary School Enrollment. I include gross secondary school enrollment rates to examine the impact of education on child mortality. This is the total secondary school enrollment of both sexes, regardless of age, expressed as a percentage of the secondary school-aged population. The data are available from the World Bank (2010). It is generally thought that education results in higher earnings in the wage labor market, thereby increasing economic growth (Shen 1999). The economic growth augments standards of living and access to advanced medical technology, leading to lower levels of child mortality (Rostow 1990). Thus, I expect that higher levels of gross secondary school enrollments should be associated with lower levels of child mortality in less-developed countries.

Female Secondary School Enrollment. I also include female secondary school enrollment in the analysis. I do so because female education may have a unique impact on child mortality. This is the total female secondary school enrollment, regardless of age, expressed as a percentage of the female secondary school-aged population. The data are available from the World Bank (2010). I expect that nations with higher levels of female secondary school enrollment should be associated with lower levels of child mortality. This may well be because female education is associated with wider use of health services. It also improves access to information about nutrition, birth spacing, reproductive health, and immunizations (Shen 1999).

Vaccination Index. As a more specific measure of government health care

performance within nations, especially relating to children's well being, I include an index of vaccination rates, for BCG, DPT, Polio, and Measles (See Appendix A for a brief description of each disease and its respective vaccine). I combine the rates of vaccination for each disease and average them to create the index. All vaccination data are obtained from the World Bank (2010). As many diseases disproportionally affect young children in less-developed countries and are preventable by vaccination, I expect higher average vaccination rates to be associated with lower rates of child mortality.

Water and Sanitation Index: To assess the affects of the natural environment on child mortality I include an averaged index of Access to Improved Drinking Water and Access to Improved Sanitation. The combined index represents the percent of total population for 1985, 1990, 1995, and 2000. Access to Improved Drinking Water is the proportion of the population with sustainable access to piped water, public tap, treated surface water or untreated water from protected springs and wells, boreholes, or rainwater collection. Access to Improved Sanitation measures the percentage of the population with access to facilities that hygienically separate human excreta from human, animal and insect contact. Improved sanitation facilities include flush or pour/flush (to piped sewer systems, septic tanks, or pit latrines), ventilated improved pit (VIP) latrine, pit latrine with slab, and composting toilets. Examples of unimproved facilities are systems that flush or pour-flush to any other place, open pit latrines, buckets, or hanging toilets/latrines. All data are gathered by the World Health Organization in collaboration with various partners including UNICEF and the Water Supply and Sanitation Collaborative Council. Data are available from the Pacific

Institute (2014). I expect higher levels of access to water and sanitation to be associated with lower levels of child mortality.

Findings

In Table 4, I present random-effects regression estimates of child mortality for eighty-three less-developed countries (See Appendix B for a complete list of countries). I begin by examining the key indicator under evaluation – health international non-governmental organizations per capita in the linear models (Equations 4.1 and 4.2). Contrary to expectation, neither equation produced a significant result for the health non-governmental organizations indicator. Therefore, there appears to be no relationship between health international non-governmental organizations and child mortality or support for my first hypothesis. However, there are some significant results of note.

First, in each of the first two linear equations (4.1 and 4.2), the coefficients for International Monetary Fund structural adjustment are both positive and significant. This indicates that nations under International Monetary Fund structural adjustment loans experience higher rates of child mortality than nations not undergoing such loans. Second, gross domestic product per capita produced statistically significant results, showing an inverse relationship with child mortality in both equations 4.1 and 4.2. Therefore, nations with higher levels of gross domestic product per capita have on average, lower rates of child mortality than nations with low gross domestic product per capita. Third, the coefficient for the measure of overall government spending – total

government consumption – is significant, but not in the expected direction. In both equations 4.1 and 4.2 its unstandardized coefficient is close to zero, at .008, but nevertheless positive. This seems to show that nations with governments that spend more have higher levels of child mortality than nations whose governments spend less. This may be due to misdirected government spending, such as spending on programs that do not benefit public health, or programs that do not equally reach all members of the nation's populations. Similar results have been found in prior research in the field (Shircliff 2011). Fourth, both the indicators for secondary school enrollments, gross in equation 4.1, and female in equation 4.2 are negative and significant. Higher rates of secondary school enrollments, over the entire general population, and specifically amongst women and girls, are associated with lower rates of child mortality. This result is in accord with other research showing the substantial effects for education (Shandra 2010b, Shen 1997). Fifth, in equation 4.1, significant and negative results appear for the vaccination index as well at the water and sanitation index. On a whole, nations with greater percentages of their population vaccinated against major diseases are associated with lower rates of child mortality. The specific coefficient here (-.002) is relative low and close to zero, which may be due to fluctuations in the effects of each individual vaccination within the index, but the net result remains significant. This result, however, only holds for equation 4.1. In equation 4.2, the vaccination index loses it significance. Sixth, the coefficient for the water and sanitation index is negative and significant, as expected. Thus, nations whose populations have greater access to both clean water and adequate sanitation facilities are correlated with lower rates of child mortality.

In the interactive models, equations 4.3 and 4.4, I find the same results for International Monetary Fund structural adjustment, gross domestic product per capita, government consumption, gross and female secondary school enrollments, and both indices – vaccination, and water and sanitation. For these sets of variables, the coefficients of interest retain their levels of significance and direction. In essence, the story remains the same, save one crucial detail – the effects of Health international non-governmental organizations and democracy. Equations 4.3 and 4.4 both include the interaction term between level of democracy and Health international non-governmental organizations per capita. The resulting coefficient for the interaction term is negative and significant. With this I now find support for H_2. This shows that a nation's level of democracy moderates the effect that Health international non-governmental organizations have child mortality. Specifically, Health international non-governmental organizations have a greater effect within nations that have higher levels of democracy, than within nations with lower levels of democracy. The fullness of this result can be seen in the calculated effects for Health international non-governmental organizations at different levels of democracy. In nations with more repressive governments, who received a "1" on the 7 point scale indicating the highest level of autocracy and repression, Health international non-governmental organizations have an unstandardized coefficient of -.067 (See Eq. 4.4). While this is in fact a significant relationship that demonstrates Health international non-governmental organizations are associated with lower rates of child mortality, even in nations with low levels of democracy, it is substantially lower than the effect at high democracy. In nations with the highest coding of democracy ("7"), the calculated effect for health international non-

governmental organizations rises to -.241, over a three-fold increase above the effect of health international non-governmental organizations at low democracy. This provides addition support to my political opportunity hypothesis. Health international non-governmental organizations and democracy do not independently affect child mortality, but when interacted with each other a nation's level of democracy is able to enhance or restrain the effect on Health international non-governmental organizations.

Discussion and Conclusion

The goal of this paper is to test for the impact of health international non-governmental organizations and democracy on child mortality rates. Initially, I found no support for world society theory that health international non-governmental organizations are associated with lower levels of child mortality. However, my interactive models revealed support for world society in light of the political opportunity structure hypothesis. In that regard, I find that higher levels of health international non-governmental organizations are associated with lower levels of child mortality in democratic but not repressive nations. This is most likely the case as democratic nations allow non-governmental organizations and concerned citizens the political opportunity to engage in the public dialogue. Specifically, democratic nations protect the rights to free speech, press, and assembly (Tarrow 1994). The protection of these rights is especially pertinent relative to viewpoints that might run counter to government policies, as those of many international non-governmental organizations do. In repressive nations, these rights and liberties are often non-existent, thus highly

restricting the ability of non-governmental organizations to act and respond to health crises effectively. These rights might also be directly impaired by government law, as in Jordan where the Law of Societies and Social Organizations requires non-governmental organizations to obtain a permit from the government in order to form and then submit to the government detailed records of their activities in an annual report, which includes information on finances, correspondence, board meetings, fixed assets, revenues, and working members (Wiktorowicz 2002). The Jordanian government also has the right to perform inspections, issue violations, certify elections of executive committees, and reorganize leadership "to prevent activities deemed threatening to the regime" (Wiktorowicz 2002:84). Similar restrictions on non-governmental organizations can be found in repressive nations including China, Nigeria, Indonesia, and Laos among many others (Shandra 2010a).

There are some important theoretical and methodological implications that correspond with the main findings of this study. First, health international non-governmental organizations failed to explain a significant amount of variation in child mortality in the additive models. The same was true of democracy. Each indicator by itself produced a non-result. However, testing for interaction effects revealed that higher levels of health international non-governmental organizations are associated with lower levels of child mortality more so in democratic than in repressive nations. It is likely that similar interactive effects exist elsewhere. Therefore, it would benefit sociologists to consider the possibility of interaction effects between democracy and non-governmental organizations in cross-national research that examines other pertinent health outcomes. Second, the results are reminiscent of an approach used by Shandra, Shandra, and

London (2008b). These authors find higher levels of environmental and women's non-governmental organizations are associated with lower rates of deforestation. They conclude that it is necessary to consider both types of international non-governmental organizations in cross-national research on the environment. While I demonstrate the importance of examining how health international non-governmental organizations impact child mortality, future scholarship on child health should similarly explore the specific impacts of both environmental and women's non-governmental organizations. This is especially important given my findings on access to water and sanitation. Such an approach would provide a more detailed and nuanced understanding of the factors that shape this child mortality. Findings from these sorts of global civil society groups also suggest very specific policy prescriptions to help reduce the rate of child deaths in less-developed countries. In fact, there are several policy implications that correspond with the main findings.

First, given the consistent effects of secondary education enrollments on child mortality, health international non-governmental organizations should endeavor to push for greater access to and improvement in education. This holds for both overall enrollment and female-specific enrollment. Second, increasing the number of non-governmental organization sponsored clean water and sanitation improvement programs, should also be effective in lowering the levels of child mortality within less-developed countries. Finally, health international non-governmental organizations should push governments to promote greater democratic laws and regulations. These can include increased access to information, participation in decision-making processes, transparency in government, and free and fair elections among many others.

In fact, Annis (1987) argues that such a process may promote a "virtuous circle" that will strengthen the impact of both democracy and non-governmental organizations on development outcomes in less-developed countries. Child mortality may well be one such outcome.

I conclude with some possible directions for future research. It may well be that repression enhances the harmful effects of debt service and structural adjustment. For example, Evans describes a “triple alliance” in Brazil of multinational capital, local capital, and the state. He argues that multinational investors are attracted to states that promote a “good business climate,” largely through repression of political rights (Evans 1979). Such alliances among transnational economic actors, state officials, and economic elites plays a key role in shaping a range of development policies in less-developed countries of the world (London 1995). In this way, repressive nations put in place polices that are good for business operations, yet are harmful to the health of a nation’s population. Future research should include an interaction term between democracy and debt service, to determine if Evan’s (1979) claims are true. Finally, this effort to gauge processes from the more recent period are bound to miss long-term trends. Thus, this study would be greatly aided by historical-comparative case study research to determine how the pattern of findings presented here either converge or diverge across time and space (Rudel 2005).

References

Ainsworth, Martha and Waranya Teokul. 2000. "Breaking the Silence: Setting Realistic Priorities for Aids Control in Less-Developed Countries." *The Lancet* 356(July 1):55-60.

Annis, S. 1987. "The Next World Bank: Financing Development from the Bottom Up." *Grassroots Development* 11:24-29.

Boli, John, and G. M. Thomas. 1997. "World Culture in the World Polity." *American Sociological Review* 62:171-90.

Boli, John, and G. M. Thomas. 1999. *Constructing World Culture: International Non-Governemental Organization since 1875*. Stanford: Stanford University Press.

Bradshaw, York, and M. J. Schafer. 2000. "Urbanization and Development: The Emergence of International Non-Governmental Organizations Amid Declining States." *Sociological Perspectives* 43:97-116.

Brook, Penelope J., and Suzanne M. Smith. 2001. "Contracting for Public Services: Output-Based Aid and Its Applications.". *World Bank*:91.

Bryant, Raymond L. and S. Bailey. 1997. *Third World Political Ecology*. New York: Routledge.

Buchmann, Claudia. 1996. "The Debt Crisis, Structural Adjustment, and Women's Education: Implications for Status and Development." *International Journal of Comparative Sociology* 37:5-30.

CARE International. 2014. (http://www.care-international.org/).

Chapin, M. 2004. "A Challenge to Conservationists." *World Watch Magazine* 1:17-34.

Clark, J. 1991. *Democratizing Development: The Role of Voluntary Organizations*. London: Earthscan Press.

Cordaid. 2014. (https://www.cordaid.org/en/).

Crane, Barbara B., and Jennifer Dusenberry. 2004. "Power and Politics in International Funding for Reproductive Health: The Us Global Gag Rule." *Reproductive Health Matters* 12(24):128-37.

Doctors Without Borders. 2014. (http://www.doctorswithoutborders.org/).

Edwards, M. and D. Hume. 1996. "Too Close for Comfort? The Impact of Official Aid on Non-Governmental Organizations." *World Development* 24:961-73.

Evans, Peter. 1979. *Dependent Development: The Alliance of Multinational, State, and Local Capital in Brazil*. Princeton: Princeton University Press.

Fisher, W. F. 1997. "Doing Good? The Politics and Anti-Politics of Non-Governmental Organizations Practices." *Annual Review of Anthropology* 26:439-64.

Frank, D. J., A. Hironaka, and E. Schofer. 2000. "The Nation-State and the Natural Environment over the Twentieth Century." *American Sociological Review* 65:96-116.

Freedom House. 1997. *Freedom in the World: 1996-1997*. New York: Freedom House.

Frees, Edward. 2004. *Longitudinal and Panel Data: Analysis and Applications in the Social Sciences*. New York: Cambridge University Press.

Gomez-Jauregui, Jessica. 2004. "The Feasibility of Government Partnerships with Ngos in the Reproductive Health Field in

Mexico." *Reproductive Health Matters* 12(24):42-55.

Halmshaw, Caroline and Kate Hawkins. 2004. "Capitalizing on Global Hiv/Aids Funding: The Challenge for Civil Society and Government." *Reproductive Health Matters* 12(24):35-41.

Haque, M. Shamsul. 2002. "The Changing Balance of Power between the Government and Ngos in Bangladesh." *International Political Science Review* 23(4):411-35.

Hausman, J. A. 1978. "Specification Tests in Econometrics." *Econometrica* 46(6):1251-71.

Hurst, P. 1990. *Rainforest Politics*. London: Zed Books.

Inonue, K. and G. Drori. 2006. "The Global Institutionalization of Health as a Social Concern: Organizational and Discursive Trends." *International Sociology* 21:199-219.

International Monetary Fund. 2010, "IMF Lending Arrangments". (http://www.imf.org/external/np/fin/tad/extarr1.aspx).

Karim, R., Lamstein S.A., Akhtaruzzaman M., Rahman K.M., and Alam N. 2003. "The Bangladesh Intergrated Nutrition Project Community-Based Nutrition Component Endline Evaluation." edited by U. o. D. Institute of Nutrition and Food Services, Bangladesh and International Food and Nutrition Center, Tufts University, USA.

Keck, M., and Sikink, K. 1998. *Activists Beyond Borders*. Ithaca: Cornell University Press.

La Forgia, G., Mintz P., and C. Cerezo. 2004. "Contracting for Basic Health Services: A Case Study of Guatemalan Experience." edited by W. Bank. Washington DC.

Leonard, H. Jeffrey. 1988. *Pollution and the Struggle for World Product: Multinational Corporations, the Environment, and International Comparative Advantage*. Cambridge: Harvard University Press.

Lewis, T. L. 2000. "Transnational Conservation Movement Organizations: Shaping the Protected Area Systems of Less Developed Nations." *Mobilzation* 5:105-23.

Livernash, R. 1992. "Policies and Institutions: Non-Governmental Organizations and a Growing Force in the Developing World." *World Resources*:399-403.

Loevinshohn, Benjamin, and April Harding. 2005. "Buying Results? Contracting for Health Service Delivery in Developing Countries." *The Lancet* 366(9486):676-81.

London, Bruce, and B. Williams. 1990. "National Politics, International Dependency, and Basic Needs Provision: A Cross-National Analysis." *Social Forces* 69:564-84.

London, Bruce, and R. J. S. Ross. 1995. "The Political Sociology of Foreign Direct Investment: Global Capitalism and Capital Mobility, 1965-1980." *International Journal of Comparative Sociology* 36:198-219.

Mahmud, H., Ullah Khan A., and Ahmed S. 2002. "Mid-Term Health Facility Survey-Urban Primary Health Care Project." edited by M. a. Associates. Dhaka, Bangladesh.

McAdam, Doug. 1982. *Politcal Process and the Development of Black Insurgency, 1930-1970*: The University of Chicago Press.

Meessen, B, A. Soucat, et al. 2011. "Performance-Based Financing: Just a Donor Fad or a Catalyst Towards Comprehensive Health-Care Reform?". *Bulletin of the World Health Organization* 89(2):153-56.

Mercer, A.M., Haseen, F., Huq, M.L., Khan, M.H., and Larson, C.P. 2006. "Risk Factors for Neo-Natal Mortality in Rural Areas of Bangladesh Served by a Large Non-Governmental Organization Program." *Health Policy and Planning* 21:432-43.

Midlarsky, M. 1998. "Democracy and the Environment: An Empirical Assessment." *Journal of Peace Research* 35:341-61.

Murthy K.J.R., T.R. Friedman, A. Yazdani, and P. Hreshikesh. 2001. "Public Partnership in Tuberculosis Control: Experience in Hyderabad, India." *International Journal of Tuberculosis and Lung Disease* 5:354-59.

Newell, P. 2000. "Environmental Ngos and Globalization: The Governance of Tncs." in *Global Social Movements*, edited by R. C. a. S. M. Rai. London: Athlone Press.

Pacific Institute. 2014, "The World's Water". (http://worldwater.org/water-data/).

Powell, M. and D. Seddon. 1997. "Ngos and the Development Industry." *Review of African Political Economy* 24:3-10.

Princen, T. 1994. "Non-Govermental Organizations: Creating a Niche in Environmental Diplomacy." Pp. 105-24 in *Environmental Ngos in World Politics: Linking the Local and the Global*, edited by P. a. Finger. New York: Routlege.

Rostow, Walter W. 1990. *The Stages of Economic Growth: A Non-Communist Manifesto*. New York: Cambridge Univeristy Press.

Rudel, Thomas K. 2005. *Tropical Forests: Regional Paths of Destruction and Regeneration in the Late Twentieth Century*. NewYork: Columbia University Press.

Ruether, Rosemary Radford. 2005. *Integrating Ecofeminism, Globalization, and World Religions*. Oxford: Rowman & Littlefield Publishers, Inc.

Rugendyke, Barbara, ed. 2007. *Ngos as Advocates for Development in a Globalizing World* Taylor & Francis.

Rusa, L. 2009. "Performance-Based Financing for Better Quality of Services in Rwandan Health Centres: 3-Year Experience.". *Tropical medicine and international health* 14(7):830-37.

Sanders, D. M., Todd C., and M. Chopra. 2005. "Confronting Africa's Health Crisis: More of the Same Will Not Be Enough." *BMJ: British Medical Journal* 331(7519):755-58.

Sattler, Christopher, and John M. Shandra. 2012. "Do Health Nongovernmental Organizations Improve Child Mortality." *International Journal of Sociology* 42(2):28-46.

Schafer, Mark J. 1999. "International Non-Governmental Organizations and Third World Education in 1990: A Cross-National Study." *Sociology of Education* 72:69-88.

Schofer, E. and A. Hironaka. 2005. "The Effects of World Society on Environmental Protection Outcomes." *Social Forces* 84:25-47.

Schwartz, JB, Bhushan, I. 2004. "Improving Equity in Immunization through Public-Private Partnership in Cambodia." *Bull World Health Organ* 82:661-67.

Shandra, John M. 2007. "The World Polity and Deforestation: A Cross-National Analysis ". *International Journal of Comparative Sociology* 48:5-28.

Shandra, John M., Carrie L. Shandra, and Bruce London. 2010a. "Do Non-Governmental Organizations Impact Health?: A Cross-National Analysis of Infant Mortality." *International Journal of Comparative Sociology* 51(Feb. 2010):137-64.

Shandra, John M., Carrie L. Shandra, and Bruce London. 2010b. "Debt, Structural Adjustment, and Non-Governmental Organizations: A Cross-National Analysis of Maternal Mortality." *Journal of World Systems Research* 16(2):217-45.

Shen, Che, and John B. Williamson. 1999. "Maternal Mortality, Women's Status, and Economic Dependency in Less Developed Countries: A Cross-National Analysis." *Social Science & Medicine* 49:197-214.

Shen, Che, and John B. Williamson. 1997. "Child Mortality, Women's Status Economic Dependency, and State Strength: A Cross-National Analysis." *Social Forces* 76(2):667-700.

Shircliff, Eric J., and John M. Shandra. 2011. "Non-Governmental Organizations, Democracy, and HIV Prevalence: A Cross-National Analysis." *Sociological Inquiry* 81(2):143-73.

Smith, J. 1999. "Global Politics and Transnational Social Movement Strategies: The Transnational Campaign against Trade in Toxic Wastes." Pp. 170-88 in *Social Movements in a Globalizing World*, edited by H. Kriesi, D.D. Porta and D. Rucht. London: Macmillan.

Smith, J., ed. 1995. *Transnational Political Processes and the Human Rights Movement*, Edited by M. D. L. Kriesberg, and I. Walliman. Greenwood: JAI.

Soeters, R., P. B. Peerenboom, et al. 2011. "Performance-Based Financing Experiment Improved Health Care in the Democratic Republic of Congo." *Health Affairs* 30(8):1518-27.

Tarrow, S. 1994. *Power in Movement: Social Movements, Collective Action and Politics*. Cambridge: Cambridge University Press.

United Nations Conference on Trade and Development. 2010. (http://unctadstat.unctad.org).

Walgate, Robert. 2004. "Bush's Aids Plan Criticised for Emphasising Abstinence and Forbidding Condom." *BMJ: British Medical Journal* 329(7459).

Walton, John, and Charles Ragin. 1990. "Global and National Sources of Political Protest: Third World Responses to the Debt Crisis." *American Sociological Review* 55(6):876-90.

Wiktorowicz, Q. 2002. "The Political Limits to Non-Governmental Organizations in Jordan." *World Development* 30:77-93.

Willets, Peter, ed. 1982. *Pressure Groups in the Global System: The Transnational Relations of Issue-Orientated Non-Governmental Organizations*. London: Frances Pinter.

Woolridge, Jeffrey. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge: MIT Press.

World Bank. 2010. *World Development Indicators*. Washington, DC: World Bank.

World Health Organization. 2014. (http://www.who.int/malaria/data/en/).

CHAPTER 5

Summary & Conclusion

To understand the dissertation in whole, as a sum of its chapters, we must return to the original motivating question: what factors help to explain the variation of child mortality rates in less-developed countries? To answer this question, each previous chapter improves upon the methodological models that typify cross-national research in the field of health by employing longitudinal data collected over a 20-year period. Furthermore, each chapter employs the same modeling strategy and uses the same sample as to offer consistent and robust explanations. The factors that explain the disparity in child mortality rates fall into three distinct categories – economic, environmental, and civil society. Each chapter examines a new area, yet remains connected to the preceding chapter by using the same model base.

Chapter 2 shows that the presence of International Monetary Fund loans is correlated with higher rates of child mortality in less-developed countries. This finding is net of a number of national and international measures found in prior cross-national work. Effects for other predictors such as gross domestic product per capita and education are shown as well, but throughout all the equations of the chapter, International Monetary Structural adjustment retains its positive direction and level of significance. Therefore, support is garnered for Dependency Theory claims in that the austerity measures attached to International Monetary Fund loans reduce the resources available for a nation's government to spend on the prevention or treatment of illness

(Evans 1979). This reduction may well translate to higher child mortality rates for less-developed countries indebted to the International Monetary Fund.

Chapter 3 builds directly upon the findings from Chapter 2 by retaining the International Monetary Fund indicator and adding new measures for a population's access to improved water source and sanitation facility. I show that less-developed countries with greater access to improved water source and improved sanitation facility are associated with lower rates or child mortality than less-developed countries with lesser access to these provisions. Not only do I find support for the ideas from Environmental Sociology that the natural environment contributes to human health, but the effects for structural adjustment hold as well. I theorize that this may be the case because of certain conditions of International Monetary Fund structural adjustment loans that relate to the provision of water and sanitation. Terms of International Monetary Fund loans to many less-developed countries recommend the privatization of public works like water and sanitation in order to reduce government spending, increase capital holdings, and facilitate debt repayment (Rich 1994). This usually results in a reduction in access to both services, especially for the poor (Barlow 2002). Therefore, the inclusion of variables for water and sanitation may not detract from the effect of International Monetary Fund lending on child mortality, as theory suggests that nations under adjustment are more likely to have lower access to water and sanitation. Nations undergoing structural adjustment then, continue to be associated with higher rates of child mortality after taking into account such provision.

Lastly, Chapter 4 adds another layer of analysis to the findings from Chapter 3. Here, new variables for the number of health international non-governmental

organizations operating within each country are included. As with the preceding chapters, the results for International Monetary Fund remain positive and significant. However, although World Society Theory dictates that non-governmental organizations represent new agents for change in a global society, my findings are not so straightforward. The theoretical expectation is that health-related non-governmental organizations may fill a void in the delivery of health services in countries too poor to provide adequate care for their population (Smith 1995), thereby reducing rates of child mortality. This expectation is compounded in light of Dependency driven ideas that expect countries under International Monetary Fund loans to have an even more depleted public health system due to the reasons highlighted in Chapter 2. Nevertheless, my findings only show that health international non-governmental organizations are associated with child mortality rates when a country's level of democracy is taken into account. In other words, the *political opportunity structures* within less-developed countries are instrumental to the changes that global civil society groups like health international non-governmental organizations try to effect.

Less-developed countries with higher levels of democracy, operationalized as a combination of political rights and civil liberties, present a more open society for health international non-governmental organizations to work within, than less-developed countries with lower levels of democracy.

Overall, the findings of this dissertation suggest a number of things. First, future cross-national work in health should consider including a measure of International Monetary Fund structural adjustment as a necessary component. The findings for the International Monetary Fund variable are consistent and robust across all model

specifications in every chapter. Just as cross-national scholars would never omit indicators for national wealth such as gross domestic product, they should as well not negate the importance of International Monetary Fund structural adjustment in research that includes less-developed countries. Second, the ways in which International Monetary Fund might affect health are many. Although my findings suggest that the effects on child mortality hold for a large sample and across a variety of conditions, future work should investigate the subtleties involved in such processes at the national or regional level. Third, I demonstrate the need for cross-national researchers to consider insights from multiple theoretical frameworks. Subscribing to only one perspective may limit the potential for new discoveries and insights into public policy, which may then translate to tangible health outcomes. For example, had I only considered insights from World Society Theory in Chapter 4, without the consideration of the political opportunity hypothesis from the Social Movements literature, my findings for health international non-governmental organizations would have been null. In the same regard, future work on health and illness would benefit from the thoughtful consideration of the impact of the natural environment. Sociologists in this genre must not fall back into the theoretical pitfalls suggested by Dunlap and Catton (1979) by only investigating the social causes and consequences of social problems in negligence of environmental causes. This is especially pertinent for scholars of health.

References

Barlow, Maude, and Tony Clark. 2002. *Blue Gold: The Fight to Stop the Corporate Theft of the World's Water*. New York: The New Press.

Dunlap, Riley E., and William R. Catton Jr. 1979. "Environmental Sociology." *Annual Review of Sociology* 5:243-73.

Evans, P. 1979. *Dependent Development: The Alliance of Multinational, State, and Local Capital in Brazil*. Princeton: Princeton University Press.

Rich, Bruce. 1994. *Mortgaging the Earth: The World Bank, Environmental Impoverishment, and the Crisis of Development*. Boston: Beacon Press.

Smith, J., ed. 1995. *Transnational Political Processes and the Human Rights Movement*, Edited by M. D. L. Kriesberg, and I. Walliman. Greenwood: JAI.

United Nations Children's Fund. 2008. *The State of the World's Children 2008: Child Survival*.

United Nations. 2008. "The Millenium Development Goals Report 2008."

Table 1

Univariate Descriptive Statistics and Bivariate Correlation Matrix (N = 83, Obs = 219)

Variable	Mean	Std. Dev.	Min.	Max.	(1)	(2)	(3)	(4)	(5)	(6)
(1) Child Mortality (ln)	4.16	.89	2.08	5.72	1.000					
(2) IMF Structural Adjustment	.580	.50	0	1	.339	1.000				
(3) Multilateral Debt Service	38.82	22.95	.81	100	.285	.049	1.000			
(4) Gross Domestic Product Per Capita (ln)	7.65	.83	6.02	9.46	-.875	-.291	-.254	1.000		
(5) International Trade	72.38	73.77	13.05	1008.49	-.220	.025	.010	.187	1.000	
(6) Foreign Investment (ln)	2.51	1.08	0	5.00	-.292	-.005	.138	.265	.200	1.000
(7) Domestic Investment	21.17	7.10	6.69	49.59	-.413	-.292	-.296	.393	.161	.193
(8) Democracy	3.815	1.65	1	7	-.484	-.034	-.036	.489	.204	.182
(9) Total Government Consumption	13.89	5.62	4.15	43.48	-.014	-.194	.117	.077	.091	.123
(10) Gross Secondary School Enrollments	39.93	25.24	3	104	-.801	-.130	-.318	.794	.141	.310
(11) Female Secondary School Enrollments	37.77	27.69	2	109	-.789	-.123	-.285	.778	.148	.286
(12) Vaccinations Index	72.48	21.84	1.75	99	-.632	-.222	-.054	.586	.173	.325
(13) Access to Improved Water Source	74.43	19.93	24	100	-.742	-.230	-.219	.791	.182	.173
(14) Access to Improved Sanitation Facility	52.87	28.72	3	100	-.859	-.259	-.292	.782	.237	.238
(15) Water and Sanitation Index	63.65	22.84	15	100	-.864	-.294	-.279	.837	.228	.225
(16) Health International Non-Governmental Organizations, Per Capita	1.01	.79	0	3.93	-.436	-.197	.158	.462	.364	.270
(17) Health International Non-Governmental Organizations x Democracy	4.45	4.85	0	25.56	-.526	-.193	.071	.532	.362	.304

Table 1, Part II

Univariate Descriptive Statistics and Bivariate Correlation Matrix (N = 83, Obs = 219)

Variable	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Child Mortality (ln)											
(2) IMF Structural Adjustment											
(3) Multilateral Debt Service											
(4) Gross Domestic Product Per Capita (ln)											
(5) International Trade											
(6) Foreign Investment (ln)											
(7) Domestic Investment	1.000										
(8) Democracy	.202	1.000									
(9) Total Government Consumption	.092	.039	1.000								
(10) Gross Secondary School Enrollments	.386	.471	-.036	1.000							
(11) Female Secondary School Enrollments	.372	.520	-.034	.969	1.000						
(12) Vaccinations Index	.454	.331	.103	.591	.610	1.000					
(13) Access to Improved Water Source	.370	.450	.064	.706	.680	.614	1.000				
(14) Access to Improved Sanitation Facility	.406	.417	.054	.726	.703	.624	.756	1.000			
(15) Water and Sanitation Index	.417	.459	.062	.765	.738	.660	.911	.959	1.000		
(16) Health International Non-Governmental Organizations, Per Capita	.158	.468	.329	.271	.294	.347	.382	.431	.437	1.000	
(17) Health International Non-Governmental Organizations x Democracy	.243	.689	.242	.401	.431	.382	.451	.495	.508	.925	1.000

Table 2

Random Effects Regression Estimates for International Monetary Fund Structural Adjustment on Child Mortality, 1990-2005

	Equation (2.1)	Equation (2.2)	Equation (2.3)	Equation (2.4)	Equation (2.5)	Equation (2.6)
International Monetary Structural Adjustment	.102**	.057**	.073**	.085**	.093**	.085**
	.024	.029	.032	.035	.035	.033
	(.032)	(.032)	(.031)	(.031)	(.029)	(.029)
Debt Service	.001	-.001	-.001	-.001	-.001	-.001
	-.001	-.008	-.007	-.007	-.017	-.013
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Gross Domestic Product Per Capita		-.677***	-.683***	-.697***	-.495***	-.538***
		-.147	-.161	-.187	-.141	-.144
		(.058)	(.063)	(.061)	(.070)	(.077)
International Trade			-.001***	-.001***	-.001***	-.001***
			-.009	-.011	-.018	-.018
			(.001)	(.001)	(.001)	(.001)
Foreign Investment			-.024	-.025	-.028	-.029
			-.004	.001	-.001	-.006
			(.027)	(.026)	(.025)	(.025)
Domestic Investment			.001	.001	.001	.001
			-.011	-.011	-.010	-.010
			(.004)	(.004)	(.003)	(.003)
Democracy				-.019	-.020	-.019
				-.031	-.032	-.012
				(.013)	(.012)	(.013)

Notes: * indicates $p < .05$, ** indicates $p < .01$, and *** indicates $p < .001$ for a two-tailed test. The first number is the unstandardized coefficient, the second number is the standardized coefficient, and the number in parentheses is the robust standard error.

Table 2, Part II

Random Effects Regression Estimates for International Monetary Fund Structural Adjustment on Child Mortality, 1990-2005

	Equation (2.1)	Equation (2.2)	Equation (2.3)	Equation (2.4)	Equation (2.5)	Equation (2.6)
Total Government Consumption				.008** .026 (.003)	.009** .031 (.003)	.008** .027 (.003)
Gross Secondary School Enrollments					-.009*** -.153 (.002)	
Female Secondary School Enrollments						-.006** -.119 -.002
Vaccination Index					-.004** -.032 (.001)	-.003** -.018 (.001)
Overall R^2	.116	.767	.774	.783	.823	.820
Within R^2	.661	.603	.610	.619	.658	.648
Number of Observations	219	219	219	219	219	219
Maximum Number of Observations	4	4	4	4	4	4
Average Number of Observations	2.6	2.6	2.6	2.6	2.6	2.6
Number of Countries	83	83	83	83	83	83
Mean VIF	1.55	2.26	2.40	2.45	3.59	3.46
Highest VIF	1.93	1.67	1.63	1.61	2.15	2.13

Notes: * indicates $p < .05$, ** indicates $p < .01$, and *** indicates $p < .001$ for a two-tailed test. The first number is the unstandardized coefficient, the second number is the standardized coefficient, and the number in parentheses is the robust standard error. All models also contain a constant and period specific intercepts that are not shown.

Table 3

Random Effects Regression Estimates for Access to Water and Sanitation on Child Mortality, 1990-2005

	Equation (3.1)	Equation (3.2)	Equation (3.3)	Equation (3.4)
IMF Structural Adjustment	.095**	.083**	.105***	.107***
	.039	.036	.043	.041
	(.029)	(.029)	(.025)	(.024)
Debt Service	-.001	-.001	-.001	-.001
	-.025	-.019	-.017	-.013
	(.001)	(.001)	(.001)	(.001)
Gross Domestic Product Per Capita	-.475***	-.478***	-.245***	-.266***
	-.447	-.478	-.230	-.243
	(.074)	(.081)	(.067)	(.068)
International Trade	-.001*	-.001*	-.001	-.001*
	-.016	-.016	-.007	-.008
	(.001)	(.001)	(.001)	(.001)
Foreign Investment	-.028	-.032	-.028	-.028
	-.031	-.033	-.032	-.034
	(.025)	(.025)	(.024)	(.023)
Domestic Investment	.001	-.001	.001	-.001
	.008	.003	.006	.001
	(.003)	(.003)	(.003)	(.003)
Democracy	-.019	-.020	-.014	-.014
	.033	-.035	-.026	-.028
	(.013)	(.013)	(.011)	(.011)
Total Government Consumption	.009**	.007**	.007**	.006**
	.052	.048	.043	.039
	(.003)	(.003)	(.003)	(.003)

Notes: * indicates $p < .05$, ** indicates $p < .01$, and *** indicates $p < .001$. The first number is the unstandardized coefficient, the second number is the standardized coefficient, and the number in parentheses is the robust standard error.

Table 3, Part II

Random Effects Regression Estimates for Access to Water and Sanitation on Child Mortality, 1990-2005

	Equation (3.1)	Equation (3.2)	Equation (3.3)	Equation (3.4)
Gross Secondary School Enrollments	-.009*** -.253 (.002)		-.006*** -.176 (.002)	
Female Secondary School Enrollments		-.007** -.201 (.001)		-.005** -.146 (.001)
Vaccination Index	-.004** -.071 (.001)	-.001 -.051 (.001)	-.002* .036 (.001)	-.001 -.021 (.001)
Water	-.002** -.028 (.001)	-.003** -.041 (.002)		
Sanitation			-.015*** -.409 (.002)	-.016*** -.422 (.002)
Overall R^2	.823	.817	.859	.862
Within R^2	.657	.658	.744	.738
Number of Observations	219	219	219	219
Maximum Number of Observations	4	4	4	4
Average Number of Observations	2.6	2.6	2.6	2.6
Number of Countries	83	83	83	83
Mean VIF	2.32	2.30	2.34	2.36
Highest VIF	4.24	4.13	4.12	4.17

Notes: * indicates $p < .05$, ** indicates $p < .01$, and *** indicates $p < .001$ for a two-tailed test. The first number is the unstandardized coefficient, the second number is the standardized coefficient, and the number in parentheses is the robust standard error. Models also include a constant and period specific intercepts that are not shown.

Table 4

Random Effects Regression Estimates for Health International Non-Governmental Organization Per Capita on Child Mortality, 1990-2005

	Equation (4.1)	Equation (4.2)	Equation (4.3)	Equation (4.4)
IMF Structural Adjustment	.107***	.102***	.107***	.101***
	.039	.037	.040	.037
	(.028)	(.028)	(.028)	(.028)
Debt Service	-.001	-.001	-.001	-.001
	-.019	-.014	-.027	-.020
	(.001)	(.001)	(.001)	(.001)
Gross Domestic Product Per Capita	-.299***	-.313***	-.292***	-.309***
	-.413	-.442	-.401	-.435
	(.078)	(.021)	(.075)	(.079)
International Trade	-.001*	-.001*	-.001*	-.001*
	-.015	-.015	-.015	-.015
	(.001)	(.001)	(.001)	(.001)
Foreign Investment	-.026	-.028	-.016	-.019
	-.026	-.028	-.015	-.018
	(.025)	(.024)	(.025)	(.024)
Domestic Investment	-.001	-.001	.001	.001
	.010	.004	.010	.005
	(.003)	(.003)	(.003)	(.003)
Democracy	-.006	-.007	.027	.022
	-.025	-.027	-.046	-.045
	(.013)	(.013)	(.019)	(.019)
Total Government Consumption	.008*	.008*	.008*	.008*
	.056	.051	.056	-.052
	(.003)	(.003)	(.003)	(.003)

Notes: * indicates $p < .05$, ** indicates $p < .01$, and *** indicates $p < .001$ for a two-tailed test. The first number is the unstandardized coefficient, the second number is the standardized coefficient, and the number in parentheses is the robust standard error.

Table 4, Part II

Random Effects Regression Estimates for Health International Non-Governmental Organization Per Capita on Child Mortality, 1990-2005

	Equation (4.1)	Equation (4.2)	Equation (4.3)	Equation (4.4)
Gross Secondary School Enrollments	-.007***		-.007***	
	-.255		-.255	
	(.002)		(.002)	
Female Secondary School Enrollments		-.006**		-.006**
		-.202		-.198
		(.002)		(.002)
Vaccination Index	-.002*	-.001	-.003*	-.002
	-.062	-.040	-.067	-.044
	(.001)	(.001)	(.001)	(.001)
Water and Sanitation Index	-.013***	-.014***	-.013***	-.014***
	-.072	-.090	-.081	-.097
	(.002)	(.002)	(.002)	(.002)
Health International Non-Governmental Organizations Per Capita	-.054	.051	-.040	.038
	-.024	-.026	-.013	-.016
	(.047)	(.046)	(.098)	(.095)

Notes: * indicates $p < .05$, ** indicates $p < .01$, and *** indicates $p < .001$ for a two-tailed test. The first number is the unstandardized coefficient, the second number is the standardized coefficient, and the number in parentheses is the robust standard error.

Table 4, Part III

Random Effects Regression Estimates for Health International Non-Governmental Organization Per Capita on Child Mortality, 1990-2005

	Equation (4.1)	Equation (4.2)	Equation (4.3)	Equation (4.4)
Interaction Term and Calculated Effects:				
Health International Non-Governmental Organizations x Democracy			-.033*	-.029*
			-.030	-.026
			(.017)	(.012)
Calculated Effect for Health International Non-Governmental Organizations at High Democracy			-.271	-.241
Calculated Effect for Health International Non-Governmental Organizations at Low Democracy			-.073	-.067
Overall R^2	.848	.849	.847	.848
Within R^2	.681	.675	.690	.681
Number of Observations	219	219	219	219
Maximum Number of Observations	4	4	4	4
Average Number of Observations	2.6	2.6	2.6	2.6
Number of Countries	83	83	83	83
Mean VIF	2.51	2.49	2.53	2.51
Highest VIF	4.86	4.77	4.94	4.85

Notes: * indicates p < .05, ** indicates p < .01, and *** indicates p < .001 for a two-tailed test. The first number is the unstandardized coefficient, the second number is the standardized coefficient, and the number in parentheses is the robust standard error. All models also contain a constant and period specific intercepts that are not shown.

BIBLIOGRAPHY

Agha, Sohail. 2000. "The Determinants of Infant Mortality in Pakistan." *Social Science and Medicine* 51(199-208).

Ainsworth, Martha and Waranya Teokul. 2000. "Breaking the Silence: Setting Realistic Priorities for Aids Control in Less-Developed Countries." *The Lancet* 356(July 1):55-60.

Annis, S. 1987. "The Next World Bank: Financing Development from the Bottom Up." *Grassroots Development* 11:24-29.

Baker, Brook K. 2010. "The Impact of the International Monetary Fund's Macroeconomic Policies on the Aids Pandemic." *International Journal of Health Services: Planning, Administration, Evalualation* 40(2):347-63.

Balthazar, J.C. and F.S. Solon. 1989. "Disposal of Faeces of Children under Two Years Old and Diarrhoea Incidence: A Case-Control Study." *International Journal of Epidemiology* 18(4):S16-19.

Barlow, Maude, and Tony Clark. 2002. *Blue Gold: The Fight to Stop the Corporate Theft of the World's Water*. New York: The New Press.

Bartlett, Sheridan. 2005. "Water, Sanitation, and Urban Children: The Need to Go Beyond "Improved" Provision." *Children, Youth and Environments* 15(1):115-37.

Berkman, D.S., Lescano, A.G., Gilman, R.H., Lopez, S.L., Black, M.M. 2002. "Effects of Stunting, Diarrhoeal Disease, and Parasitic Infection During Infancy on Cognition in Late Childhood: A Follow-up Study." *The Lancet* 359:564-71.

Boehmer, Ulrike, and Williamson, J.B. 1996. "The Impact of Women's Status on Infant Mortality Rate: A Cross-National Study." *Social Indicators Research* 37:333-60.

Boli, John, and G. M. Thomas. 1997. "World Culture in the World Polity." *American Sociological Review* 62:171-90.

Boli, John, and G. M. Thomas. 1999. *Constructing World Culture: International Non-Governmental Organization since 1875*. Stanford: Stanford University Press.

Bradshaw, York, and Ana-Maria Wahl. 1991a. "Foreign Debt Expansion, the International Monetary Fund, and Regional Variation in Third World Poverty." *International Studies Quarterly* 35:251-72.

Bradshaw, York, and J. Huang. 1991b. "Intensifying Global Dependency: Foreign Debt, Structural Adjustment, and Third World Underdevelopment." *The Sociological Quarterly* 32:321-42.

Bradshaw, York, and M. J. Schafer. 2000. "Urbanization and Development: The Emergence of International Non-Governmental Organizations Amid Declining States." *Sociological Perspectives* 43:97-116.

Brook, Penelope J., and Suzanne M. Smith. 2001. "Contracting for Public Services: Output-Based Aid and Its Applications.". *World Bank*:91.

Bryant, Raymond L. and S. Bailey. 1997. *Third World Political Ecology*. New York: Routledge.

Buchmann, Claudia. 1996. "The Debt Crisis, Structural Adjustment, and Women's Education: Implications for Status and Development." *International Journal of Comparative Sociology* 37:5-30.

Burroway, Rebekah. 2010. "Schools against Aids: Secondary School Enrollment and Cross-National Disparitites in Aids Death Rates." *Social Problems* 57:398-420.

Buttel, Frederick H. 1976. "Social Science and the Environment: Competing Theories." *Social Science Quarterly* 57:307-23.

CARE International. 2014. (http://www.care-international.org/).

Carlson, Joy E. 2005. "Exposure to Toxicants and Child Health." *Children, Youth and Environments* 15(1):224-33.

Catton William R, and Riley Dunlap. 1980. "A New Ecological Paradigm for Post-Exuberant Sociology." *American Behavioral Scientist* 24(1):15-47.

Chapin, M. 2004. "A Challenge to Conservationists." *World Watch Magazine* 1:17-34.

Cheng, J.J., Schuster-Wallace, J.C., Watt, S., Newbold, K.NB., Mente A. 2011. "An Ecological Quantification of the Relationships between Water, Sanitation, and Infant, Child, and Maternal Mortality." *Environmental Health* 11.

Clapp, Jennifer. 1998. "Foreign Direct Investment in Hazardous Industries in Developing Countries: Rethinking the Debate." *Environmental Politics* 7:92-113.

Clark, J. 1991. *Democratizing Development: The Role of Voluntary Organizations*. London: Earthscan Press.

Cordaid. 2014. (https://www.cordaid.org/en/).

Crane, Barbara B., and Jennifer Dusenberry. 2004. "Power and Politics in International Funding for Reproductive Health: The Us Global Gag Rule." *Reproductive Health Matters* 12(24):128-37.

Curtale, F. et al. 1998. "Differenct Patterns of Intestinal Helminth Infection among Young Workers in Urban and Rural Areas of Alexandria Governorate, Egypt." *Parassitologia* 40(3):251-54.

Curtis, V., S. Cairncross and R. Yonli. 2000. "Domestic Hygiene and Diarrhoea - Pinpointing the Problem." *Tropical medicine and international health* 5(1):22-32.

Doctors Without Borders. 2014. (http://www.doctorswithoutborders.org/).

Dunlap, Riley E., and William R. Catton Jr. 1979. "Environmental Sociology." *Annual Review of Sociology* 5:243-73.

Edwards, M. and D. Hume. 1996. "Too Close for Comfort? The Impact of Official Aid on Non-Governmental Organizations." *World Development* 24:961-73.

Evans, Peter. 1979. *Dependent Development: The Alliance of Multinational, State, and Local Capital in Brazil*. Princeton: Princeton University Press.

Farmer, Paul. 1999. *Infections and Inequalities: The Modern Plagues*. Berkeley: University of California Press.

Fisher, W. F. 1997. "Doing Good? The Politics and Anti-Politics of Non-Governmental Organizations Practices." *Annual Review of Anthropology* 26:439-64.

Freedom House. 1997. *Freedom in the World: 1996-1997*. New York: Freedom House.

Frank, D. J., A. Hironaka, and E. Schofer. 2000. "The Nation-State and the Natural Environment over the Twentieth Century." *American Sociological Review* 65:96-116.

Freedom House. 1997. *Freedom in the World: 1996-1997*. New York: Freedom House.

Frees, Edward. 2004. *Longitudinal and Panel Data: Analysis and Applications in the Social Sciences*. New York: Cambridge University Press.

Frey, R.S. and Field, C. 2000. "The Determinants of Infant Mortality in the Less Developed World: A Cross-National Test of Five Theories." *Social Indicators Research* 52:215-35.

Friel, S., Bowen K., D. Campbell-Lendrum, H. Frumkin, A.J. McMichael, and K. Rasanathan. 2011. "Climate Change, Noncommunicable Diseases, and Development: The Relationships and Common Policy Opportunities." *Annual Review of Public Health* 32:133-47.

Gellert, Paul K. and John Shefner. 2009. "People, Place, and Time: How Structural Fieldwork Helps World Systems Analysis.". *Journal of World Systems Research* 25:193-218.

George, Susan. 1992. *The Debt Boomerang*: Pluto Press.

George, Susan and Fabrizio Sabelli. 1994. *Faith & Credit: The World Bank's Secular Empire*. Boulder: Westview Press.

Gomez-Jauregui, Jessica. 2004. "The Feasibility of Government Partnerships with Ngos in the Reproductive Health Field in Mexico." *Reproductive Health Matters* 12(24):42-55.

Guzelian, P.S., C.J. Henry, and S.S. Olin. 1992. *Similarities and Differences Betweeen Children and Adults: Implications for Risk Assessment*. Washington, D.C.: ILSI Press.

Haas, C.N., Rose, J.B., and Gerba, C.P. 1999. *Quantitative Microbial Risk Assessment*. New York: John Wiley & Sons.

Halmshaw, Caroline and Kate Hawkins. 2004. "Capitalizing on Global Hiv/Aids Funding: The Challenge for Civil Society and Government." *Reproductive Health Matters* 12(24):35-41.

Haque, M. Shamsul. 2002. "The Changing Balance of Power between the Government and Ngos in Bangladesh." *International Political Science Review* 23(4):411-35.

Hausman, J. A. 1978. "Specification Tests in Econometrics." *Econometrica* 46(6):1251-71.

Hotchkiss, DR and Jacobalis S. 1999. "Indonesian Health Care and the Economic Crisis: Is Managed Care the Needed Reform?". *Health Policy* 46:195-216.

Hurst, P. 1990. *Rainforest Politics*. London: Zed Books.

Inonue, K. and G. Drori. 2006. "The Global Institutionalization of Health as a Social Concern: Organizational and Discursive Trends." *International Sociology* 21:199-219.

International Monetary Fund. 2010, "IMF Lending Arrangments". (http://www.imf.org/external/np/fin/tad/extarr1.aspx).

Ismi, Asad. 2004. *Impoverishing a Continent: The World Bank and International Monetary Fund in Africa*. Toronto: Canadian Center for Policy Alternatives.

Jorgenson, Andrew K. 2004. "Global Inequality, Water Pollution, and Infant Mortality." *The Social Science Journal* 41:279-81.

Karim, R., Lamstein S.A., Akhtaruzzaman M., Rahman K.M., and Alam N. 2003. "The Bangladesh Intergrated Nutrition Project Community-Based Nutrition Component Endline Evaluation." edited by U. o. D. Institute of Nutrition and Food Services, Bangladesh and International Food and Nutrition Center, Tufts University, USA.

Keck, M., and Sikink, K. 1998. *Activists Beyond Borders*. Ithaca: Cornell University Press.

Kick, E. L., Davis, B.L., Burns, T.J., and Li, L.Y. 1995. "World-System and National Institutional Effects on Infant Mortality in Third World Countries." *International Third World Journal and Review* 7:61-67.

Kick, E. L., Nasser, R., Davis, B.L., and Bean, L. 1990. "Militarization and Infant Mortality in the Third World." *Journal of Political and Military Sociology* 18(2):285-305.

La Forgia, G., Mintz P., and C. Cerezo. 2004. "Contracting for Basic Health Services: A Case Study of Guatemalan Experience." edited by W. Bank. Washington DC.

Last, John M. 1993. "Global Change: Ozone Depletion, Greenhouse Warming, and Public Health." *Annual Review of Public Health* 14:115-36.

Leonard, H. Jeffrey. 1988. *Pollution and the Struggle for World Product: Multinational Corporations, the Environment, and International Comparative Advantage*. Cambridge: Harvard University Press.

Lewis, T. L. 2000. "Transnational Conservation Movement Organizations: Shaping the Protected Area Systems of Less Developed Nations." *Mobilzation* 5:105-23.

Livernash, R. 1992. "Policies and Institutions: Non-Governmental Organizations and a Growing Force in the Developing World." *World Resources*:399-403.

Loevinshohn, Benjamin, and April Harding. 2005. "Buying Results? Contracting for Health Service Delivery in Developing Countries." *The Lancet* 366(9486):676-81.

London, Bruce, and B. Williams. 1990. "National Politics, International Dependency, and Basic Needs Provision: A Cross-National Analysis." *Social Forces* 69:564-84.

London, Bruce, and R. J. S. Ross. 1995. "The Political Sociology of Foreign Direct Investment: Global Capitalism and Capital Mobility, 1965-1980." *International Journal of Comparative Sociology* 36:198-219.

Ludwig, K.M. et al. 1999. "[Correlation between Sanitation Conditions and Intestinal Parasitosis in the Population of Assis, State of Sao Paulo]." *Revista da Sociedade Brasileira de Medicina Tropical* 32(5):547-55.

Mahfouz, Ahmed A.R. el al. 1997. "Ecological Determinants of Intestinal Parasitesitic Infections among Pre-School Children in an Urban Squatter Settlement of Egypt." *Journal of Tropical Pediatrics* 43:341-44.

Mahmud, H., Ullah Khan A., and Ahmed S. 2002. "Mid-Term Health Facility Survey-Urban Primary Health Care Project." edited by M. a. Associates. Dhaka, Bangladesh.

Mertens, T.E. et al. 1992. "Excreta Disposal Behaviour and Latrine Ownership in Relation to the Risk of Childhood Diarrhoea in Sri Lanka." *International Journal of Epidemiology* 21(6):1157-64.

McAdam, Doug. 1982. *Politcal Process and the Development of Black Insurgency, 1930-1970*: The University of Chicago Press.

McMichael, Phillip. 2001. *Development and Social Change: A Global Perspective*: Pine Forge Press.

Meessen, B, A. Soucat, et al. 2011. "Performance-Based Financing: Just a Donor Fad or a Catalyst Towards Comprehensive Health-Care Reform?". *Bulletin of the World Health Organization* 89(2):153-56.

Mercer, A.M., Haseen, F., Huq, M.L., Khan, M.H., and Larson, C.P. 2006. "Risk Factors for Neo-Natal Mortality in Rural Areas of Bangladesh Served by a Large Non-Governmental Organization Program." *Health Policy and Planning* 21:432-43.

Midlarsky, M. 1998. "Democracy and the Environment: An Empirical Assessment." *Journal of Peace Research* 35:341-61.

Mohan, Giles. 2001. "The Environmental Impacts of Adjustment." Pp. 95-117 in *Structural Adjustment: Theory, Practice, and Impacts*, edited by E. B. G. Mohan, B. Milward, and A. B. Zack-Williams. New York: Routledge.

Murthy K.J.R., T.R. Friedman, A. Yazdani, and P. Hreshikesh. 2001. "Public Partnership in Tuberculosis Control: Experience in Hyderabad, India." *International Journal of Tuberculosis and Lung Disease* 5:354-59.

Nalugwa, A., Olsen, A., Tukahebwa, M.E., Nuwaha, F. 2015. "Intestinal Schistosomiasis among Preschool Children Along the Shores of Lake Victoria in Uganda." *Acta Tropica* 142:115-21.

National Academy of Sciences. 1993. *Pesticides in the Diets of Infants and Children*. Washington, D.C.: National Academy Press.

Newell, P. 2000. "Environmental Ngos and Globalization: The Governance of Tncs." in *Global Social Movements*, edited by R. C. a. S. M. Rai. London: Athlone Press.

Pacific Institute. 2014, "The World's Water". (http://worldwater.org/water-data/).

Patz, Jonathan A., David Engelberg, and John Last. 2000. "The Effects of Changing Weather on Public Health." *Annual Review of Public Health* 21:271-307.

Paxton, P. 2002. "Social Capital and Democracy: An Interdependnt Relationship." *American Sociological Review* 67:254-77.

Peet, Richard. 2003. *Theories of Development*. New York: The Guilford Press.

Petifor, A. 2002. *Debt Is Still the Linchpin: The Case of Malawi*. London: Zed Books.

Powell, M. and D. Seddon. 1997. "Ngos and the Development Industry." *Review of African Political Economy* 24:3-10.

Princen, T. 1994. "Non-Govermental Organizations: Creating a Niche in Environmental Diplomacy." Pp. 105-24 in *Environmental Ngos in World Politics: Linking the Local and the Global*, edited by P. a. Finger. New York: Routlege.

Prüss, Annete et al. 2002. "Estimating the Burden of Disease from Water, Sanitation and Hygiene at a Global Level." *Environmental Health Perspectives* 110(5):537-42.

Prüss-Üstün, A., Bos, R., Gore, F., Bartram, J. 2008. "Safer Water - Better Health: Costs, Benefits, and Sustainability of Interventions to Protect and Promote Health." edited by W. H. Organization. Geneva.

Prüss-Üstün, A., Kay, D., Fewtrell, L. 2004. "Unsafe Water, Sanitation, and Hygiene." in *Comparative Quantification of Health Risks: Global and Regional Burden of Disease*, edited by M. Ezzati, Lopez, D.A., Rodgers, A., Murray, J.C.L. Geneva: World Health Organization.

Rahman, M.M., Chowdury, U.K., Mukherfee, S.C., Mondal, B.K., Paul, K., Lodh, D., Biswas, B.K., Chanda, C.R., Basu, G.K., Saha, K.C., Roy, S., Das, R., Palit, S.K., Oumruzzaman, Q., and Chakraborti, D. 2001. "Chronic Arsenic Toxicity in Bangladesh and West Bengal, India - a Review and Commentary." *Journal of Toxicology, Clinical Toxicology* 39(7):683-700.

Rich, Bruce. 1994. *Mortgaging the Earth: The World Bank, Environmental Impoverishment, and the Crisis of Development*. Boston: Beacon Press.

Riddell, J. B. 1992. "Things Fall Apart Again: Structural Adjustment in Sub-Saharan Africa." *Journal of Modern Africa Studies* 30:53-68.

Rostow, Walter W. 1990. *The Stages of Economic Growth: A Non-Communist Manifesto*. New York: Cambridge Univeristy Press.

Rowden, Rick. 2010. "International Monetary Fund Sacrifices Higher Growth, Employment, Spending, and Public Investment in Health Systems in Order to

Keep Inflation Unnecessarily Low." *International Journal of Health Services: Planning, Administration, Evalualation* 40(2):333-38.

Rudel, Thomas K. 2005. *Tropical Forests: Regional Paths of Destruction and Regeneration in the Late Twentieth Century*. NewYork: Columbia University Press.

Ruether, Rosemary Radford. 2005. *Integrating Ecofeminism, Globalization, and World Religions*. Oxford: Rowman & Littlefield Publishers, Inc.

Rugendyke, Barbara, ed. 2007. *Ngos as Advocates for Development in a Globalizing World* Taylor & Francis.

Rusa, L. 2009. "Performance-Based Financing for Better Quality of Services in Rwandan Health Centres: 3-Year Experience.". *Tropical medicine and international health* 14(7):830-37.

Sanders, D. M., Todd C., and M. Chopra. 2005. "Confronting Africa's Health Crisis: More of the Same Will Not Be Enough." *BMJ: British Medical Journal* 331(7519):755-58.

Sattler, Christopher, and John M. Shandra. 2012. "Do Health Nongovernmental Organizations Improve Child Mortality." *International Journal of Sociology* 42(2):28-46.

Schafer, Mark J. 1999. "International Non-Governmental Organizations and Third World Education in 1990: A Cross-National Study." *Sociology of Education* 72:69-88.

Schofer, E. and A. Hironaka. 2005. "The Effects of World Society on Environmental Protection Outcomes." *Social Forces* 84:25-47.

Schwartz, JB, Bhushan, I. 2004. "Improving Equity in Immunization through Public-Private Partnership in Cambodia." *Bull World Health Organ* 82:661-67.

Seipel, M. M. 1994. "Toward Effective Health Care Investment in Developing Countries." *Social Development Issues* 16:13-22.

Shandra, John M. 2007. "The World Polity and Deforestation: A Cross-National Analysis". *International Journal of Comparative Sociology* 48:5-28.

Shandra, John M., Carrie L. Shandra, and Bruce London. 2010a. "Do Non-Governmental Organizations Impact Health?: A Cross-National Analysis of Infant Mortality." *International Journal of Comparative Sociology* 51(Feb. 2010):137-64.

Shandra, John M., Carrie L. Shandra, and Bruce London. 2010b. "Debt, Structural Adjustment, and Non-Governmental Organizations: A Cross-National Analysis of Maternal Mortality." *Journal of World Systems Research* 16(2):217-45.

Shandra, John M., Jenna Nobles, Bruce London, and John B. Williamson. 2004. "Dependency, Democracy, and Infant Mortality: A Quantitative, Cross-National Analysis of Less Developed Countries." *Social Science & Medicine* 59:321-33.

Shen, Che, and John B. Williamson. 2001. "Accounting for Cross-National Differences in Infant Mortality Decline (1965-1991) among Less Developed Countries: Effects of Women's Status, Economic Dependency, and State Strength." *Social Indicators Research* 53:257-88.

Shen, Che, and John B. Williamson. 1999. "Maternal Mortality, Women's Status, and Economic Dependency in Less Developed Countries: A Cross-National Analysis." *Social Science & Medicine* 49:197-214.

Shen, Che, and John B. Williamson. 1997. "Child Mortality, Women's Status Economic Dependency, and State Strength: A Cross-National Analysis." *Social Forces* 76(2):667-700.

Shi, Anqing. 2000. "How Access to Urban Potable Water and Sewerage Connections Affects Child Mortality." in *Development Research Group*, edited by W. Bank. Washington, C.C.

Shircliff, Eric J., and John M. Shandra. 2011. "Non-Governmental Organizations, Democracy, and HIV Prevalence: A Cross-National Analysis." *Sociological Inquiry* 81(2):143-73.

Smith, A.H., Lingas, E.O., and Rahman, M. 2000. "Contamination of Drinking-Water by Arsenic in Bangladesh: A Public Health Emergency.". *A Bulletin of the World Health Organization* 78:1093-103.

Smith, J. 1999. "Global Politics and Transnational Social Movement Strategies: The Transnational Campaign against Trade in Toxic Wastes." Pp. 170-88 in *Social Movements in a Globalizing World*, edited by H. Kriesi, D.D. Porta and D. Rucht. London: Macmillan.

Smith, J., ed. 1995. *Transnational Political Processes and the Human Rights Movement*, Edited by M. D. L. Kriesberg, and I. Walliman. Greenwood: JAI.

Soeters, R., P. B. Peerenboom, et al. 2011. "Performance-Based Financing Experiment Improved Health Care in the Democratic Republic of Congo." *Health Affairs* 30(8):1518-27.

Stuckler, David, Sanjay Basu, and Martin McKee. 2011. " International Monetary Fund and Aid Displacement." *International Journal of Health Services* 41(1):67-76.

Sweezy, Paul M., and Harry Magdoff. 1989. *The Irreversible Crisis*. New York: Monthly Review Press.

Tarrow, S. 1994. *Power in Movement: Social Movements, Collective Action and Politics*. Cambridge: Cambridge University Press.

Thomas, K., McBean, E., Shantz, A., and H.M. Murphy. 2015. "Comparing the Microbial Risks Associated with Household Drinking Water Supplies Used in Peri-Urban Communities of Phnom Penh, Cambodia." *Journal of Water & Health* 13(1):243-58.

United Nations. 2008. "The Millenium Development Goals Report 2008.

United Nations Children's Fund. 2014. *The State of the World's Children 2014: Every Child Counts*.

United Nations Children's Fund. 2009. *The State of the World's Children 2009: Maternal and Newborn Health*.

United Nations Children's Fund. 2008. *The State of the World's Children 2008: Child Survival*.

United Nations Conference on Trade and Development. 2010. (http://unctadstat.unctad.org).

United Nations Fund for Population Assistance. 1998. *Southeast Asian Populations in Crisis - Challenges to the Implementation of the Ipcd Programme of Action*. Canberra: Australian National University.

Vasquez, M.L. et al. 1999. "[Incidence and Risk Factors for Diarrhoea and Acture Respitory Infections in Urban Communities of Pernambuco, Brazil]." *Cadernos de Saúde Pública* 15(1):163-71.

Walgate, Robert. 2004. "Bush's Aids Plan Criticised for Emphasising Abstinence and Forbidding Condom." *BMJ: British Medical Journal* 329(7459).

Walton, John, and Charles Ragin. 1990. "Global and National Sources of Political Protest: Third World Responses to the Debt Crisis." *American Sociological Review* 55(6):876-90.

Waters, Hugh, Fadia Saada, and Menno Pradhan. 2003. "The Impact of the 1997-98 East Asian Economic Crisis on Health and Health Care in Indonesia." *Health Policy and Planning* 18(2):172-81.

WHO/UNICEF. 2014. "Progess on Drinking-Water and Sanitation - 2014 Update." Geneva.

Wiktorowicz, Q. 2002. "The Political Limits to Non-Governmental Organizations in Jordan." *World Development* 30:77-93.

Willets, Peter, ed. 1982. *Pressure Groups in the Global System: The Transnational Relations of Issue-Orientated Non-Governmental Organizations*. London: Frances Pinter.

Woolridge, Jeffrey. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge: MIT Press.

World Bank. 2010. *World Development Indicators*. Washington, DC: World Bank.

World Health Organization. 2015, "Diarrhoeal Disease Factsheet". (http://www.who.int/mediacentre/factsheets/fs330/en/).

World Health Organization. 2014. (http://www.who.int/malaria/data/en/).

World Health Organization. 2010a. (http://www.who.int/topics/vaccines/en/).

World Health Organization. 2010b. "The World Health Report." Geneva.

World Health Organization. 2004, "Water, Sanitation and Hygiene Links to Health". (http://www.who.int/water_sanitation_health/publications/factsfigures04/en/).

World Health Organization. 2000. "Global Water Supply and Sanitation Assessment 2000 Report." edited by World Health Organization. Geneva, Switzerland.

York, R., E. A. Rosa, and T. Dietz. 2003. "Footprints on the Earth: The Environmental Consequences of Modernity." *American Sociological Review* 68:279-300.

APPENDIX A

Vaccination Index

Tuberculosis Vaccination Rate

Bacille Calmette Guerin (BCG) is the current and only vaccine for tuberculosis. It is most effective in protecting children from the disease.[1] BCG vaccination rate is the percentage of children ages 12-23 months who received vaccinations before 12 months or at any time before the survey for BCG. A child is considered adequately immunized after one dose.

DPT Vaccination Rate

DPT vaccination measures the percentage of children ages 12-23 months who received vaccinations before 12 months or at any time before the survey. The vaccination protects against diphtheria, pertussis (or whooping cough), and tetanus (DPT). Diphtheria is an infectious disease that can be fatal. Pertussis is a highly contagious bacterial disease of the respiratory tract that occurs mainly in infants and young children, is easily transmitted from person to person, and can be prevented by vaccination. Tetanus affects people of all ages but the disease is particularly common and serious in newborn babies. Neonatal tetanus is mostly fatal, and most common in rural areas. It is estimated that neonatal tetanus killed about 180,000 babies in 2002 alone. A child is considered properly immunized for DPT after receiving three doses of vaccine.

Polio Vaccinations Rate

Polio (poliomyelitis) is a highly infectious viral disease, which mainly affects young children. It can only be prevented by vaccination. Child vaccination rate for Polio is the percentage of children ages 12-23 months who received vaccinations before 12 months or at any time before the survey. A child is considered adequately immunized after three doses.

Measles Vaccinations Rate

Measles is a highly contagious viral disease, which affects mostly children. In malnourished children and people with reduced immunity, measles can cause serious complications, including blindness, encephalitis, severe diarrhea, ear infection and pneumonia. Measles vaccination rate measures the percentage of children ages 12-23 months who received vaccinations before 12 months or at any time before the survey. A child is considered adequately immunized against measles after receiving one dose of vaccine.

[1] All data in Appendix A are obtained from the World Bank.

APPENDIX B

List of Countries

Albania
Algeria
Argentina
Bangladesh
Belize
Benin
Bolivia
Botswana
Brazil
Bulgaria
Burkina Faso
Burundi
Cambodia
Cameroon
Cape Verde
Central African Republic
Chad
Chile
China
Colombia
Comoros
Costa Rica
Cote D'Ivoire
Democratic Republic of the Congo
Djibouti
Dominican Republic
Ecuador
Egypt
El Salvador
Ethiopia
Fiji
Gabon
Gambia
Ghana
Guatemala
Guinea
Guinea-Bissau
Guyana
Hungary
India
Iran, Islamic Republic of
Jamaica
Kenya
Lao People's Democratic Republic
Madagascar
Malawi
Malaysia
Mali
Mauritania
Mauritius
Mexico
Mongolia
Morocco
Mozambique
Nicaragua
Niger
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Rwanda
Saint Kitts and Nevis
Saint Lucia
Senegal
Solomon Islands
Sri Lanka
Sudan
Syrian Arab Republic
Thailand
Togo
Tonga
Tunisia
Turkey
Uganda
United Republic of Tanzania
Uruguay
Venezuela
Viet Nam
Yemen
Zambia
Zimbabwe