DISEASE CONTROL AND DONOR PRIORITIES: THE POLITICAL ECONOMY OF DEVELOPMENT AID FOR HEALTH

BY

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DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Political Science
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2011

Urbana, Illinois

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Abstract

Disease remains the primary threat to human life and prosperity in developing countries. Over the last two decades, development aid for health has increased substantially, yet the affects of disease remain severe in many countries. Unlike other types of development aid, health aid is often viewed as technical and apolitical. I argue that, development aid for health is subject to political influences and distributional incentives similar to other forms of foreign aid. Although allocations undoubtedly reflect some aspects of recipient need, I contend that the benefits received by donors' constituencies as a result of health aid will condition these allocations. I examine the distribution of aid across diseases using disease burden as an objective measure of need. Using variation across disease characteristics — including geographic spread, cost of prevention and treatment, and both donor and recipient burden of disease — I illuminate the effects of donors' interests upon disease specific health aid allocations. I then extend the analysis to the distribution of health aid across disease control activities. Donors' interests play a significant role in the distribution of aid across diseases, yet have little effect on the selection of disease control activities.

For my grandmothers — Anna Margaret, whose love was unbounded and Barbara, whose support is unlimited.

Acknowledgements

This project marks the culmination of my post-graduate education. Throughout the process, I have been assisted and supported by faculty, friends and family, all of whom deserve thanks. To those mentioned here, and any I may have overlooked, I am sincerely grateful.

I would like to thank my fellow graduate students who have provided feedback and helped pushed this project to completion, including Mike Findley, Peter Rudloff, Toby Rider, Shweta Moorthy, Andy Owsiak, Jaclyn Streitfeld-Hall, Dongsuk Kim, Neil Baer, and Steve Meserve.

I would also like to thank the political science faculty and staff at the University of Illinois, Urbana-Champaign. Many have provided support for me and this project. I would especially like to thank Brenda Stamm, Tracy Sulkin, and Jim Kuklinski. Brenda was invaluable to my entire graduate school experience and the completion of this dissertation. She answered every one of my many questions, always pointed me in the right direction, helped ensure I met every bureaucratic requirement, and she did it all with a smile. Tracy Sulkin also offered advice on navigating the bureaucracy and was an indispensable source of information. In addition, Tracy provided professional advice and support on many occasions, for which I will always be grateful. Jim Kuklinski served as an advisor on this project in its early stages – not only shaping the project, but pressing me to view the project with an ever more critical eye. His support for the project in its initial stages and his feedback on drafts of the prospectus prepared me for the much more difficult task of writing a dissertation.

Special thanks to the members of my committee: Xinyuan Dai, Bill Bernhard, Matt Winters and Bob Pahre. Professor Dia is among the most positive and optimistic people I have ever met. Her constant encouragement was a great asset both in writing this dissertation

and also in preparing for job talks. Moreover, her advice and feedback has always pointed me in fruitful directions. I would like to thank Professor Bernhard who, as Director of Graduate Studies, accepted me as a refugee student from Kentucky into the graduate program at Illinois. In addition, Bill has been a kind and helpful advisor to me in many situations and I appreciate his support. Likewise, I would like to thank Professor Winters for his encouragement and support. Matt always made time to attend my presentations, read drafts, and provide feedback and encouragement despite his own busy schedule. His knowledge of foreign aid and feedback on my various drafts challenged my thinking and improved this project dramatically.

I would like to offer special thanks to my advisor and chair, Robert Pahre. Over the last three years, Professor Pahre has been both my mentor and my friend. He was instrumental in helping me refine my general ideas into a dissertation topic and keeping me on track. Throughout the dissertation process, he has challenged me to be more creative and think more critically about my own research. In addition he has provided me with many opportunities. I have come to rely heavily upon his advice both professionally as well as in all hiking and backpacking matters. His advice, mentoring, and friendship has been an essential part of my academic career and I am very grateful.

I would also like to thank my family for their constant love. In addition, I would like to thank Neil Baer, Beth Popp, and Jill and Toby Rider, who have become my second family. They have been my primary personal and professional support system — great colleagues and even better friends — and for that I will always be grateful. Finally, I would especially like to thank my partner and fiancé, Steve Meserve. His encouragement, patience, and love has been essential to my completion of this project.

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Chapter 1

Introduction

Infectious disease has historically accounted for the greatest proportion of human morbidity and mortality — surpassing war as the foremost threat to human life (McNeill 1976). Over the past two centuries, the threat of disease has prompted diverse efforts at international cooperation. The eradication of smallpox and the near eradication of polio demonstrated the potential public benefits of global cooperation. More recently, the spread of HIV/AIDS and the resurgence of tuberculosis have renewed international health concerns, drawing attention and funding from an array of international actors hecht06. Yet, even with record levels of international funds being spent to combat disease, the benefits of these efforts have been uneven across developing states and across diseases. Many developing states continue to struggle with diseases that are geographically limited or easily prevented and treated in industrialized states. Millions of people in developing states die each year from measles, acute respiratory infections, malaria and diarrhoeal diseases. In an international system devoting ever increasing attention and resources to health, what explains the inconsistent improvement of health in developing states? I contend that part of the answer to this question lies in how development assistance for health is distributed. Indeed, of the few analyses of development aid for health (DAH), most indicate that, although record levels of aid are being provided, the distribution of aid to control specific diseases does not match need (MacKellar 2005, Shiffman 2006).

The literature on aid distribution suggests that most foreign aid allocations are subject to a constellation of political forces. In contrast, international health, and subsequently DAH, are generally viewed as technical rather than political issues. As a result, the study

of aid for health has been largely overlooked by policy-makers and scholars. I argue that, like other forms of foreign aid, DAH is subject to political influences. Although allocations undoubtedly reflect some aspects of recipient need, donors' interests regarding specific diseases, programs, and recipients are expected to alter the distribution of DAH. Given that the political forces driving aid decisions are based upon the political and economic priorities of developed countries, there are many ways in which DAH allocations will fail to reflect need in developing countries. Where funding does not correspond with need the consequences include increased disease, disability and death. Using theories of public goods, international cooperation and foreign aid, I develop a theory of DAH allocations based upon donors' interests. I use variations across disease characteristics such as geographic spread and disease burden, in order to examine donors priorities for disease specific aid. I find strong support for the theory that donors provide more aid for diseases with wider geographic spread and greater domestic disease burden, whereas I find little evidence that recipient burden of disease affects disease specific aid allocations.

1.1 International Health and Cooperation

Efforts to control the spread of disease are as old as states themselves and include some of the earliest formal efforts at international cooperation outside of military alliances. Outbreaks of cholera, bubonic plague, yellow fever and other infectious diseases have long illustrated the permeability of state boundaries to disease. This permeability increased dramatically in the mid-nineteenth century. Improvements to travel and commerce, such as the invention of steel-hulled ships and railways spurred increased international migration and trade between Europe and Asia. These increases enabled the spread many diseases, especially cholera (Sigfried 1965, Foreman-Peck 1983, Zacher 2007, Zacher & Keefe 2008). European cholera epidemics in 1832 and 1853 originated in India and Russia respectively, while an outbreak of plague in 1899 originated in China (Sigfried 1965, Goodman 1971, Zacher 2007). The spread

of disease was not limited to Europe. Trade, colonial travel and religious pilgrimages brought diseases to other states along major trade routes – especially Mediterranean states such as Egypt. With poorer health systems, diseases such as cholera were far more devastating in these places. (Sigfried 1965).

Before 1850, efforts to control the spread of disease were primarily unilateral efforts by individual states involving the quarantine of ships and embargoes of goods from endemic areas. Such measures resulted in increased financial costs to shipping and barriers to trade. To curtail the cost of disease control measures, states orchestrated a series of conferences on international health concerns attended by diplomatic and health experts from more than a dozen governments. Beginning in 1851, these conferences attempted to establish standards for disease control without undue hinderance to commerce. These first attempts at multilateral cooperation proved contentious, both politically and medically. After nearly half a century of such conferences, the first formal health agreement – the International Sanitary Convention (ISC)– was ratified in 1892 (Fidler 2005). The key provisions for the ISC included the obligation of ship owners to maintain ship sanitation standards and health logs, the obligation of port authorities to provide lazarettos for sick passengers without hindering the landing of passengers with a clean bill of health, and the right of port authorities to inspect ships and health logs and enforce the quarantine of passengers from infected vessels for a specified number of days (Fidler 2005, Zacher & Keefe 2008). The ISC was later replaced by the International Health Regulations (IHR), in 1903. The IHR — an international convention directed specifically at the containment of cholera and bubonic plague — attempted to regulate states' health practices in order to reduce their burden on trade. In 1912 and 1926, the IHR was revisited and expanded to include typhus, yellow fever and smallpox (Goodman 1971, Zacher 2007).

Despite the benefits of these measures, implementation was inconsistent and monitoring and sanctioning mechanisms were weak. Many developing states were reluctant to report outbreaks, fearing embargoes and economic penalties. In contrast, improved sanitation

systems as well as new medicines and vaccines enabled developed states to control local outbreaks with relative ease. Thus, although the IHR remained in effect, its provisions were largely disregarded — the one exception being the regulation of ports. (Sigfried 1965, Goodman 1971, Fidler 2005, Zacher 2007).

Expansion of cooperation on health began again in 1922, with the establishment of the League of Nations Health Organization (LNHO). Although previous cooperation focused upon coordination of states' domestic policies, the LNHO involved efforts by industrialized countries to provide technical assistance and medical advice to developing countries (Berridge & Herring 2009). These activities served as the basis for future efforts. By the end of World War II, efforts at international health cooperation had shifted from compliance and containment to information dissemination and technical assistance. Specifically, the LNHO's mandate focused upon the collection of statistical data and the development of scientific knowledge and international health standards (Berridge & Herring 2009). As an international organ intended to improve cooperation among health ministries, the LNHO suffered from the same issues of legitimacy that the rest of the League of Nations suffered from — failure of the United States to participate — and dissolved with the advent of World War II.

In 1946, the World Health Organization was created to provide financial assistance for international health projects with the hope of improving health coordination and marked the beginning a current system of health governance (Zacher 2007). This new effort at cooperation relatively proved effective. Indeed, the WHO's campaign to eradicate smallpox in the 1960's and 70's is often regarded as the model for effective global cooperation on health (Goodman 1971, Zacher 2007). In 1959, ten years after mass vaccination programs had virtually eliminated the disease from the United States and Russia, smallpox remained endemic in 59 countries with an estimated 50 million new cases each year. The WHO campaign relied upon national contributions from industrialized countries for transportation, equipment and medical supplies, including donations of freeze-dried vaccines. Despite a slow start and inconsistent funding, improved technical and material support from individual

donors - the US in particular - produced dramatic results. The last case of smallpox was recorded in October of 1977 and the World Health Assembly declared smallpox eradicated in May of 1980 (Fenner 1988, Levine & Kinder 2007).

On the heels of this success, a consensus emerged within the health community which viewed poor health anywhere as a threat to good health everywhere. To this end, the Alma Alta Declaration, signed in 1978, declared "...the attainment of health by people in any one country directly concerns and benefits every other country." Such sentiments were soon bolstered by the threat and spread of new and reemergent diseases. The identification of diseases like Ebola — which can have a nearly 90 percent mortality rate — and the rapid spread HIV/AIDS in the 1980's and 90's have provided ample evidence that dangers to health still loom and can spread undetected across borders. Likewise, the reemergence of diseases such as tuberculosis – previously prevented and controlled in industrialized states – demonstrated states' continued vulnerability. In addition, poor health has recently been connected to other negative outcomes. Poor worker health has been tied to poor economic performance leading to depressed economic growth (McNeill 1976, Institute of Medicine 1997, United Nations Security Council 2000, Jamison, Sachs & Wang 2001, World Health Organization 2002, Global Burden of Disease Project 2003, Heymann 2003, World Bank 2004). Likewise, some argue that poor health contributes to frustration within the population and a weakening of the state resulting in instability and potential collapse (Smith-Price 2002, *HIV and National Security: Where are the Links?* 2005) The connection of poor health to these negative outcomes has increased demand for international health cooperation and coordination. Much of this increased attention has been directed at health problems with roots in developing states.

The adoption of the Millennium Development Goals (MDG) in 1990 reflected an increased international commitment to health in developing states. Of the eight goals, three specifically deal with health in developing countries. Goals 4 and 5 focus upon the reduction of childhood mortality and improvement of maternal health, while Goal 6 establishes

combatting HIV/AIDS, Malaria and other diseases as key to improved development (Hecht & Shah 2006, Wagstaff & Fang 2006, Zacher 2007).

Health cooperation at the end of the twentieth and beginning of the twenty-first centuries reflects this expanding mission. Initiatives for cooperation now include improving infrastructure, access to basic health care, administrative and policy management, and medical research and development among others. Likewise, the number of actors has grown exponentially. The role of individual states is now accompanied and sometimes overshadowed by intergovernmental agencies. For example, the WHO's role in surveillance has expanded dramatically. Although disease reports had previously come directly from state governments, changes in information technology has enabled health professionals and the media to report disease outbreaks. Unable to hide outbreaks, governments have begun reporting outbreaks more frequently and more accurately (Fidler 2004). Likewise, the WHO's authority has also expanded to prescribing acceptable medical practices. Throughout the late 1990's, the WHO was fundamental in providing recommendations concerning the management of disease. In 2000, the WHO created the Global Observation Alert Response Network (GOARN) which provides advice on best health practices from health experts to ministries of health (Heymann & Rodier 1998, World Health Organization 2004, World Health Organization 2002, Zacher 2007) . Moreover, the WHO secretariat has not only increased the number of its recommendations, but has also become increasingly willing to publicly criticize states that do not comply with those recommendations. For example, during an outbreak of severe acute respiratory syndrome (SARS) in 2003, the WHO issued travel advisories for areas of China as well as the city of Toronto (Fidler 2004, Zacher 2007). Yet, even though cooperation on health may now cover a variety of objectives, particularly within developing states, control of specific communicable diseases remains one of the primary focal points of cooperation.

Of these new objectives, many require more than state level compliance with established regulations. Likewise, such initiatives require considerable financial support and a variety of

organizations and programs have been developed to satisfy the demand for greater health funding. International health initiatives now includes a diverse range of actors – states, multilateral organizations, non-governmental organizations and philanthropic foundations – providing funding for these activities. As a result, cooperation on global health has become an expansive and complex coordination game. Although much of the literature assumes that international cooperation should lead to more efficient outcomes, I contend that the growing number of actors and changes in objectives has increased the opportunities for politics resulting in discontinuities between development aid for health and need. This project examines how allocations of development aid for health may be distorted as a result of donor interests.

1.2 Development Aid for Health

The most obvious and extensive method of health cooperation is the provision of development aid for health. DAH programs provide financial and material aid for improving health standards in developing countries. Since the early 1990's, the programs have expanded tremendously. In the early 1990's Official Development Assistance (ODA) as a whole declined significantly. Yet, during this time, DAH continued a slow but steady increase. Between 1990 and 1995 measured approximately $2 billion per year. By 2004, this had risen to $14 billion (Organization for Economic Cooperation and Development 2007, Gottret & Schieber 2006). The trend of increased assistance for health can be seen across both bilateral and multilateral channels. Although some of this increase was due to aggregate increases in all sectors of ODA, some of this increase reflects a change in prioritization of ODA funds. For example, of ODA contributed by New Zealand between 1996 and 1998, none was DAH. Between 2002 and 2004 however, 10 percent of New Zealand's ODA was specified as DAH. This trend is observed among many state donors including Canada, Finland, Sweden, the UK, and Ireland (Organization for Economic Cooperation and Development 2009). A similar

trend is observed among some non-state donors. Aggregate DAH from UN agencies rose from an average of US$1.6 billion a year from 1997-1999 to US$2 billion in 2002 (World Health Organization 2002, Hecht & Shah 2006, Zacher & Keefe 2008). Similarly, World Bank funding for health was virtually non-existent in 1990. However, new commitments for health are estimated to have risen from about US$1 billion in 2001 to US$1.7 billion in 2003 of which $507 million was specifically directed at communicable diseases (Alberinni, Cooper, Kurpnick & Simon 2005, Hecht & Shah 2006, Zacher & Keefe 2008).[1]

1.2.1 Diseases and Priorities

Development aid for health is directed at a diverse range of initiatives including provision of basic health care, development of health infrastructure, medical service training, policy and administrative management, medical research, reproductive health, family planning and infectious disease control. Of these initiatives, infectious disease control arguably produces some of the most "public" benefits. While the effects of infrastructure, training, reproductive health and basic health care are generally enjoyed by individuals or local populations, the benefits of infectious disease control and medical research are most certainly transnational. Diminished threat of and improved responses to diseases enhances health for individuals as well as local and global populations. As a result, disease control efforts have remained a central focus of international health cooperation over the last several decades. Indeed, infectious disease control is generally among the top two initiatives in terms of aid allocations (the other being policy and administrative management). Between 1990 and 1998, disease control efforts comprised roughly 20 percent of DAH. This had grown to 37 percent by 2004 (World Health Organization 2007, Organization for Economic Cooperation and Development 2009).

Historically, disease control has been directed at diseases that cross borders and pose an

[1]Scholars, including the authors cited hear, generally agree that a lack of comprehensive and organized development aid for health data make estimations difficult. These numbers should be taken as educated guesses.

economic threat to states. As previously noted, outbreaks of cholera and bubonic plague not only devastated populations, but also burdened international trade (Sigfried 1965, Goodman 1971, Zacher 2007). Recent efforts to control disease however, reflect the universality of the Alma Alta declaration and address both international health as well as localized economic concerns. For example, tuberculosis (TB), and in particular the spread of drug resistant TB in industrialized countries, has increased interest in controlling this once neglected disease. In addition to this global threat, parasitic diseases such as trypanosomiasis, guinea worm, and malaria have also gained increased attention, as have vaccination initiatives for polio and measles - two diseases virtually eliminated in developed societies (World Health Organization 2002, World Health Organization 2007). Each of these efforts produces benefits, however the distribution of those benefits varies. Measles, polio and guinea worm are all diseases that can be fully eradicated, like small pox. Monitoring and containing the spread of TB prevents further spread of the disease and increased microbial resistance, immediate benefits shared by countries across the globe. Prevention and treatment for parasitic diseases such as trypanosomiasis and malaria produces the benefits of decreased infections and improved health for populations within the diseases geographic range. Finally, investing in prevention has the potential for larger international payoffs. These differences in benefits alters donors' incentive to invest in disease control activities for each of these diseases.

Despite sharing many benefits, international donors and recipient states may develop differing or even conflicting priorities in health policy. For example, developing states are faced with an array of diseases varying in severity, transmission and treatability. Many diseases that are easily prevented or treated in developed states are of serious concerns for developing states. Poverty stricken, nutrient deprived populations suffer increased vulnerability, turning diseases that would be inconsequential elsewhere into a serious, often life-threatening, concern in developing states. Treatment for many such diseases, though relatively inexpensive in developed states, is often beyond the fiscal means of those in the developing world. Such diseases are often not viewed as a serious threat to international health — despite their

potentially devastating consequences in developing states — and thus gain little attention among international organizations. Despite the growing percentage of DAH that is directed toward disease control, the allocation of that aid remains a complex story. Indeed, MacKellar (2005) found that variation in disease burden and disability-adjusted life years across 10 diseases had little correlation to donor aid allocations for those diseases. Similarly, Shiffman (2006) found that acute respiratory infections represented more than a quarter of the total developing world disease burden among the 10 diseases. Despite its crushing burden, acute respiratory infections receive less than 2.5 percent of direct funding (Shiffman 2006). Most DAH directed at disease control is largely focused upon one particular disease - HIV/AIDS. As noted above, by 2004, the proportion of DAH allocated to disease control had reached 37 percent. Of this, two-thirds was directed at HIV/AIDS and other STIs (Organization for Economic Cooperation and Development 2009). Because diseases vary considerably in terms of mortality rates, geographic spread, and cost, it is possible to use differences across diseases to identify donor priorities in the allocation of disease specific aid. I examine differences in funding levels across disease using these disease characteristics as measures of donor interest in controlling a given disease.

1.2.2 Donors

The increase in DAH has also been accompanied by a proliferation of donors. The current international health regime is comprised of six types of international donors: state governments, intergovernmental organizations, development banks, non-governmental organizations, philanthropic foundations and private businesses. The largest donors of bilateral aid are members of the Development Assistance Committee (DAC) of the OECD. Although the members of the DAC remain the largest donors, many new donors have joined their ranks, including Saudi Arabia, Brazil, Korea, and China (World Health Organization 2002, World Health Organization 2007, Zacher & Keefe 2008, Organization for Economic Cooperation and Development 2009). The rest of DAH consists of contributions by intergovernmental

organizations, development banks, non-governmental organizations, philanthropic foundations and private businesses. The agencies affiliated with the United Nations, such as the World Health Organization (WHO), the United Nations Development Program (UNDP), the United Nations Children's Fund(UNICEF), the United Nations Population Fund (UNFPA) and the Joint United Nations Programme on AIDS (UNAIDS) all distribute some level of health assistance. Development banks have also begun to play an increasingly important role in the provision of DAH. The connection of poor health to disheartening economic performance has improved the value of health investments in the view of financial institutions. The World Bank Group is now the largest multilateral donor of DAH. In addition to these donors, NGOs such as the Red Cross, Medecins Sans Frontieres (MSF), Christian Children's Fund (CCF), and the Carter Center and philanthropic foundations such as the Bill and Melinda Gates Foundation and the John G. Rockefeller Foundation all provide much needed funding for health. Finally, and more recently, private businesses have become important contributors of DAH. Pharmaceutical companies spent 564 million dollars in 2002 sponsoring the provision of vaccines and remedial drugs (Zacher & Keefe 2008).

Despite the vast array of actors contributing aid for health, all donors claim to share a unified goal of preventing, containing and treating disease. Unlike other issues subject to international cooperation, actors in global health agree upon the nature of problems faced, have shared goals and, agree upon the technical actions necessary to accomplish the desired outcomes (Chen, Evans & Cash 1999, Perin & Attaran 2003, Widdus 2001). Unlike other types of foreign aid, the causes of disease are known and commonly identified, as are the preventive measure, treatments and cures. Under such conditions, the coordination of DAH for disease control and public health support should be relatively straightforward and free of political distortion. As a result, scholars studying foreign aid have generally neglected public health as a non-political matter directed by technical specialists (Kickbusch 2003, Lee & Zwi 2003, Fidler 2003, Kates, Morrison & Lief 2006, Kates & Lief 2007). Yet, despite the high level of consensus among actors and the shared benefits of improved health, promotion of

public health remains a matter of strategic political calculations. There remains considerable tension among various entities - IGO's, development banks, donor and recipient governments, etc. - regarding health policy, how the financial burden should be borne and how the limited funds should be spent.

These donors provide desperately needed resources to developing states facing continued poor health, economic stagnation and the possibility of destabilization as a result. However, despite the billions of dollars spent as DAH, the gap between demand and need remains quite large. Moreover, although foreign aid is often seen as humanitarian in nature, these donors are not without their own interests. Donors make allocation decisions based upon need as well as donors' health interests. Variations across disease result in a wide spectrum of potential threat levels. For example, geographically limited disease pose little threat to the global population as a whole whereas pandemic influenza poses a threat to populations worldwide. I use variations in disease burden across donors as an objective measure of the threat a disease may pose to various populations. I then use this measure of threat as a means of testing the influence of donors' health interests on their allocation of aid across diseases.

1.2.3 Recipients

Despite growing numbers of donors and volumes of aid, demand for DAH continues to outpace supply. In 2001 The Millennium Development Goals Commission on Macroeconomics and Health argued that a donor commitment of 27 billion US dollars a year would be necessary to meet the health needs of the developing world (Millennium Development Goals Commission on Macroeconomics and Health 2001, Wagstaff & Fang 2006). Actual donor commitments in 2003 were only 8 billion US dollars, less than one third of the necessary amount (Hecht & Shah 2006, Wagstaff & Fang 2006). As a result, there remains ongoing competition over the limited resources available to control communicable diseases in developing states. Donors and recipients may differ what they view as their health priorities. For

example, while a donor might view HIV/AIDS as a more pressing issue, malaria may have a higher disease burden and thus be of greater concern for the recipient state. However, with limited resources available and high levels of competition for those resources, donors' may face the dilemma of either allocating aid according to recipient need or distributing aid strategically according to their own interests. I use recipient burden of disease to account for recipient need for aid directed at a specific disease. Using this as an objective measure, I am able to examine if donors allocate aid based upon recipient need or if allocations are skewed according to donors' interests.

Just as with other types of foreign aid, donors' interests will vary across recipient and may influence DAH allocations. Despite the high level of rhetorical agreement on the purposes of DAH, donors may also view development aid for health as an opportunity to promote economic and political interests. Thus, I include a measure for colonial legacy between donors and recipients to account for the potential political and economic interest of donors. Additionally, recipients of DAH range from middle to low income countries. Moreover, potential recipients vary tremendously across population, institutional capacity, and health system structure. Similar to other forms of foreign aid, DAH donors may take these recipient level characteristics into account when making DAH allocation decisions. These may ultimately skew allocations toward recipients with more capacity and better health systems instead of toward those with fewer resources and greater need. Alternatively, these factors may skew allocations towards poorer recipient regardless of the relative need for a particular disease.

1.3 Project Summary

This project addresses one key puzzle at two distinct levels. The puzzle hinges upon variation in funding across diseases. The international consensus that poor health anywhere is a threat to good health everywhere might lead one to suspect funding should reflect need. Specifically, one would expect greater resources to be dedicated to diseases with greater

disease burden. This, however, is not the case. Some diseases such as HIV/AIDS receive a disproportionately large portion of international funds. Still other high burden diseases, such as acute respiratory infections and measles, receive little international funding. Additionally, some lower burden diseases such as polio, leprosy and trachoma receive quite high levels of funding. This disparities between the burden of disease and level of aid indicates that, despite the general agreement surrounding health aid, DAH is being allocated according to other factors beyond need. In the next chapter, I develop a theory explaining how and why these discontinuities occur and test the theory on data from two different levels of aid allocation decisions.

At first level I examine donor allocations of DAH by disease. Using aggregate levels of aid allocated by a single donor, to a single recipient, and directed a specific disease, I model donor funding decisions across disease. Using variations across disease characteristics including geographic spread, and cost, as well as differences across donors' and recipients' burden of disease, I am able to identify patterns in DAH allocations in connection with recipient need and donor interests. My results suggest that some types of donors provide more funding for diseases that threaten populations in industrialized countries.

At the second level, I extend the theory proposed in the next chapter and consider how political forces may also alter what activities donors choose to support through development aid for health. Because prevention and control of disease is a primary objective among all actors, it is reasonable to expect that, not only do donors' spend more money on diseases that threaten larger populations, but also that donors are more likely to provide aid to support surveillance, monitoring and outbreak control activities. I examine the likelihood of donors allocating aid for specific activities based upon variation across disease characteristics. My results suggest that, while some donor may provide aid strategically across diseases, at the activity level donors are more likely to provide aid for activities viewed as more "humanitarian"

One of the core contributions of my dissertation is a new dataset on aid projects in the

health sector. This dataset was constructed by collecting information on more than 60,000 health sector grants between 1995 and 2008. The grants represent development aid for health from bilateral and multilateral donors, including all OECD countries, UN agencies, and several development banks. Each grant is recorded as a donor/recipient dyad. In addition to donor and recipient level data, each dyad also includes disease specific information including disease burden. Using this dataset, I find that donor priorities often differ vastly from the health needs of developing states. The theory and the subsequent empirical analyses suggest that the distributional effects of political processes detract from the normative outcomes of disease control. Moreover, the project suggests that political processes result in the undersupply of disease control and international health conceptualized as public goods.

1.3.1 Contribution to Knowledge

This project offers several contributions to the collective political science knowledge. First, despite similarities between health and other areas of cooperation, international health cooperation has thus far been neglected by scholars. Likewise, development aid for health has largely been overlooked by scholars studying foreign aid. This neglect has been due primarily to the assumption that health is essentially an apolitical issue. This assumption to which scholars and policy-makers alike subscribe, addresses international health as a technical problem to which international health is an answer (Gallup & Sachs 2001, Jamison, Sachs & Wang 2001). Little academic attention has considered the potential impact of political forces on international health cooperation (Fidler 2003). If the conventional view of international cooperation on health is correct, disease specific development assistance should correspond to burden of disease. This project identifies an anomaly in international health funding - disparity between disease specific DAH allocations and burden of disease - and uses theories of public goods and foreign aid allocation to explain this anomaly.

Additionally, international health presents a unique cooperation scenario. Cooperation scholars have long argued that the primary source of inefficiency in international cooperation

is lack of consensus among actors regarding problems and solutions. Unlike other areas of cooperation, international health is largely characterized by consensus. Participants share identical objectives - the elimination of health threats - and, agree upon technical solutions for achieving those objectives. Yet, to presume that this consensus has resulted in seamless cooperation and optimal policies is short-sighted. While, there is very little conflict over *what* is to be done, conflicts over *how* it should be done remain. Conflicts over the application and distribution of the "solution" produce opportunities for political maneuvering and distortions in allocations despite consensus.

Finally, in examining DAH allocations' deviation from disease burden, this project relies upon an extensive original dataset. Using grants provided by the AidData Development Financing Tracking, I have examined more than 60,000 DAH grants. The end result is a donor/recipient/disease triad dataset that includes donor, recipient and disease specific variables.

1.3.2 Organization of Dissertation

The remainder of this dissertation proceeds as follows. In Chapter 2, I develop a theory of disease specific DAH allocations that explains the failure of DAH to match disease burden. My theory addresses disease control through DAH as a semi-public good in which the benefits of reduced rates of infection are enjoyed by everyone, but the payoff for improvements is centralized in developing countries where poor health is most prevalent. Using this model, efforts to control diseases with wider geographic spread and greater burden of disease will likely produce the greatest payoffs for donors — even in recipient countries where other geographically limited diseases may have a higher burden of disease. I use variations across disease to illuminate the political preferences of donors. I argue that donors' interests vary in accordance with their own utility rather than with need. These interests, as defined by utility, should be evident across several levels of analysis. This logic produces several hypotheses, which I test in Chapters 3 and 4. In Chapter 3, I examine the impact of donor interests on

DAH allocations across diseases through a series of large-n hierarchical models. In Chapter 4, I examine the impact of donor interests on DAH allocations across program activities across diseases. Finally, in Chapter 5 I summarize my findings, review their theoretical and empirical importance and discuss possible avenues for future research on development aid for health and international health in general.

Chapter 2

Disease Control and Donor Priorities

Rates of infection and ability to control communicable diseases vary greatly across states. Developing states, with weak health systems and few resources face daunting rates of infection. In contrast, developed states, with advanced health systems and a relative abundance of resources, enjoy relatively low rates of infection and mortality. Examples of international cooperation, such as the eradication of smallpox, suggest that through collective action, all actors – rich and poor – can enjoy the benefits of infectious disease control (Attaran & Sachs 2001). Growing levels of international funding reflect growing international concern over the spread of disease and shared belief that collaborative efforts can produce additional successes. Despite the growth in development aid for health (DAH) however, many developing states continue to struggle with diseases easily prevented and/or treated in developed states, as well as geographically limited diseases such as malaria (Lopez & Murray 2006, Hotez 2008). Because developing states are often reliant upon health funding from international donors, examining the distribution of disease specific development aid for health (DAH) may shed light upon some of these inconsistencies (Drager, Camen, Fouad & Genberg 1992, MacKellar 2005, Webber & Kremer 2001).

DAH is often viewed as a humanitarian endeavor and relatively free of political distortions (Fidler 2003, Kickbusch 2003, Lee & Zwi 2003). In aggregate however, international financial support does not accurately reflect actual disease burdens (MacKellar 2005, Shiffman 2006). For example, Shiffman (2006) found that acute respiratory infections which account for roughly 26 percent of aggregate disease burden receives only 2.5 percent of aggregate funds. In contrast tuberculosis, which accounts for roughly 9 percent of aggregate disease burden

and polio, which accounts for 0.04 percent of aggregate disease burden each receives approximately 7 percent of aggregate funds(Global Burden of Disease Project 2003, Millennium Development Goals Commission on Macroeconomics and Health 2001).

When DAH is disaggregated it is possible to observe differences in funding priorities across donors. For example, while the World Bank gives primarily to programs addressing HIV/AIDS, Tuberculosis, Malaria and Polio, (World Health Organization 2007, Alberinni et al. 2005) some donors, such as the Bill and Melinda Gates Foundation and New Zealand's bilateral donation program, seek out high-burden diseases that are underfunded by other organizations (Bill and Melinda Gates Foundation 2010, Kates & Lief 2007).

The provision of foreign aid by international donors has drawn increasing attention among scholars, however, little of this attention has been directed at development assistance for health (McGillivary 1989, Neumayer 2003*a*, Lancaster 2006). Examining DAH using the theoretical frameworks used to study other forms of development assistance provides some insight into trends in DAH allocation. Studies of other types of foreign aid provide two theoretical explanations for the allocation of aid — recipient need and donor interests. I apply these frameworks to development aid for health. However, DAH differs from other forms of development aid in some key ways. Unlike other forms of aid, all actors involved agree upon the problems and solutions toward which DAH is directed. Yet, because improvements to disease control can be shared beyond the borders of the recipient states, it is essential to theorize about the affects of this distributional structure on potential determinants of DAH. Identifying patterns in DAH not only extends the previous foreign aid literature to an under-studied area, it also provides fertile ground for examining donor behavior and studying the politics of distribution. Relying upon the previous literature, I examine the distribution of disease specific DAH as determined by a mix of need and donor interest. I argue that some international donors attempt to maximize the payoff they receive from DAH through strategic allocation of funds. Donors' calculations seek to maximize the political benefits to donors rather than address diseases that burden the health of the most people. Examination

of disease specific allocations is academically and practically important as policy decisions may divert funding from high-burden diseases. Where health funding does not reflect need, the consequences may be grave, including increased, disease, disability, and death.

2.1 Theories of Foreign Aid Allocations

Studies of foreign aid have identified several explanations for the allocation of foreign aid, which I argue can reasonably be applied to DAH funding (Hook 1995, Lancaster 1999). Although foreign aid is often regarded as altruism by the general public, the literature suggests a more complex set of motivations. According to Dollar and Levin (2006) some donors take recipient need as measured by prevalence of poverty, and economic development into account while others do not. As a result, the foreign aid literature prescribes a theoretical framework that accounts for a combination of humanitarianism and selfish interests (Neumayer 2003*a*, Lancaster 1999, Lancaster 2006).

The most obvious motivation for foreign aid is recipient need. Rhetorically, policymakers tend to portray foreign aid as an attempt to relieve suffering. Indeed, the US Agency for International Development (USAID)- the agency responsible for billions of dollars of US bilateral foreign aid - states its mission as "improving the lives of citizens of the developing world...by extending assistance to countries recovering from disaster, escaping poverty or engaging in democratic reforms." Such rhetoric has led to a pervading public view that foreign aid expenditures are based upon need. Recipient need as a motivator for foreign aid allocations presumes that donors are target recipients with the lowest income, identify and respond to the greatest barriers to development and/or the most pressing humanitarian concerns (Schraeder, Hook & Taylor 1998, Neumayer 2003*b*, Alesina & Dollar 2000). Previous literature has adopted several measures to operationalize a recipients level of need, including GDP per capita and average life expectancy. Although the literature produces mixed results, there is some support for need as a determinant of foreign aid (Apodaca & Stohl 1999, **?**, **?**).

For example, Neumayer (2003) finds that, across bilateral and multilateral donors, a recipients total economic development aid as a total of all ODA is highly correlated with lower GDP per capita. (Neumayer 2003*a*). Likewise, Schraeder, Hook and Taylor (1998) examine aid allocations from France, Japan, Sweden and the United States to 36 recipients. The findings of this study indicate that all donors provide more aid to poorer countries. These findings suggest that one should expect greater levels of development aid to be targeted at the poorest countries.

Although recipient need is the most prominent rhetorical explanation of foreign aid allocations, many studies of foreign aid indicate that donors' interest is an equally, if not more, powerful predictor of foreign aid allocations (Frey & Schneider 1986, Schraeder, Hook & Taylor 1998, Alesina & Dollar 2000, Neumayer 2003*a*, Anderson, Hansen & Markussen 2006, Easterly & Pfutze 2008, Dreher, Sturm & Vreeland 2009, Moyo 2009). Such studies suggest that foreign aid allocations are determined by donors' strategic political interests across a variety of issues. During the Cold war, strategic political interests equated to the security/military interests of donor state. Specifically, a potential recipient's strategic importance to a donor's security interests was regarded as a key determinant of foreign aid allocations. After the Cold War ended, the definition of strategic political interests broadened. Scholars of all stripes now acknowledge a potential role for economic and policy interests. Donor interest in trade, investment, shared values, and specific policy outcomes are often included in studies of foreign aid (Frey & Schneider 1986, Alesina & Dollar 2000, Neumayer 2003*a*, Bueno de Meqsuita & Smith 2007, Bueno de Meqsuita & Smith 2009). Variables such as bilateral trade flows, alliance portfolio similarity, and colonial legacy recur throughout the literature as useful predictors of receipt and levels of aid. Indeed, considerable research indicates that bilateral aid flows generally reflect donor interests better than recipient need (Hook 1995, Schraeder, Hook & Taylor 1998, Alesina & Dollar 2000, Wolf 2007)

Donor preferences and how they affect foreign aid decisions will depend upon both the type of donor and the problems being addressed. Different types of donors will cer-

tainly have different interests as well as different constituencies to which they are accountable. Such variations will undoubtedly influence donors' interests as applied to foreign aid(Berthelemy 2006, Alesina & Dollar 2000). For example, decision-makers in a bilateral donor state will be heavily influenced by the preferences of voters within that state. Foreign aid monies are domestic tax dollars allocated to non-citizen populations. Despite arguments that these funds promote citizens' interests overseas, foreign aid in all forms is often controversial (Sogg 2002). Indeed, despite making up less than one half of one percent of the US budget, a recent survey by The Economist indicates that Americans overwhelmingly select foreign aid as the most likely area for budget cuts in hard economic times (Economist 2010). The preferences of domestic audiences undoubtedly constrain donor resources and increase pressure upon decisions-makers to allocate aid based upon constituents' interests. In response to such pressures, donors are strategic with regard to the programs they choose to fund. State governments may strategically select programs that are least objectionable to their constituencies. For example, US food aid is more appealing to voters in the US than long term projects directed at broadly defined objectives such as "economic development." Food aid it is often viewed as an essential humanitarian activity in response to a specific need — the solution for hunger is to provide food. Moreover and the removal of surplus agricultural goods from the US market directly benefits American farmers. In contrast, the problems associated with development and democratization do not have such clear and simple solutions. Moreover, the solutions that are offered do not provide a specific benefit to constituents within the donor states. Alternatively, governments may select programs that have particular appeal or value to their constituencies. Such is the case of USAID's democracy and governance programs. Public sentiment regarding the benefits of democracy, coupled with the spread of the democratic peace thesis, has made democracy promotion one of the fasted growing foreign aid initiative conducted by USAID (United States Agency for International Development 2010).

In contrast, foreign aid given through multilateral channels may be less constrained. Be-

cause IGOs' constituencies are state governments rather than voters within a single state, foreign aid allocations will reflect a more diverse range of interests and preferences. Indeed, Maizels and Nissanke (1984) suggests that recipient need is a more effective predictor of aid allocations through multilateral than bilateral channels. Likewise, Thiele et al. (2007) analyzes aid portfolios of bilateral and multilateral donors. In comparing aid allocations to Millennium Development Goal targets, they find that multilateral donors' allocations are more likely to reflect need than those of bilateral donors. Studies of IGOs such as the European Community support this, finding that physical quality of life measures have significant impact upon aid allocations (Tsoutsoplides 1991). Likewise, because philanthropic organizations represent constituencies that have a primarily humanitarian focus, their preferences will also vary in comparison to state governments and IGOs, although little research is available to confirm or deny this.

Donors may also strategically select recipients - selecting recipients that are considered most promising, most receptive or that are most appealing to constituents. One recipient selection criteria addressed above, is the relative income level of recipients. By definition, aid is intended to assist low income states. Additionally, a growing body of literature suggests that governance structures are an important factor in selecting recipients (McKinlay & Little 1977, Svensson 2000, Neumayer 2003*a*, Dollar & Levin 2006, Winters 2010). Studies incorporating good governance, as conceptualized as a wide variety of factors including civil rights, lack of corruption, and/or rule of law (see Neumayer 2003 for summary), generally find a positive relationship between good governance and foreign aid (Cingranelli & Pasquarello 1985, Apodaca & Stohl 1999, Alesina & Dollar 2000, Burnside & Dollar 2004, Winters 2010). This result, which extends across bilateral and multilateral donors, is not surprising. Offered the opportunity to select recipients, it is reasonable to expect donors to select recipients that are most likely to show some improvement. There is also some evidence that cultural similarity, ideological stance, religion, or recent publicity may contribute to a recipient being viewed as a worthwhile investment by bilateral donors (Schraeder, Hook & Taylor 1998). As

a result, donor selectivity toward recipients may distort foreign aid allocations away from the rhetorically supported explanation of recipient need.

These frameworks of foreign aid allocation provide some initial explanations for how development aid for health might be allocated. Table 2.1 summarizes three categories of potential foreign aid determinants — recipient need, donor interest, and good governance. For each of these categories, the table offers examples of variables used within the literature and example article in which that variable is used. These determinants of foreign aid provide a useful starting point for theorizing about the allocations of development aid for health. Indeed, each of these broad categories of determinants is likely to explain portions of disease specific health aid.

2.1.1 Applying Theories of Foreign Aid to Development Aid for Health

Portions of the theories addressed above may be easily applied to development aid for health. In terms of health funding and disease control, recipient need suggests that donors seek solutions for and target diseases that pose the greatest threat to the health of individuals in developing states. Thus, one would expect funding allocations to be directed toward diseases that affect the most lives in the poorest countries.

Donor interest can also be easily applied to development aid for health. Just as with other forms of foreign aid, donors may seek to satisfy strategic political or health concerns through the use of DAH. Donors may use DAH to improve the health and safety of their own constituencies. For example, after rises in tuberculosis rates in the United States and Western Europe throughout the 1990s, the US Congress authorized significant increases in funding to control tuberculosis overseas. During the same time the disease received increased attention from international organizations such as the WHO (Raviglione, Sudre & Rieder 1992). Donors may also use DAH to address economic concerns. For example, labor

force health is a fundamental consideration in foreign direct investment and establishment of multinational corporations. If the constituents in the donors state are heavily invested in recipient states, these economic factors may encourage funding for the control of diseases such as HIV/AIDS, which are major economic burdens or affect individuals during their most productive years (Webber & Kremer 2001, Widdus 2001).

The potential for various types of donors to impact foreign aid extends well to DAH as well. Just as with other forms of development aid, the diversity of donors providing DAH is just as varied as those providing other forms of development aid. The current international health regime is comprised of six types of international donors: state governments, intergovernmental organizations, development banks, non-governmental organizations, philanthropic foundations and private businesses. Different types of donors will have different interests depending upon their constituency's preferences. Because large portions of health aid are provided by bilateral donors, these allocations will likely be correlated with localized interests. Those interests will inevitably vary from one state donor to another. Bilateral donors are primarily characterized as industrialized democracies. Recently however, interest in funding health initiatives has expanded. As of 2006 Saudi Arabia, Brazil, Korea, and China all provided bilateral aid for health (Hecht & Shah 2006, Zacher & Keefe 2008, Organization for Economic Cooperation and Development 2009)[1]. Differences in socioeconomic standing, health systems and geography will inevitably create variation in preferences across these state donors.

The remaining portion of DAH consists of contributions by intergovernmental organizations, development banks, non-governmental organizations, philanthropic foundations and private businesses. As the foreign aid framework suggests, each of these various types of donors is engaged in a different mission and is accountable to a different constituency. As a result, one would expect DAH decisions to vary across types of donors just as it does for other types of foreign aid.

[1]China is a particularly interesting example as it is also a recipient

Finally, just as the literature on other types of aid suggests, donor may select recipient of development aid for health strategically. Recipient characteristics may influence DAH decisions just as with other forms of foreign aid. Donors may select recipients based upon governance, infrastructure, and the level of support for the health system, in addition to the level of illness and death within that country. In the simplest model, one might expect the domestic level of disease to be a primary factor in the selection recipient states. However, it is also essential to consider how these factors may differ in the case of health aid. For example, unlike other forms of foreign aid, factors such as political and civil rights, levels of democratization, and corruption may be of less concern to donors than characteristics like health system infrastructure. The perceived necessity and humanitarian imperative associated with DAH may spur donors to give aid to even the most corrupt and authoritarian regimes. Indeed, corrupt and/or authoritarian states are often among the most desperate for DAH. This desperation, as well as the broad benefits associated with improved disease control, may entice donors to provide funding despite a recipient's poor performance in these measures of good governance. In contrast, recipient levels of health funding and health system organization may be of greater importance in donor selectivity. Without the semblance of infrastructure or some minimal health system, disease specific DAH may be difficult to distribute and of little benefit to the recipient or any other actor.

Although development assistance for health can be loosely modeled using this framework, as demonstrated above, additional modifications are needed to accurately explain variations in donor interests. Other forms of development aid are intended to produce improvements to economic, social and political conditions within a specific recipient states. In addition to these improvements, which primarily benefit the recipient states, non-DAH development aid also may indirectly produce benefits for the donor state. In comparison, disease specific DAH may produce a benefits that are shared by a broad range of actors including the recipient, donor, and the global system as a whole. As a result, communicable disease control can be and is increasingly viewed as a public good (Zacher & Keefe 2008, Smith, Woodward,

Acharya, Beaglhole & Drager 2004, **?**, Fidler 2003). Thus, the nature of infectious disease control and the distribution of its benefits alter donors' incentives in ways not accounted for in the initial foreign aid framework.

2.2 A Theory of Development Aid for Health

The preceding application of the general foreign aid framework to development aid for health provides an initial view of DAH allocations as a political outcome. Although this view is a needed improvement to the understanding of DAH as an apolitical outcome, it fails to address some fundamental difference between DAH and other forms of development aid. By considering disease specific DAH a public good, it is possible to describe how donors' interests might differ in this sector as compared to other sectors of giving. Moreover, using variations across disease, recipients, disease control activity and donors I am able to explain discontinuities between aid allocations need.

2.2.1 Infectious Disease Control as a Semi-Public Good

The economic theory of public goods provides two criteria that must be met for a good to be truly public. First, a public good must be non-excludable. Once a public good has been produced by one actor, other actors cannot be prevented from enjoying the benefits of this good. Second, a public good must be non-rivalrous. One actors' use of the good, cannot deplete another actors' use or enjoyment of the good. While economists generally view individual level health as a private good, public health bears the primary markers of a public good. Governments often intervene to maximize the health of populations by providing goods that individuals cannot provide for themselves, for example health research. Among these efforts, control of communicable diseases is distinctly public in its nature. Prevention or successful treatment of a communicable disease not only benefits the individual, but has direct positive benefits for others by reducing the risk of infection. Similarly, the reduction

of disease in a single state reduces the risk of spread to other states. At both the individual and the state level, the benefit of reduced risk of infection is both non-excludable and non-rivalrous. No individual or state can be excluded from enjoying the benefits of decreased infection rates, thus it is non-excludable. Likewise, one individuals or states' enjoyment of decreased rates of infection does not prevent other individuals from enjoying the same benefits. Indeed, unlike other public good examples - the classic lighthouse - each individuals' enjoyment of the benefits is enhanced as more individuals enjoy the benefits of disease control.

Consider the case of smallpox. Efforts to eradicate smallpox were disjointed and relied heavily upon the contributions of a handful of states. Despite the disparate levels of contributions, today all states enjoy the benefits the of the eradication of smallpox, even if they did not actively contribute. Moreover, unlike other examples of public goods, the benefits of eradication are unlimited. While specific states contributed over a period of two decades, once eradication was achieved, the benefits are permanent - extending across all future generations.

In the same manner, poor public health and unchecked spread of disease can be conceptualized as a public bad. Globally, communicable disease accounted for 26 percent of deaths in 2000 (Lopez & Murray 2006, Hotez 2008). The advent of globalization and improved transportation has also enabled broader and faster spread of disease as well. Efforts by individual states to improve domestic health, however, are often threatened by the spread of communicable disease across state borders. In an international system where differences in resources produce immense variation in state capacity to control the spread of disease, resource rich states have incentives to reduce these externalities by extending their efforts to populations beyond their own borders, often in the form of DAH. This project will focus on the use of disease-specific DAH as an investment in communicable disease control.

These externalities are not limited solely to health. Increasingly, poor health, disease outbreaks, and full pandemics are regarded not only as a threat to the health of global populations but also as an international threat to peace and security. Aside from the direct

threat of biological weapons and draining of state capacity as a result of health burdens (United Nations Security Council 2000, Fidler 2003, United Nations Security Council 2005), this focus has increasingly accepted indirect health threats to national security. HIV/AIDS, SARS, and Avian flu have all been cited as threats to security and global peace (United Nations Security Council 2000, Fidler 2003, World Health Organization 2003, World Health Organization 2007). Security analyses have increasingly included HIV/AIDS as a primary source of destabilization in African states (*HIV and National Security: Where are the Links?* 2005, Kirton 2004). Moreover, states where disease contributes to societal instability, societal tension and violence increase the spread of disease as military troops move to maintain order and populations migrate to more stable areas.

Likewise, the consequences of disease are increasingly being identified as an obstacle to economic development. Diseases throughout the world produce negative effects on economic productivity including reduction in GDP, decreases in worker productivity, labor shortages, increased financial burdens on household units, reduction in per capita income, reduced savings, and increases in income inequalities within and across societies (Millennium Development Goals Commission on Macroeconomics and Health 2001, United Nations Security Council 2000, World Health Organization 2003, World Health Organization 2007). The spread of HIV/AIDS throughout sub-Saharan Africa poses a particularly graphic illustration of the economic obstacles presented by disease. Many African states, some with infection rates as high as 20 percent, are facing devastating losses in the supply of labor. As most infected individuals become debilitated during their 30's, the disease effectively eliminates some of the most productive members of the work force (World Bank 2004). Households are thus faced with financial burdens of caring for sick individuals while household income declines; firms are faced with an ever shrinking workforce and decreased incentive for investing in employees (e.g. training for increasingly technical positions); and, states face increasing difficulty in attracting foreign investment while also dealing with the financial burdens of poor health. These effects are particularly burdensome for developing states where infection

rates tend to be highest and financial resources for combating illness the scarcest.

2.2.2 Variation Across Diseases

Although infectious disease control (IDC) meets the criteria of a public good, the geographic distribution of diseases creates a grey area when considering how the benefits of infectious disease control are distributed. Not all communicable diseases are global. Diseases such as schistosomiasis, guinea worm, and other parasitic diseases are limited to areas hospitable to the disease-causing organism or their intermediary hosts. Other diseases, such as measles, polio, and cholera have been effectively eliminated or prevented in industrialized states through immunization and improved sanitation. These variations in disease alter how the benefits of improved disease control are distributed.

For example, influenza is extremely mobile. Because it is easily spread through casual contact from one person to another and carriers are contagious even when no symptoms are present, influenza spreads rapidly around the globe. Likewise, HIV/AIDS is not geographically limited. Because symptoms may not appear for 8-10 years and individuals may be unaware of infection, it moves across borders with relative ease. As a result, globally there are approximately 33 million individuals infected, with infections to be found in every state in the international system (World Health Organization 2003, Global Burden of Disease Project 2003, Joint United Nations Programme on HIV/AIDS 2008). Thus, states investing DAH specifically for influenza and HIV/AIDS may share in the benefit of reduced rates of infection.

In contrast, schistosomiasis - which can cause chronic illness, increased risks of cancer, nervous system lesions, and damage to internal organs and is the second most socioeconomically damaging parasitic disease in the world- is caused by blood fluke and cannot be transmitted directly from one person to another (Weisbrod, Andreano, Baldwin, Epstein & Kelley 1973). Each of the three species of flukes that cause schistosomiasis seek out a specific species of fresh water snail to serve as a host. Once the flukes have matured, they exit the

snails into pools of fresh water. When these trematodes come into contact with human flesh, they then burrow into the skin, enter the blood stream and travel to the lungs, heart and other organs. Because the flukes are dependent upon specific species of snails, schistosomiasis is geographically limited to areas hospitable to these intermediate hosts. Specifically, these snails require temperatures between 10C and 35C (Weisbrod et al. 1973, World Health Organization 2004, Hotez 2008). As a result, schistosomiasis is geographically limited to tropical areas in Asia, Africa and Latin America. Thus, when non-endemic states invest in efforts to control schistosomiasis, the resulting benefit is conditioned by the geographic limits of the snails.

Many diseases are geographically limited as a result of medical advances. Diseases such as polio, cholera, and measles no longer pose a serious medical threat in industrialized societies with access to adequate health care. Advancements in medical treatments, immunization programs, sanitation systems, and nutrition have all minimized the threat of countless diseases to populations in developed states. Other diseases are only endemic in some countries, but may spread under proper conditions. Malaria, now eradicated in the United States was once endemic and saw a brief resurgence in the mid to late 60's as military troops returned from Vietnam. Trypanosomiasis -also known as sleeping sickness - is a parasitic disease that is transmitted to humans via biting insects. Although historically limited to Africa, Asia and Latin America, immigration from these areas has assisted the diseases spread - cases of sleeping sickness have recently appeared in Europe (World Health Organization 2010*b*). Likewise, despite aggressive vaccination programs, 131 cases of measles were reported in the United States between January and July 2008 (Center for Disease Control 2010). Thus, non-endemic states that invest DAH in diseases such a measles may receive some benefit, but the payoff will be smaller than investments in diseases such as influenza or HIV/AIDS. As a result, diseases that still pose a serious threat to populations in developing states, may be neglected by donors.

In these cases, IDC remains non-rival and non-excludable, however, variation across

diseases' geographic spread conditions the payoff received by each actor. These differences do not exclude a state from enjoying the benefits of reduced infection rates, but rather diminish the ratio of payoff to investment. Because states where infection rates for specific diseases are near zero have already reached the maximum threshold of benefits offered by controlling those diseases, it is not possible for them to improve their payoff. In this way, infectious disease control for geographically limited diseases is not a purely public good, but rather more like a club good (Cornes & Sandler 1986). For example, elimination of polio has not excluded any states from enjoying the benefit of lower infection rates. However, states that have eliminated polio have already reached the pareto position as members of the club of states that have eliminated polio. When polio has been eradicated, and all states are members of the club, the good will become a public good. Likewise, the geographical limitations of schistosomiasis does not prevent the United States from enjoying the benefit of no infection, yet it is impossible for the U.S. to improve its enjoyment of decreased infection. Thus, while IDC remains a public good, variation across diseases will determine the distribution of the benefits. Variations in the globalness of diseases may alter incentives and distort investments across diseases. Table 2.2 displays the diseases examined in this project, as well as the relative geographic spread and whether efforts at controlling that disease should be treated as public or club good.

For diseases with potential for global spread, failure to prevent, treat and contain infections can be seen as a global bad. Where developing states do not have the resources to address global communicable diseases, the spread of disease across borders can be viewed as an externality. As a result, donors have incentives to invest in IDC for diseases with potential for wider geographic spread. By doing so, donors are investing in the public good of infectious disease control and will enjoy a share of benefits — decreased spread of disease. In contrast, diseases with geographic limitations produce only localized externalities. Although guinea worm and malaria may spread across borders, there are limitations to how far they can spread. Most industrialized states — those that are most likely to be donors — remain

outside of the geographic range of these diseases — they are members of a club that already enjoy the maximum benefits available for controlling geographically limited diseases. As a result, donors have few incentives to invest development aid in diseases that are geographically limited, leading to the following propositions:

Proposition 1: Greater levels of DAH will be allocated to diseases with potential for wider geographical spread.

Proposition 2: Greater levels of DAH will be allocated to diseases that pose a greater threat to populations in industrialized states.

2.2.3 Variation Across Donors

Allocation of DAH will most certainly reflect some combination of recipient need and donor interest as suggested by the previously discussed foreign aid framework. Likewise, DAH allocations should be expected to vary across different types of donors as well. This variation not only provides potential insight into why DAH does not correspond to need as reflected by disease burden, it also provides an opportunity to examine unique anomalies in cooperation. Unlike other ares of foreign aid and cooperation, all of the actors involved in infectious disease control agree upon the nature of the problem, share the objective of reducing the spread of disease and even subscribe to a shared solution. Although the ultimate goals of international health are widely agreed upon, divergent priorities remain. Variations in strategic political and economic pressures across types of donors sheds light upon the divergent outcome in DAH allocations despite this accord. For example, international organizations represent a global audience are expected to focus on geographically unlimited diseases and devise policy recommendations that minimize the threat of cross-border spread — thus a policies heavily weighted toward testing, case identification and containment. States offering bilateral funds

represent the interests of their domestic constituencies, thus they may focus funding toward diseases that they perceive as a threat to their own citizens.

Thus, while donors share a primary goal of prevention of spread, there will often be divergence regarding which diseases should be addressed and how the limited resources available to implement such programs should be allocated among differing priorities. These tensions create puzzling behaviors such as disproportionate allocation of aid across diseases, and the use of different activities across similar diseases.

Bilateral Donors

Bilateral aid accounts for a large portion of total aid flow — and estimated 70% since the 1970's (Zacher & Keefe 2008, Organization for Economic Cooperation and Development 2007). Bilateral donors also provide the largest portion of development aid for health. Members of the Development Assistance Committee (DAC) of the OECD provide the greatest volume of aid — with the United States and the United Kingdom ranked as top contributors (Organization for Economic Cooperation and Development 2007, Organization for Economic Cooperation and Development 2009). Historically, bilateral aid for health was not considered a separate aid sector. As a result aid spent on health was generally considered a component of other programs. [2] In the last twenty years, however, health has been recognized as an independent sector and state-to-state aid contributions have increasingly been driven by specific donor initiatives. For example, the President's Emergency Plan for AIDS Relief (PEPFAR) — a US policy initiative — was developed with the express mission of combatting HIV/AIDS in 15 developing countries (President's Emergency Plan for Aids Relief 2010). Although the members of the DAC remain the largest donors, many new donors have joined their ranks over the last two decades. Indeed, the number of donors states funding health projects reached 56 in 2007 - the highest it has ever been (International De-

[2]Data on health aid is relatively sparse. Until the 1990's, health aid was often recorded as other forms of aid.

velopment Association 2007). The list of bilateral donors now includes Saudi Arabia, Brazil, Korea, Mexico, Turkey, Russia, the United Arab Emirates, Kuwait, and China (Zacher & Keefe 2008, Organization for Economic Cooperation and Development 2009).

As previously noted, bilateral DAH will likely be subject to a collection of donor related political pressures. States may choose bilateral channels for contributions specifically because these provide donors with more control over how aid money is used. Because bilateral foreign aid dollars are citizen tax dollars, state governments will undoubtedly feel pressure to invest according to their constituent's interests and have incentive to maintain greater control over aid spending. The reasons for this could be both humanitarian and political in nature. Because DAH is often viewed as a humanitarian endeavor, citizens may expect aid to be directed at humanitarian issues with which they are familiar. In these cases, it is beneficial for governments to be able to claim specific humanitarian acts. Alternatively, and probably more likely, bilateral aid allows donor governments' to ensure that domestic priorities are being met. For example, concerns within the electorate regarding the spread of HIV/AIDS, H1N1 Influenza, SARS, or TB may encourage a donor government to increase DAH. However, in order for this increase to translated into political payoff, it is necessary for the government to demonstrate the money was spent on the diseases of concern to the electorate rather than more pressing diseases that are of less interest. Factors that might influence the electorate's attention to a particular disease may include geographic spread, means of transmission and cost of treatment.

The strategic calculations associated with bilateral aid extends beyond the selection of an appropriate recipient or targeting a specific disease. Politically motivated allocation of funding can also be directed at specific disease control activities within and across diseases. For example, given a limited amount of DAH to be allocated, France may choose to focus on HIV/AIDS because the French public is well informed about the disease, it can and has spread within the US population, and the treatment costs are relatively high. Bilateral contributions also give donors greater control over how the investment is spent. In this case,

France might choose allocate money specifically for HIV/AIDS vaccine development because the resulting vaccine would provide the greatest possible benefit to its constituency.

Donors' attempts to satisfy constituent interests may have potentially detrimental effects in developing countries. Although voters in developed democracies may have preferences on how aid is spent, there is no indication that these preferences will produce positive outcomes. An obvious example of this is the United States' (PEPFAR) initiative. The PEPFAR program focuses on reducing the spread of HIV/AIDS and the provision of anti-retroviral medication in 15 countries. Although it represents the largest commitment of aid by any single country for a specific disease, PEPFAR has also been internationally criticized for its funding bias against safe sex programs. PEPFAR's official HIV/AIDS prevention policy is the "ABC program" — **A**bstinence, **B**e faithful, use a **C**ondom. Although this policy incorporates a safe sex component, the legislation authorizing the PEPFAR program includes a 33% abstinence-until-marriage budgetary allocation (Institute of Medicine 2007). Scientific research examining behavioral changes indicate that, while abstinence and fidelity training produce no meaningful behavioral change, safe sex education programs result in a marked increase in the use of condoms (Cohen & Tate 2005, Cleland & Ali 206). Moreover, these budgetary constraints prevent the implementation of interventions specifically tailored to the recipient country. Yet, despite international criticism, PEPFAR has been heavily praised by conservatives in the United States.

The extent to which a donor government uses DAH to serve strategic political objectives may vary considerably across factors. First, democratically elected governments would be expected to be more inclined to use DAH as a political tool than less democratic governments. Greater accountability to voting constituencies increases the likelihood that a government will need to serve political interests. Likewise, budget processes within democratic states increase the potential for DAH allocations to become part of political discourse. Governments that are not democratically elected or whose constituencies are less able to hold them accountable will have less reason to serve political interests and thus may be more free to use

DAH to address need. Likewise, cultural differences across states will inevitably influence how DAH is used. Thus, I propose the following:

Proposition 3: DAH allocations from bilateral donors will be more reflective of donor interests than burden of disease

Multilateral Donors

Over the past 60 year, international organizations and institutions have become an increasingly prevalent part of international relations. The use of formal institutions to coordinate for purposes of health began with the International Sanitary Convention and has grown to include other organizations such as the World Health Organization. Although multilateral efforts to control disease have often taken the form of organization and agreements, over the last thirty year, this has also grown to include the distribution of development aid. The growth of multilateral health aid indicates growing global concern about the effects of poor health and the spread of disease. Additionally, the distribution of aid through multilateral channels reflects growing efforts to coordinate health assistance policy and allocations. Development aid for health is provided by a variety of multilateral organizations. These international organizations also represent the interests of their constituent populations, however, constituent populations vary depending upon the organization.

International organizations are important and active participants in the distribution of health aid to and development of health programs in developing countries. This category includes global donors, such as the United Nations (UN), the Global Fund to fight AIDS, TB and Malaria (Global Fund), the G8 organization, as well as regional donors, such as the Organization of American States, and development banks such as the World Bank. Just as with bilateral aid flows, aggregate values of multilateral aid flows have increased substantially in the recent past — rising from $3.4 billion average in 1997 to more that $5.5

billion in 2002 (Hecht & Shah 2006)[3] Increases in bilateral aid also encouraged increases in aid from international organizations. More governments providing bilateral health aid reflects either shared goals, or concern about shared threats. Thus, it is unsurprising that donor states would seek means of coordinating their efforts. As a result, several new organizations developed and several existing organizations developed new responsibilities. For example, the Global Fund was launched in 2002 as a means of raising and distributing money contributed by member states.

The recent increases in DAH from intergovernmental organizations (IGOs) attributed to both the adoption of the Millennium Development Goals, as well as increased disease threats. Three of the Millennium Development Goals, adopted in September of 2000, deal specifically with issues of health. Goals 4 through 6 require reduction in childhood mortality, improvement to women's health, and combatting HIV/AIDS, malaria and other major diseases respectively. These goals not only identify key health problems in developing countries, but identify poor health is a barrier to development. The connection of poor health to disheartening economic performance and other related negative outcomes has had a substantial impact on DAH allocations from development banks. The World Bank Group, for example has played an increasingly important role in health assistance since the 1990's. Although the World Bank originally offered few funds for health projects, by 1995 it had expanded its activities in the health sector so dramatically that it is now the largest funder of health, nutrition and population programs in low and middle income states, giving a total of 13.5 billion dollars in 2002 (Buse & Gwin 1998, Alberinni et al. 2005). World Bank contributions include billions of dollars to fight HIV/AIDS, tuberculosis, and malaria. Regional development banks have followed suit — becoming a major source of assistance for health related projects. Over the past four decades, the Inter-American and the African Development Banks have provided 291 and 19.8 billion dollars respectively of assistance for health related

[3]The total increase in aid from international organizations, and multilateral donors in general, is difficult to measure. Changes in reporting procedures and classifications of health related result in gross overestimation of most estimates.

project. Similarly, in 2003 alone, the Asian Development Bank dispersed 3.8 billion dollars in health related development aid (Zacher & Keefe 2008).

In addition, the MDGs, specifically goals 4 through 6, represent global consensus regarding the importance of health. As with most international conventions, the Millennium Development Goals are the culmination of a long process of diplomacy and international negotiations among all members of the United Nations. Agreement upon these goals has outlined shared international values and aspirations. As a result, bilateral and multilateral donors alike have altered their aid policies to reflect those aspirations.

Beyond the adoptions of the Millennium Development Goals, increased health cooperation can also be attributed to shared concern about new and reemergent threats to global health. The discovery and rapid spread of HIV/AIDS, as well as outbreaks of Ebola in the 1980's and 90's alarmed domestic and international health officials equally. The SARS pandemic in 2002-2003 and growing global concern over the potential for an avian flu pandemic has only heightened this concern. As described previously, failure of one country to control these outbreaks could produce devastating externalities for many other states. Thus, many countries have increasingly looked for ways to coordinate on health concerns and alleviate the threat of disease. International organizations have become a key forum through which states work to coordinate health policy, improve developing state health systems, and prevent the spread of disease. For example, the Global Fund and the emergence of global health partnerships have brought together bilateral donors and intergovernmental organizations to pool resources and identify shared goals, as well as develop and fund global health initiatives.

These organizations distribute DAH to recipients around the globe and address a wide array of issues including both general health concerns and disease specific programs. For example, the United Nations and its affiliated agencies are among the most active multilateral participants with regard to health and address a wide variety of health issues. The World Health Organization's primary objective is the design of effective health policy. The WHO engages in surveillance, data collection, reporting, research, and provision of technical

and policy advise. Indeed, approximately half of its budget is used to fund technical assistance efforts to combat disease (Siddiqi 1995). The United Nations Development Program (UNDP), the United Nations Children's Fund(UNICEF), and the United Nations Population Fund (UNFPA) all provide aid for various health related objectives including improved nutrition, maternal and child health, testing and treatment for sexually-transmitted infections, and vaccination programs. In 2001, 24 percent of UNICEF's budget was allocated for immunization and 7 percent for HIV/AIDS projects (UNICEF 2001, Zacher & Keefe 2008).

Unlike bilateral donors, these organizations represent the interests and values of a collection of states. As a result, their incentives in providing development aid for health differ considerably from those of bilateral donors. Unlike bilateral donor governments, intergovernmental organizations do not answer to constituencies through elections. Instead, intergovernmental organizations act as agents of governments that have reached a decision about issues of mutual concern.[4] While some international organizations have health specific objectives, such as the Global Fund, others operate under much broader mandates. For example, the World Bank's primary objective is to provide loans and grants to developing countries with the express purpose of improving development. Connecting poor health to a collection of negative outcomes regarding economic development has resulted in a significant change in how the World Bank approaches health in developing states. Prior to 1980 the World Bank, provided very limited support for health initiatives. However, research has emerged connecting diseases such as malaria and schistosomiasis in particular, to depressed economic performance. In 2001, the Commission on Macroeconomic and Health reported that each 10 percent improvement in life expectancy at birth is associated with an increase in economic growth of at least 0.3 percentage points per year when other growth factors are held constant (Millennium Development Goals Commission on Macroeconomics and Health 2001, Shiffman 2006), while Bloom and Williamson (Bloom & Williamson 1998)

[4]Although there is some support for the argument that international organizations are subject to political influences, others argue that multilateral donors are free of strategic interests and thus more efficient distributors of development aid (Girod 2008, Heady 2008, Kilby & Dreher 2010).

estimate the roughly one third of the "East Asian Miracle" may be attributable to improvements in health. By tying poor health to poor economic outcomes, the World Bank is able to fund health initiatives that support its mandate and reflect the shared objectives of its members — improved development.

Although the World Bank and other international organizations do rely on contributions from member states, they remain separate from individual governments. Although member states may disagree over the specifics of policies, accountability to localized constituencies is generally non-existent. As a result, international organizations are generally freed of the policy constraints imposed upon bilateral donors. This means, using the World Bank example above, that the combination of a broad mandate and a global constituency enables the World Bank to fund programs to control malaria, schistosomiasis and other diseases that affect development without concern for the distribution of benefits outside of the recipient country. Likewise, because decisions made by IGOs cannot be attributed to a single government, governments may be more willing to support humanitarian/need-based initiatives even in the absence of benefits to their domestic audiences. As a result, one would expect multilateral donors to be more responsive to the global burden of disease and recipient need — selecting diseases with higher global and recipient burden of disease. Thus, I proposed to the following propositions:

Proposition 4: Disease burden will significantly impact DAH allocations from multilateral donors.

Proposition 5: Recipient disease burden will significantly impact DAH allocations from multilateral donors.

If multilateral donors are freed from the necessity of appeasing localized constituencies, different criteria may be used in the selection of diseases and disease control activities to

support. Likewise, if the theory outlined in the previous paragraph is true, and multilateral donors are more responsive to humanitarian concerns, it is likely that aid will be allocated in a manner so as to increase cost-effectiveness in order to provide the greatest relief possible. Indeed, the World Bank incorporates cost-effectiveness in its evaluation of health policies and outcomes. Its 1993 World Development Report and background studies were among the first attempts to use cost-effectiveness analysis. Using Disability Adjusted Life Year (DALY), this report presented global priority-setting exercises which were then translated into recommendations about specific public health objectives for low and middle income countries (World Bank 1993).

Each disease has a variety of prevention and treatment options, each with a separate financial cost. For example, measles can be prevented with a vaccination while cholera can be prevented through improved sanitation, proper water treatment, and the digging of deep source wells. Each of these interventions has a different cost, as do different treatment options for various diseases. Multilateral donors may use cost-effectiveness analyses to calculate the benefit produced through spending on specific diseases and activities. These calculations could then be used to produce the greatest improvement to health for the money or "more health bang for their buck." Thus, I propose the following proposition:

Proposition 6: The cost of treatment and prevention will significantly impact DAH allocations from multilateral donors.

Other Donors

In addition to bilateral and multilateral donors, a collection of non-governmental entities have also become key contributors of development aid for health, including non-governmental organizations (NGOs), philanthropic organizations, and private businesses. These donors are dramatically different from bilateral and multilateral donors with regard to objectives, resources, and constraints. Moreover, these donors vary substantially within their own cat-

egory — private businesses' objective are considerably different than those of NGOs and philanthropic foundations. Although these donors will not be addressed in the empirical chapters, the category serves as a useful comparison to bilateral and multilateral donors.

Philanthropic Foundations Philanthropic foundations have been a staple in health assistance for nearly a century. The Rockefeller Foundation, established in 1913, was essential in early health coordination efforts. For example, the Rockefeller Foundation provided nearly half of the League of Nations Health Organization's budget (Weindling 1995). In addition, the Rockefeller Foundation been active in disease control and research. Its early agenda focused upon the control of malaria, hookworm, and yellow fever in the southern United States and parts of Latin America, and in 1935 the first vaccine for yellow fever was developed in the Rocekfeller Laboratory (Weindling 1995, Berridge & Herring 2009).

Other prominent foundations have also contributed to provision of DAH. The Bill and Melinda Gates Foundation (Gate Foundation), for example provides large amounts of funding for vaccine development and treatment for neglected diseases. Indeed, the Bill and Melinda Gates Foundation supplies more than 17 percent of all funding currently directed toward the eradication of polio. Having provided more than $13 billion to global health in the last seven years, it is one of the largest donors - rivaling states and international organizations in terms of contributions(Bill and Melinda Gates Foundation 2010).

Unlike governmental donors and other civil society donors, philanthropic foundations' budgets are maintained through investment rather than contribution. For example, The Gate Foundation was originally founded with a 94 million dollar stock gift in 1994. In 2000, Bill Gates added an additional 126 million dollar gift. In 2006, Warren Buffett pledged the foundation 10 million shares of Berkshire Hathaway shares spread over multiple years. The donation totaled approximately 30 billion dollars. These funds are managed through the Bill and Melinda Gates Trust, which manages these investments and the transfer of interest from these investments to chosen initiatives(Bill and Melinda Gates Foundation 2010). Because philanthropic foundations are not accountable to any particular constituency — including

contributors — they are free to select initiatives based upon their own criteria. Thus any systematic predictions about the priorities of foundations as a category is impossible.

Non-Governmental Organizations Non-governmental organizations for health include universities, research organizations, professional associations and trade unions, faith based organizations, and consumer groups. NGOs differ considerably in organization, funding and mission. Some, such as Oxfam and International Planned Parenthood, are well funded, internationally recognized and administer a wide range of health related interventions, while others remain relatively small with few resources. (Buse & Walt 2002).

These organizations also focus on a variety of activities including fund raising, lobbying and carrying out health initiatives in developing countries. For example, Medecins Sans Frontieres (MSF) is a trade based organization, focusing on organizing health interventions in and deploying individuals with medical expertise to developing countries. It maintains missions in roughly 80 developing countries and its activities range from providing medical treatment in refugee camps and/or during times of conflict to maintaining clinics in underserviced areas. In 1999 it established one of the most successful campaigns to provide access to essential medicines for neglected tropical diseases (Buse & Walt 2002, Medecins Sans Frontieres 2009).

Because NGOs vary considerably generalization and comparison is often difficult, as is identifying factors the influence DAH decisions. NGOs are do not faced specific constituency pressures like those exerted upon states. As a result, DAH provided by NGOs is likely to more accurately match each NGOs respective mission. For example, the Carter Center, which was founded by former president and first lady Jimmy and Rosalynn Carter, has a stated mission of advancing human rights and alleviating suffering — specifically, the center focuses upon health concerns neglected by other international donors (The Carter Center 2003). To this end it directs 77.5 percent of its funding is toward health programs, many of which focus specifically upon combating tropical infectious diseases with initiatives directed specifically at guinea worm, onchocerciasis, trachoma, and schistosomiasis (The Carter Center 2003).

Private Businesses Finally, private businesses are another notable non-governmental donor. Private businesses, particularly in the pharmaceutical sector, have increasingly begun providing development aid for health. In 1998, 10 major drug companies created the Partnership for Quality Medical Donations. Since that time, these companies have donated nearly 2.7 billion dollars worth of medical products directed at a variety of diseases including lymphatic filariasis, malaria, and TB (Hotez 2008). Other notable contributions include a 122 million dollar donation by Novartis to establish a tropical disease research center in Singapore (Zacher & Keefe 2008). Unlike other entities, private businesses have privately funded initiatives whose funds are directly linked to the provision of other health materials. The motivation for private businesses to provide DAH is directly related to business outcomes. Maintaining a positive business image is helped significantly by charitable activities. However, in order for this incentive to play out, the diseases addressed must be high profile enough to gain public recognition. The highest profile diseases will be those that are most likely to affect population in industrialized societies.

2.2.4 Donor Coordination

The allocations of development aid for health will reflect, not only divergent donor interests across diseases and activities, but may also reflect the affect of shared ideas and norms. Constructivists argue that the diffusion of ideas may influence actors' preferences and behaviors, resulting in similar policy outcomes (Finnemore 1996, Deacon 1997, Keck & Sikkink 1998). The international health complex, including bilateral, multilateral, and non-governmental donors as well as recipients, has increasingly emphasized the sharing of information and provision of recommendations and technical support. In addition, the development of global health partnerships, such as those among the WHO, UNAIDS, UNICEF, and the World Bank, indicate a growing effort to identify shared goals and coordinate efforts — at least at the multilateral level. These activities might be viewed as having a socializing affect. This socialization may affect the allocation of development aid for health. If donors develop a

shared agenda — such as the proposed "global public health agenda" — the allocation of DAH will reflect areas of agreement and shared values at the expense of areas where there has been no such socialization. Shared ideas, preferences, and/or agendas may develop as a result of international cooperation, or through a degree of policy leadership. Global partnerships, like those developed among the UN agencies and the World Bank, may play a crucial role in identifying diseases to target and devising policy programs.

One way to identify areas of shared values is to identify diseases that have been targeted by a disease specific international control program, such as the Eradicate Polio program. These programs indicate diseases that are recognized by multiple donors as deserving specific attention and provide policy recommendations. The result of this socialization process will be policy convergence around these programs, with donors providing more money for targeted diseases. Thus, I propose the following proposition:

Proposition 7: A disease being targeted by a disease specific international control program will significantly impact DAH allocations.

2.3 Disease Control Activities and Donor Priorities

The public and club good principles described above distinguish DAH from the models of other types of foreign aid. While the preceding discussion contends that donor interests may vary across diseases, it is also possible for interests to vary across disease control activity. For each disease, donors and recipients devise a program that employs a combination of activities such as prevention, education, treatment, and research to achieve program goals. These activities are directed at various aspects of disease spread and produce benefits that are relatively more or less public in nature. I extend the theory presented above, which uses the allocation of aid across diseases to explain donor priorities, to the selection of disease control activity.

Efforts to control diseases take many forms. For examples, in an effort to control tuberculosis donors may provide aid for increased TB screening, surveillance and monitoring, provision of directly observed treatment, short-course (DOTS) to infected individuals, the building of clinics to increase access to testing and treatment in developing countries, and/or research into effective treatment for anti-microbial resistant tuberculosis, among other possible activities. These activities fall into eight primary categories: prevention, treatment, infrastructure, administrative assistance, research, surveillance and outbreak responsiveness, education, and general program support. The benefits of these activities cover a continuum of public-ness. For example, investment in infrastructure, such as the building a hospital in a developing country, provides direct benefits to individuals in that community. Those benefits, however, are limited to individuals in that community — excludable based upon distance from hospital. The good produced by investment in infrastructure more closely resembles a club good and has only a low degree of public-ness. Likewise, the benefits of treatment for HIV/AIDS are primarily private. Although the treatment produces significant benefits for the individual, these benefits are not shared by others in society.[5] In contrast, testing, reporting, monitoring and surveillance of disease incidence provides information that is accessible and useful to all members of the international system. Table 2.3 displays these eight categories of disease control activities, provides examples of each and rates the publicness of the benefits produced as being high, moderate, or low in publicness.

If disease specific DAH is the result of goals and technical solutions agreed upon by all actors, it is reasonable to expect that programs across similar diseases should employ similar activities. For example, HIV/AIDS, tuberculosis, and influenza are all transmitted from one individual to another, may remain undiagnosed for a period of time during which

[5]Recent research indicates that although the benefits of treatment for HIV/AIDS is primarily private, it does produce some benefits that are shared by others. Access to anti-retroviral treatments encourages individuals to get tested for HIV/AIDS and encourages responsible behavior in confirmed cases of HIV positive individuals (Pisani 2009). Likewise, anti-retroviral medications have been shown to reduce the virus load in infected individuals, decreasing the likelihood of infected and uninfected individual who might come into contact with infected bodily fluids (**?**)

the individual may pass the disease to others, and spread across state borders with relative ease. In contrast, malaria, schistosomiasis, and guinea worm cannot be transmitted directly from one individual to another. Nor is there a credible threat of global spread. Given these similarities, one would expect programs for the first group of diseases to be similar to one another but differ from the latter group. If, however, donors' allocate aid in a manner intended to maximize their enjoyment of the benefits — as described in the previous section — it is also likely that donors are strategic in their allocations by activity. In particular, one would expect donors to select activities that global benefits, such as surveillance and monitoring, over activities with localized benefits, such as treatment. This leads to the following proposition:

Proposition 8: DAH allocations will be more likely to be directed at activities with public rather than private benefits.

2.4 Studying Development Assistance for Health

The 8 propositions produced here serve as the foundation for the rest of the project. Using these propositions, I develop several statistical models of DAH allocations that account for recipient need and donor interest. Although the models reflect the initial theories of development aid allocations, they also reflect a more nuanced understanding of the dynamics of development aid for health. The dataset used to test these hypotheses is structured in a manner that enables me to examine specific donor, recipient and disease variables. For example, variables measuring donor interest account for variations in disease prevalence and geographic spread, as well as prevention and treatment costs. The following analyses reveal the political nature of DAH allocations, illuminate the political forces at work, and offer explanation for disparities between disease specific DAH and disease burden.

Table 2.1: Determinants of Aid Allocations

Level of Explanation	Variable	Example
Recipient Need	GDP per Capita	Svensson 1999
	Caloric Intake	Schraeder et al 1998
	Life Expectancy	Schraeder et al 1998
Donor Interests	Bilateral aid flows	Cingranelli and Pasquarello 1985
	Exports	Apodaca and Stohl
	Colonial legacy	Alesina and Dollar
	UN voting similarity	Alesina and Dollar 2000
	Arms Transfers	Maizels and Nissanke 1984
	Military personnel	Apodaca and Stohl 1999
Good Governance	Civil and Political Rights	Svensson 1999
	Personal Integrity Rights	Neumayer 2003
	Political Stability and democracy	McKinlay and Little 1977
	Trade Openness	Alesina and Dollar 2000
	Rule of law	Alesina and Dollar

Table 2.2: Disease and Geographic Spread

Disease	Geographic Spread	Global or Public Good
Polio*[a]	Limited through immunization program	Club
HIV/AIDS	Unlimited	Public
Malaria	Limited	Club
Tuberculosis	Unlimited	Public
Measles*	Limited through immunization program	Club
Pandemic Influenza	Unlimited	Public
Cholera	Limited through improved technology	Club
Trypanosomiasis	Limited	Club
Guinea Worm*	Limited	Club
Intestinal Parasites	Unlimited	Public
Acute Respiratory Infection	Unlimited[b]	Public
Leprosy	Unlimited	Public
Dengue Fever	Limited	Club
Diarrhoeal Diseases	Unlimited	Public
Onchocerciasis	Limited	Club
Non-HIV Sexually Transmitted Diseases	Unlimited	Public
Tetnus	Unlimited	Public
Viral Hepatitis	Unlimited	Public
Chagas	Limited	Club
Leishmaniasis	Limited	Club
Menningitis	Unlimited	Public
Schistosomiasis	Limited	Club
Pertusis	Unlimited	Public
Childhood Diseases	Unlimited[c]	Public
Tropical Cluster Diseases		

[a]* denotes an eradicable disease

[b]Although ARI is unlimited, it is easily treated in developed countries

[c]Childhood diseases include polio and measles which are limited through immunization programs

Table 2.3: The publicness of disease control activities

Category	Activities	Public-ness
Prevention	Immunization, Preventive Measures, etc.	Moderate
Treatment	Anti-retroviral Therapy, Antibiotics, etc.	Low
Infrastructure	Clinics, Hospitals, etc.	Low
Administrative Assistance	Advisors, Personnel, etc.	Moderate
Research	Data Collection, Clinical Trial, etc.	Moderate
Surveillance	Monitoring, Reporting, etc.	High
Education	Dissemination of information, Behavior modification	Moderate
General/Access	Health system support, etc.	Moderate

Chapter 3

Donor Priorities Across Diseases

3.1 Introduction

In this chapter, I address the relationship between disease characteristics and donors' allocations of disease specific health aid. The theory proposed here suggests that international donors have incentives to invest disease specific aid strategically in order to maximize their enjoyment of the resulting benefits. Donors are able to maximize their benefits by selecting diseases that are most likely to affect their constituent population. Specifically, the theory predicts that donors will provide higher levels of aid for diseases with greater geographic spread. However, because there is considerable variation in constituent populations across donors, I also expect differences in funding priorities between bilateral and multilateral donors. This chapter uses differences across diseases to examine donor priorities, as measured by level of disease specific development aid for health.

In the following section, I outline expectations and develop testable hypotheses. In the second section I describe the data and research methods used to address these hypotheses. I then examine bilateral and multilateral donors' disease specific aid allocations using several multilevel linear regressions and report the findings addressing these hypotheses.

3.2 Disease Characteristics and Donor Priorities

The literature on foreign aid establishes donors may allocate aid based on a combination recipient need and donor interest. For this study, donor interest can mean economic, political

and/or health interests. I assume that donors of development aid for health (DAH) hold some minimal level of interest in improving health, either globally or within a recipient country. In the previous chapter, I argue that the public nature of the of disease control provides incentives for donors to invest their resources strategically in order to maximize their enjoyment of any benefits. In order to test this theory, I must first identify a pattern of allocations that serve donors interests while neglecting the potential for a collectively better or more efficient outcome. In this chapter, I use disease characteristics to parse out differences in donor priorities.

Diseases provide a particularly useful tool for identifying distortions in aid allocations. Variation across several disease characteristics provides ample means of identifying recipient need and various donor priorities, as well as examining differences between need/efficiency and donor allocations. Specifically, I use differences in disease geography and burden. Diseases vary considerably in terms of geographic spread. Some diseases such at tuberculosis are transmitted through casual contact and may spread quite easily across borders without any limitation. Other diseases, such as schistosomiasis — which relies upon an intermediary host that can only survive in tropical climates — are geographically limited. In addition to the geographic limitations of disease, disease burden varies substantially across diseases and across states. Disease burden is the relative weight or cost, in terms of loss of human life, associated with a disease. Disease may vary as a result of not only geographic limitations, but also of the prevalence of the disease, the morbidity and mortality rate of the disease, the population it generally affects (e.g. the aged, infants and children, etc.), and the general state of health within a given country. Disease burden will vary across diseases — e.g. the burden of measles in Uganda will differ from the burden of HIV/AIDS in Uganda — and a single disease's burden will vary across countries. For example, diseases such as cholera, that are relatively rare and easily treated in developed states, can be devastating in developing states where poor sanitation and water systems and few health resources result in greater spread and higher mortality.

Variation across diseases' burdens and geographic spread may be used to parse out donor interests. As the previous chapter explains, disease control can be addressed as a semi-public good. Although control of infectious diseases is non-rival, the distribution of benefits associated with improvements to disease control are indirectly excludable. Because poor health is centralized in developing states, improvements to health due to foreign aid and will also be centralized in developing states. As a result, donors may have incentive to invest strategically to maximize their enjoyment of the benefits resulting from improved disease control. If disease specific aid allocations are strategic and based upon donor interests, donors may attempt to focus on diseases with geographic ranges that include their constituency. Likewise, they may also focus on diseases for which there is evidence of the potential to threaten their constituency (e.g. higher disease burden).

In addition to identifying donor interests, burden of disease is also a useful and objective tool for identifying global and recipient need. Because disease burden will vary across diseases, between recipients, as well as across donors and recipients, it is possible to identify diseases that cause the most human suffering and death globally and within a recipient state. If donors allocate disease specific aid in an effort to save the most lives or relieve the most suffering, diseases with higher burdens should presumably receive higher levels of funding. However, if donors allocate disease specific aid strategically to maximize their benefits, diseases with high burdens may be neglected.

In addition to geography and burden, diseases also provide useful economic variation. Differences in prevention and treatment costs across various diseases allow for distinction between need, efficiency, and interest. Prevention for various diseases runs from immunization programs and provision of insecticide treated bed-nets, which cost a few dollars, to improvements to sanitation systems and marsh drainage which cost hundreds of thousands or millions of dollars. Likewise, treatment for various diseases runs from a short course of antibiotics to years of anti-retrovirus treatment. Variation in prevention and treatment across diseases allows for the separation of need and efficiency and the inclusion of economic

calculations. For example, donors seeking to maximize lives saved and suffering alleviated may choose to invest in diseases with lower costs of prevention and treatment to get "more bang for their buck." In contrast, donors seeking to address specific disease threats may disregard the cost of prevention and treatment.

3.2.1 Donor Interests

Donors efforts to identify disease threats will be affected, in part, by the nature of the donor and its constituency. Different types of donors represent different constituencies and thus will have differing efforts. Bilateral donors have a localized constituency — the citizens within the state's borders. Thus, if bilateral donors are investing DAH strategically, they may have very limited interests and only invest in diseases that will affect a localized population. In contrast, multilateral donors represent a global or regional constituency. Because multilateral donors' constituencies may cover several or many states and are less localized, they are likely to have broader interests and a wider portfolio of diseases that threaten their populations.

Bilateral Donors

Disease geography and burden provide useful tools for identifying diseases that threaten donor audiences. Bilateral donors may provide development aid for health as a means of reducing the threat of disease to their constituency. Indeed, these donors may decide that it is more cost effective to prevent and treat an outbreak while it remains contained in another country, than to pay the expenses associated with an outbreak or epidemic among their local population. Specifically, bilateral donors will focus upon diseases with fewer geographic limitations and that have demonstrated potential for infecting the donor's constituency (resulting in higher burdens) potentially at the expense of diseases with higher burdens in the recipient state and globally.

Additionally, the localized nature of bilateral donors constituencies may also distort donors' decisions regarding the cost-effectiveness of addressing one disease over another.

All donors have an interest in preventing the spread of disease. Indeed, it is less costly to prevent or contain an outbreak elsewhere than to treat a epidemic at home. Bilateral donors, however, may have modified interests. Some diseases are easily and/or cheaply treated in developed states while others remain quite expensive. Because bilateral donors are primarily concerned with the localized population, they have incentive to focus — and presumably reduce the threat — of diseases with the highest treatment cost. This is in contrast to the cost-effectiveness or "more bang for the buck" expectation. Likewise, diseases that are easily prevented in developed states through extensive vaccination programs will be of less threat to the localized population. As a result bilateral donors may spend less on these diseases. Thus, I consider the following hypotheses:

Hypothesis 1: Disease specific aid from bilateral donors will be positively correlated with that disease's burden within the donor country.

Hypothesis 2: Disease specific aid from bilateral donors will be negatively correlated with that disease's geographic limitations. (E.g. Less geographically limited diseases will received higher levels of funding).

Hypothesis 3: Disease specific aid from bilateral donors will be positively correlated with the cost of averting a single DALY.

Hypothesis 4: Disease specific aid from bilateral donors will be negatively correlated with diseases with established and effective vaccination strategies.

Multilateral Donors

In contrast to bilateral donors, multilateral donors represent a wider constituency that is less localized and may be subject to a wider range of diseases. Organizations such as the United Nations and the World Bank, which represent global interests, cannot limit their interests to diseases that threaten only a localized population. Likewise, organizations such as the Organization of American States and the African Development Bank represent audiences and interests of multiple states. Although these interests are more localized than those of

global organizations, they cannot be limited to only diseases that threaten the population of a particular state. As a result, multilateral donors will be more responsive to diseases with globally — or regionally, depending upon the organization — threat.

Additionally, the expanded constituency of multilateral donors will likely increase their adherence to cost-effective strategies. Unlike bilateral donors, which have incentives to pay high treatment costs in order to minimize the threat of diseases to a localized population, multilateral donors have incentives to focus on saving the most lives. As a result, they will likely focus on diseases with lower prevention and treatment costs to ensure they do the most good with their money. Immunization programs provide some of the best "bang for the buck". Thus, I consider the following hypotheses:

Hypothesis 5: Disease specific aid from multilateral donors will be positively correlated with that disease's global burden.

Hypothesis 6: Disease specific aid from multilateral donors will be negatively correlated with that disease's geographic limitations.

Hypothesis 7: Disease specific aid from multilateral donors will be negatively correlated with the cost of averting a single DALY.

Hypothesis 8: Disease specific aid from multilateral donors will be positively correlated with diseases with established and effective vaccination strategies.

Misallocation of Aid

Finally, while the hypotheses established above identify concrete expectations from the theory, they do not address whether this reflects a misallocation in aid or not. Implicit in these discussions is the expectation that providing disease specific aid based on donors' interests regarding geographic spread, burden and cost, produces results that maximize the benefits of donors at the expense of recipients, as well as the global collective good. Consider the following counter-factual — if disease control were a pure public good in which the benefits of reducing infection rates for any disease would be share equally by all members of the system,

donors would have incentive to spend money on diseases that affect the most people and are the least costly to treat and prevent. Thus, donors would provide more foreign aid for diseases with the highest burden globally and/or within a given recipient state. In contrast to this, the theory suggests that if donors are giving based upon their interests, the burden of disease in recipient states should be insignificant. Although the previous hypotheses provide some expectations of donor interests, they fail to address the potential misallocation.

Moreover, the theory only implies a relative lack of importance of recipient and global need. In some circumstances, donors' interests may match recipient and global need however, it is assumed that these factors are less influential than other measures of donor interest. Thus, I include an additional hypothesis.

Hypothesis 9: Disease specific aid will be positively correlated with the burden of that disease within the recipient country.

Finding support for this hypothesis will not provide conclusive evidence that recipient need matters. However, finding evidence or a negative relationship between aid allocations and recipient need would support the theory's expectation of recipient need being relatively less important.

3.3 Data and Research Design

The primary argument of the theory suggests that (1) donors' invest disease specific aid strategically to gain the greatest benefit from improvements to disease control — specifically, to decrease the threat of disease to their constituencies, and (2) that differences in constituencies between bilateral and multilateral donors lead to differences in disease specific aid allocations. In order to test the hypotheses outlined in the previous section, I use a combination of interviews with policy-makers, descriptive data, and systematic analyses. I began by identifying donors, recipients, and relevant diseases. Although the number of bilateral donors for development aid for health has grown drastically over the last two decades, the

22 members of the OECD's Development Assistance Committee (DAC) continue to provide the vast majority of DAH funds. As a result, I use allocations from these members to test bilateral donor priorities. In addition to these, I also include DAH allocations from 20 multilateral organizations including global organizations such as the World Bank and the United Nations, as well as regional organizations such as the Organization of American States.

I included 150 potential recipients of disease specific aid from these donors. I limited potential recipients to those qualifying for OECD development aid and for whom the World Health Organization and the Global Burden of Disease Project maintain disease specific data. Finally, I identified 25 diseases that vary in terms of mode of transmission, geographic spread, cost of prevention and treatment, and global burden of disease. Although there are many disease to choose from, I selected diseases that currently, and have historically, account for large numbers of infections and death within developing states and whose burden of disease is calculated by the Global Burden of Disease Project. Thus, my unit of analysis is donor/recipient/disease triad. I begin with a population of all combinations of potential donors, diseases and recipients totaling 161,250. A list of donors, recipients and diseases can be found in Appendix 1.

The dependent variable for each of these hypotheses is disease specific development aid. In order to calculate disease specific aid, I use health specific aid data generated from the Project Level Aid database (Findley, Hawkins, Hicks, Nielson, Parks, Powers, Roberts, Tierney, & Wilson 2010). A search of the Project Level database for health specific aid produced approximately 60,000 health oriented grants between the years of 1995 and 2008. From these I identified 15,018 grants that directly targeted specific diseases.

The information about each grant varied dramatically. Some grants included detailed information regarding the disease, the programs, and the intent of the grant. For example, below is a description of grant from Norway to Guatemala. It provides description of not only the disease of focus and the program objective, but also the motivation behind the objective:

"The goal of the program is to improve the quality of life for of those with HIV/AIDS in Latin America. The program is intended to raise social awareness and minimize the social and economic impacts of HIV/AIDS at the individual level. Specifically, to sensitize society and the catholic church, denouncing the marginalization of people infected on HIV/AIDS and new forms of suffering and illness."

In contrast, only minimal information was provided for some other grants. For example, below is the description of a grant from Germany to Uganda and identifies the diseases and the program strategy"

"HIV/AIDS, STD testing in rural communities."

In many cases, a single grant targeted more than one disease — as in the example above. Although some grants did specify what portion of the grant each disease would receive, most did not. Thus, for grants that did not specify the breakdown of the money across multiple diseases, I duplicated the grant for each of the diseases addressed.

Using these grants, I coded donor, recipient, disease, and the program strategy if it was described — the program strategy data will be used in the next chapter. For example, below is the description of grant from Canada to Vietnam from 2007:

"Avian Flu - Pandemic Influenza This grant will support the implementation of specific areas of Vietnams Strategic Action Plan for Pandemic Influenza and will significantly improve alert and response to epidemic-prone diseases and the implementation of the International Health Regulations (IHR) (2005). Of the objectives within Vietnams Strategic Action Plan for Pandemic Influenza, this proposal will seek to address: 1. Intensify Rapid Containment operations (Strategic Objective 3); 2. Building Capacity for SAP implementation; 3. Improving surveillance and reporting"

Based upon this text, I coded the following line of data, where 104 is Canada's donor code, 663 is Vietnam's recipient code, 105 is the disease code for pandemic influenza, and 9 is the program code for Outbreak/Responsiveness:

Year	Donor	Recipient	Disease	Program/Strategy	Commitment
2007	104	663	105	9	3139760

I then aggregated grants with the same donor—recipient—disease combinations across time, producing the total aid allocated for each disease to each recipient from each donor.

However, these grants represent only the cases in which aid was given. Each donor had the opportunity to give aid to 150 recipients for 25 different disease, yet most did only provided aid in a fraction of those cases. These cases of no aid are equally important to understanding how and why donors allocate aid. Thus, I generated a dataset that included all possible donor/recipient/disease combinations and input the aggregate funding in cases where aid was given, coding the rest of the cases as zeros for the dependent variable.

3.3.1 Independent Variables

The hypotheses established in the previous section address the relationship between various disease characteristics and the resulting level of aid allocation. Thus, it is necessary to account for disease burden, cost, and geographic spread of various diseases. In addition, these hypotheses address various levels of analysis including aggregate disease funding by bilateral and multilateral donors, and disease specific aid by individual donors. As a result, I include data for each of these various levels

Disease Burden: The primary variable of interest in this analysis is the burden of disease measured as thousands of Disability-Adjusted Life Years or DALYs. The most obvious negative effects of disease are the premature loss of life and the development of disabilities.

Disability-Adjusted Life Years combine the number of years of life lost due to premature death — using a state's average life expectancy — with the number of years lived with a disability. Thus, a DALY is a single year of life lost due to death or disability as a result of a single cause. For example, if a three-year-old child in Uganda, where the average life expectancy is 53 years (UNICEF 2009), this death would be recorded as measles causing 50 disability-adjusted life years within Uganda. In this way, DALYs can be thought of as a "bad" that should be minimized.

Disease burden varies across both states and diseases. Disability-Adjusted Life Years accounts for these variations in disease burden. DALYs resulting from measles within Uganda will differ from DALYs resulting from leprosy in Uganda, which will differ from DALYs resulting from either measles or leprosy in Australia. The level of threat posed by a specific disease will vary significantly across donors and recipients. Thus, for bilateral donors, I include the disability-adjusted life years of the specific disease for both the donor and the recipient. Because multilateral donors represent a wider population, I substitute either the global or regional disability-adjusted life years for the donor burden of a specific disease.

Disease Cost: In addition to disease burden, donors may also consider the cost of preventing and/or treating a particular disease. In considering the cost a disease, one must consider the broad range of strategies. For example, DALYs as a result of HIV/AIDS can be averted in several ways, each with a different cost, including: through screening of blood transfusions, provision of sterile needles to injection drug users, the use of condoms, Mother-Child-Transmission inhibiting medications and treatment with anti-retroviral drugs. While the cost of condoms to prevent infection is relatively low, the cost of anti-retroviral treatment is quite high. The cost of prevention and treatment also varies considerably across diseases. For example, vaccination for pertussis (whooping cough), which remains prevalent, costs only a few dollars and not only prevents infection for the individual, but also provides added protection for many others. Similarly, the cost of a filter straw, used to prevent the ingestion of copepods (water fleas) that result in Guinea Worm infections cost less than

a dollar. In contrast, prevention strategies for diarrhoeal diseases include water sanitation systems, costing potentially millions of dollars.

In order to measure the cost a disease I use Jamison et al (2005)'s estimated average cost of averting a single disability-adjusted life year, measured in constant US dollars, for each disease. This measure combines both disease prevention and treatment — averaging the costs of both.

Immunization: The development of vaccination programs changed modern medicine dramatically. Through immunization, diseases that once wreaked havoc across the globe are now controlled, eliminated or, in one case, eradicated. The eradication of smallpox and the control of measles and polio as a result of vaccination programs have saved millions of lives. Immunization programs represent the most public of strategies in disease control. The low cost of a single vaccination and the aggregation of health benefits to populations with high vaccination rates make immunization one of the most cost effective strategies. Likewise, well developed immunization programs have virtually eliminated diseases such polio and measles in developed countries. As a result, the availability and implementation of immunization programs provides two incentives — donors may choose to provide more funding for immunizable diseases as a promising strategy for disease control or donors may choose not to provide funding for immunizable diseases because their local populations are protected by domestic immunizations. To measure immunization I use a dichotomous indicator where 1 indicates diseases for which vaccination programs are established and 0 for those that are not. [1]

Geographic Spread: Finally, the threat posed by a disease varies depending upon distance to which it can spread. Because some diseases, such as schistosomiasis, are geographically limited, they pose less of a threat to some states — donor states in particular.

[1]Immunization may be correlated with cost-effectiveness thereby splitting variance between diseases with low cost per DALY averted and immunization. The pairwise correlation between the two variables is quite low — .08. Yet, to address this concern, I also ran models that excluded the immunization variable and the result for cost per DALY averted maintained the same sign and in/significance.

Thus, I include a dichotomous variable for geographic limitations — a 1 indicating a geographically limited disease and a 0 indicating diseases without geographic limitations that spread easily across borders.

3.3.2 Control Variables

In order to account for potentially confounding factors, I include several control variables. The first is GDP per capita. Low income countries generally have poorer infrastructure and fewer programs already in place. As a result, donors may be inclined to provide more funding to less developed states. GDP per capita, along with life expectancy and caloric intake, is a common measure of recipient financial need within the foreign aid literature. In this study it is the most appropriate of these potential measures because, while a country's low income will certainly have an effect upon overall health, this effect is indirect. The other two measures are directly related to health and are more highly correlated with recipient burden of disease, one of the key independent variables. For example, caloric intake has a direct effect on health as individuals suffering from poor nutrition are more susceptible to infections. Likewise, a recipient's burden of disease is directly related to morbidity and mortality rates and calculations of life expectancy. Thus, I use the recipient's average GDP per capita reported in constant 2000 US dollars. Likewise, because programs within high population recipient states must serve more people, it is likely that donors provide greater funds based upon population. Thus, I use a recipients population in 2001, measured in thousands of people, as a control for the size of the recipient. Both of these variables were collected using the World Bank's World Development Indicators database (World Bank 2011).

Additionally, diseases that have been targeted for attention by international programs may receive higher levels of funding. For example, the global campaign to eradicate polio virus has decreased infection rates drastically. In fact, polio remains endemic in only a handful of countries — Afghanistan, Angola, Chad, Democratic Republic of the Congo, Congo, India, Nigeria, and Pakistan (World Health Organization 2010*a*). Even within these

countries, infections are rare — ranging from 1 to 25 cases each year. Yet, despite its low burden of disease, polio may receive greater quantities of disease specific aid as has been identified for eradication. Similar examples include the Eradicate Measles campaign as well as the Rollback Malaria campaign. Thus, I include a dichotomous indicator for diseases that are currently the target of an international program to address the disease, using a 1 to indicate targeted diseases and a 0 to indicate non-targeted diseases. It is important to note that not all such campaigns focus on eradication. For example, because gorillas serve as a reservoir population for malaria, it is impossible to fully eradicate malaria (Prugnolle & Renaud 2010). However, this has not prevented a global campaign to decrease its transmission and improve access to treatment within developing countries.

I also include a control variable for colonial legacy. Alesina and Dollar (2000) show that political alliances and colonial legacy are significant predictors of foreign aid allocations. Development aid for health is no exception. One would expect former colonial powers to have greater political and economic interest, and thus maintain closer connections to their former colonies. Thus I include a dichotomous indicator for dyads that represent colonial legacies. Using the Correlates of War Colonial Legacy dataset I code dyads with a previous colonial relationships one, and dyads with no colonial legacy as a zero.[2]

Finally, domestic health funding may affect international donors aid allocations. Portions of the foreign aid literature, reviewed in the previous chapter, identify recipient need as a potential factor in aid allocations. If this is the case, one might expect states with lower domestic health expenditures to receive more aid. In contrast, some scholars argue that DAH, like other forms of foreign aid, is fungible and may be used to divert funds to other programs. Low domestic health expenditures may indicate that health is of low priority for a state and development aid for health would simply allow a state to spend fewer domestic

[2]Donors political and economic interests may also affect funding levels. Although the colonial legacy variable covers much of this political interest, I also ran models which included two additional variables — bilateral trade flows, as provided by the Correlates of War trade flows dataset, to measure donors economic interests; and the S-Score (Signorino & Ritter 1999) measure of political similarity — to measure donors political and economic interests. The results remained the same.

funds on health. Thus, one might expect states with lower domestic health expenditures to receive less DAH. This project does not address this debate. However, I include the recipient state's per capita government health expenditures measured in 2000 US dollars as reported by the World Health Organization's National Health Accounts summary data (World Health Organization 2009).

3.3.3 Data Structure and Research Design

The theory presented in the previous chapter, and reiterated here, suggests that donors allocate aid according to political influences in addition to recipient need. However, the foreign aid literature is remarkably silent on the determinants of health sector aid, addressing DAH allocations as apolitical or technical decisions. As a first cut at identifying donors' priorities with regard to disease specific aid, I conducted interviews with representatives from key donor organizations, including the World Bank, the World Health Organization, and the US Agency for International Development, as well as representatives of health ministries in developing countries.[3] During these interviews, I asked the representatives of donor organizations about their priorities across diseases and their criteria for the allocation of health aid. I use these quotations from these interviews as an initial test of the theory and as a means of comparing health aid rhetoric with the rest of my results.

After reporting the results of the interviews with policy-makers, I conduct a series of systematic analyses using the data described in the previous subsection. Within the dataset, each observation includes data from three levels or categories — donor, recipient and disease. Each of these categories is a separate and unique group — much like gender and ethnic background. Although each case will include indicators for each level, no level is a subset of another. In addition, although there is significant variation within each variable and within each level, there are multiple variables in which there is limited variation across levels. For

[3]I conducted interviews at the First Global Symposium on Health Systems Research, held in Montreux, Switzerland. This portion of my research was generously funded by a Nelle Signor Graduate Scholarship

example, the average cost of preventing measles remains the same for every donor/recipient combination. As a result, the research design must account for the structure of the data by modeling the effects of these levels. Table 3.1 displays the variables used to test each hypothesis and its corresponding level.

A simple OLS regression would fail to adequately treat variance between and across these various levels. Although the categories overlap, no category is a subset of another or used to model the other levels. Instead the data have a non-nested structure (Gelman & Hill 2007). Additionally, the dollar amounts are left-censored at zero. I test the hypotheses using five different multilevel linear models. Because each group is considered unique and the hypotheses primarily address the affect of differences in disease, it is appropriate to use fixed effects (Snijders & Bosker 1999).[4] The first of these analyses examines aggregate disease specific aid allocations by donor, excluding recipient specific information. The second and third examine aggregate disease specific aid allocations by bilateral and multilateral donors. respectively. These three analyses provide an initial cut at the effects of variation in disease characteristics and donors' interests. In particular, the findings suggest a clear difference in aid allocations between bilateral and multilateral donors.

The final two analyses include recipient specific indicators. The first addresses the interests of bilateral donors. The second examines the interests of multilevel donors while accounting for recipient level indicators. The following section presents the results of these tests. All results are produced by Stata 11.

3.4 Results

This chapter examines the relationship between aid flow and various disease characteristics in order to identify donors' priorities. To do this, I use a combination of anecdotal evidence from interviews with policy-makers and systematic analyses of data. In the first subsection,

[4]A Hausman test indicated that fixed effects at all three levels was appropriate.

I summarize the responses from interviews and trends within the data in order to provide an initial examination of donors priorities. In the second subsection, I extend this with a series of multilevel linear regressions to parse out differences in levels of aid across disease. The results indicate that, at least in the case of bilateral donors, donor interest is a driving force behind disease specific aid allocations.

3.4.1 Donor Priorities — Rhetoric versus Data

My initial cut at testing the hypotheses presented here was to ask policy-makers directly about their priorities with regard to health and disease. These interviews, summarized in Table 3.2, provide limited support for some portions of the theory, while contradicting others. The first two columns of Table 3.2 indicate the organization that the individual represented and whether the organization is a bilateral or multilateral donor. The third column simply indicates whether the interviewee claimed that recipient need was a determinant of aid allocations. The final column provides a sample quotation from the interview that illustrates how the individual perceived aid allocation decisions being made. All of the representatives that I interviewed claimed recipient need was a determinant of aid allocations. Indeed, with the exception of the representative from the World Bank, all representatives that I interviewed noted, in some fashion, that recipient need was of paramount concern in the allocation of aid. The representative from the World Bank, while also asserting the importance of recipient need, also added the development affects of a disease as a criteria.

The results of the interviews provide greater support for the traditional view of development aid for health as apolitical than for the theory presented in this project. Although the theory predicts that multilateral donors will be responsive to recipient need, it also predicts that bilateral donors will be less responsive to recipient need than to political calculations. The results of these interviews suggested that, when identifying health issues to address, recipient need was the primary consideration.

I followed this initial test, with an examination of the data to identify trends in disease

specific aid. Table 3.3 provides a basic summary of the distribution of aid across diseases. The first column presents each diseases percentage of global disability-adjusted life year caused by infectious disease. The second column presents each diseases percentage of aid in my dataset. The distribution of aid matches disease burden well in some cases. For example, Malaria comprises 13.6% of global disability-adjusted life years caused by infectious disease. It also receives 14.8% of disease specific aid. Similarly, Tuberculosis comprises 9.3% of global DALYs caused by infectious disease and receives 11% of disease specific aid. However, there are also examples of considerable discontinuities. For example, HIV/AIDS comprises 17.8% of global DALYs caused by infectious disease and received 46.8% of disease specific aid. In contrast, acute respiratory infection and diarrhoeal diseases comprise 31.9% and 24.6% of global DALYs while only receiving 0.8% and 0.4% of aid respectively.

Additionally, the summary data presented in Table 3.3 provides support for other studies (MacKellar 2005, Shiffman 2006). The discontinuity between disease burden and aid within my data supports the underlying premise of the theory — that the allocation of aid is determined by more than simply need. Moreover, these data illustrate the severity of the mis-allocation of disease specific aid. It is clear that diseases such as HIV/AIDS are receiving a disproportionate amount of support where as disease causing more suffering, disability, and disease such as acute respiratory infections and diarrhoeal diseases receive far less funding. These findings not only suggest the failure of donors to identify the most pressing humanitarian issues, but also translate into loss of human life.

Although the findings in Table 3.3 provide evidence of discontinuities between aid and disease burden, it is necessary to disaggregate aid allocation by donors in order to further examine the role of donor decisions on these discontinuities. Table 1.3 displays the findings for the first multilevel model, which examines aid allocations by donor aggregated by disease. The findings suggest that global burden of disease is not correlated with aid allocations at the donor level, while other disease specific factors are highly correlated. The results presented in Table 3.4 show that, although the global burden of any given disease is not correlated

with aid, geographic limitation, cost of treatment and prevent, as well as a disease being targeted by an international program are powerful predictors of aid allocations by donor. The resulting negative and significant coefficient for geographic limitation indicates that geographically limited diseases received less aid than geographically unlimited diseases across all donors. Additionally, coefficients for cost per DALY averted and immunization are also statistically significant. The results suggest that diseases with higher costs will receive greater funding — roughly $1265 dollars for every $1 increase in price — where as diseases that can be prevented through immunization will receive less funding. Additionally, indicator for diseases targeted by an international program is also positive and significant.

Table 3.5 displays the findings of the second multilevel model, which examines aid allocations by bilateral donors aggregated by disease. The model is similar to the previous, but also includes the donor burden of disease measure. The results of this model provides insight to the role of donor interest in aid allocations by disease and lend support to several hypotheses. In particular, the findings here suggest that bilateral donors aid allocation reflect the potential threat of a disease.

Just as in the previous model, global burden of disease is not significant predictor of aid. In contrast to global burden of disease, the donor burden of disease variable is positive and significant indicating that donors provide more funding for diseases with higher local burdens. Specifically, for every 1,000 additional disability-adjusted life years attributed to a disease within the donor country, one would expect a $74,385 increase in aid for that disease. These results suggest initial support for the theory and specifically for Hypothesis 1. Bilateral donors provide greater funding for diseases that can/do threaten their domestic constituencies. This result, in addition to the insignificance of the global burden of disease measure suggests that bilateral donors do so while disregarding need.

Unlike, the previous model however, geographic limitations is insignificant as a predictor, as is whether or not a diseases is the target of an international program. The costs per DALY averted both significant predictors of donor aid. The coefficient for cost is positive

and significant — suggesting that for every one dollar increase in the price of treatment, one would expect a $42822 increase in aid for that disease. In contrast, there is no significant relationship between immunization and aid. These results provide initial support for Hypotheses 3 and 4.

Table 3.6 presents the results from the third multilevel model. This model examines aid allocations by multilateral donors across disease. Because multilateral donors serve a constituency wider than a single state, I have excluded the donor burden of disease variable. The results provide evidence for the theorized differences between bilateral and multilateral donors. In particular, the findings here suggest that multilateral donors are more responsive to international concerns and humanitarian concerns.

In contrast to the bilateral donor model, global burden of disease is a positive and significant. Indeed, for every 1,000 disability adjusted life years as a result of disease, a multilateral donor would be expected to give an additional $139,685. This is substantial when you consider that this is 1000 DALYs, not lives lost, and the population is global. For example, the death of a single child at age 5 in a country with the average live expectancy of 50 produces 45 DALYs. Thus, 1000 DALYs produced globally, is quite small. These results lend initial support to Hypothesis 5 — that multilateral donors will be positively correlated with global burden of disease. However, it is not possible to determine whether this pattern is due to multilateral donors being more responsive to the interests of a global constituency or to global need from this model. While the results show a positive correlation, it is also possible that multilateral donors' allocation fail to reflect need at the recipient level. This distributional question will be addressed further in subsequent tests.

Additionally, the indicator for a disease targeted by and international program is positive and significant, suggesting that — unsurprisingly — multilateral donors respond to the international targeting programs. In contrast, the remaining variables — geographic limitation, cost per DALY averted, and immunization are all insignificant. This may suggest that multilateral donors are primarily responsive to suffering and death rather than

cost-effectiveness or other considerations. This will be examined further in subsequent tests.

3.4.2 Analysis of Aid

Although the previous results provide some initial evidence in support of the theory and several hypotheses, the analyses of donors' disease specific aid aggregated by disease fail to address a second and more pressing component. While the results indicate that donor interest plays a role in aid allocations, the results presented thus far fail to address whether donor interests is prioritized above humanitarian need at the recipient level. In order to test this second component, I conduct two further anaylses — present in Table 3.7.

Table 3.7 presents the findings of the final two multilevel linear regression models. The first model displays the coefficients and standard errors for aid allocations from bilateral donors by recipient and disease. The second model displays the coefficients and standard errors for aid allocations from multilateral donor by disease and recipients. The results provide evidence that bilateral donors are more responsive to diseases that threaten their constituent populations. Moreover, the results also suggest that multilateral donors, with more varied constituencies, are more responsive to global threats and recipient needs.

The first model, which uses bilateral DAH allocations, provides evidence that bilateral donors' health concerns may distort disease specific health aid allocations. Even while controlling for other sources of donor interest, the donors' burden of disease is positive and significant. Indeed, a disease which produced an additional 1,000 years of life lost due to death or disability in a single recipient country would be expected to produce a $7111 increase in aid to a recipient for that specific disease. This finding provides support for the first hypothesis — a positive correlation between donor disease burden and allocation of disease specific aid. In contrast, recipient burden of disease — the indicator that, according to most rhetoric regarding DAH, should be most important — is not a significant predictor of bilateral donor aid allocations. In addition, the geographic limitation variable is negative and significant, as predicted by Hypothesis 2. This indicates that donors provide less money

for diseases which are geographically limited such as schistosomiasis. In combination, these three results clearly indicate that, at the recipient level, disease specific aid allocations are more highly correlated with bilateral donor interests than recipient need. As suggested by the theory, it appears that bilateral donors prioritize diseases with the greatest likelihood of affecting their own populations.

Similarly, the results provide evidence supporting Hypotheses 3 and 4. The cost per DALY averted variable produces a positive and significant coefficient. This suggests that for every $1 increase in the cost, bilateral donors will likely spend an addition $2,913 in aid for that disease within a recipient state — supporting Hypothesis 3. This finding supports that theoretic expectation that bilateral donors prefer to address high cost diseases abroad to prevent having to pay higher costs for dealing with them at home. In contrast, the immunization variable produces a negative and significant coefficient. This suggests that bilateral donors do not prioritize diseases that are easily prevented within their own borders, which supports Hypothesis 4.

Combined, however, these results fail to support the rhetoric provided by policy-makers, that donors choose select disease that affect the most people and/or have the most cost-effective options in an effort to maximize the benefit of aid within a recipient state. Contrary to the idea that disease specific development aid for health is allocated with the intention of alleviating suffering for the greatest number of people in recipient countries, these results support the first four hypotheses and suggest that bilateral disease specific development aid is intended to alleviate the threats to populations within the donor state. Indeed, of all of the variables included in the model, only those representing donors' interests are significant — even when controlling for other indicators that typically influence foreign aid decisions. The only significant control variable is colonial legacy. As expected, the coefficient is positive and significant — indicating that bilateral donors provide disease specific health aid to recipient states to whom they have a historical connection. Although not the direct object of the theory or any of the hypotheses, the significance of colonial legacy further supports the

argument that development aid for health is, in fact, subject to political influence.

The second model in Table 3.7 analyzes multilateral allocations by recipient and disease. The findings of the second model contrast with the bilateral donor model in several ways. Specifically, the results provide evidence that multilateral donors are responsive to need as measured by disease burden, both globally and within the recipient state — supporting Hypothesis 5. Additional support is also found for Hypothesis 7.

Unlike the previous model, the global burden of a disease is a significant and positive predictor of multilateral disease specific aid allocations. As the number of years lost due to premature death and/or disability rises by 1,000 worldwide, one would expect a more than $33,000 increase in funding for that disease from one multilateral donor to one recipient state. This evidence supports the theory that multilateral donors are more responsive to global need and/or interests and supports Hypothesis 5. In addition, the burden of a disease within the recipient state is also positive and significant. Multilateral donors are predicted to give approximately $890 more for a disease for every increase of 1,000 DALYs within the recipient country. Unlike the previous model, multilateral donors allocations reflect need within recipient countries. This evidence supports Hypothesis 9 in the case of multilateral donors and draws a clear distinction between bilateral and multilateral donors in terms their responsiveness to suffering in recipient states

Unexpectedly, the coefficient for geographic limitation is insignificant. Providing no evidence in support of Hypothesis 6. Likewise, the cost per DALY averted and immunization are insignificant — failing to support Hypotheses 7 and 8. In contrast to the bilateral model these results confirm the previous suggestion that multilateral donors are more responsive to suffering and need, than to calculations of constituent interests and cost-effectiveness.

3.5 Analysis and Conclusion

The results presented in the previous section offer considerable insight into the allocation of disease specific development aid for health and donor priorities. Although policy-makers' rhetoric often suggests that development aid for health is apolitical — allocated strictly on the basis of need and intended to maximize alleviation of suffering — the findings in this chapter suggest that some DAH allocations are decidedly political. Not only do the results provide evidence in support of the theory established in the previous chapter, but they also directly support several hypotheses from this section. Table 3.8 summarizes the hypotheses and findings.

The distribution of aid across diseases within this study clearly illustrates some discontinuities between aid and the burden of disease. The analyses produced here demonstrate that those discontinuities can be partially explained by variation in donor interests. However, the results of this chapter also indicate clear differences in behavior across different types of donors. As the Table 3.8 summarizes, bilateral donor allocations were positively correlated with donor burden of disease and negatively correlated with geographic spread. These findings are not terribly surprising, suggesting that donors provide more aid to diseases that are more likely to affect their constituency. However, bilateral donor allocations are also positively correlated with the cost of the disease. This suggests that donors provide more aid for diseases with higher costs as it is cheaper to address diseases elsewhere than to deal with outbreaks domestically. Likewise, bilateral aid is also negatively correlated with immunizable diseases. This not only supports Hypothesis 4, but suggests that donors provide less aid for diseases that are easily controlled in developed countries through vaccinations. Yet, most surprising is that recipient burden of disease is an insignificant predictor of aid. Not only are bilateral donors providing aid according to the interests of their constituency, but the resulting allocation fails to correlate with recipient need. In contrast to bilateral donors, multilateral donors aid allocations are correlated only with global burden of disease

and recipient burden of disease.

Although levels of DAH have increased over the last several decades, the findings suggest that these increases do not necessarily reflect developing state need. The findings here suggest that discontinuities between aid and disease are the result of donor interests. Specifically, the results provide two primary conclusions: (1) Bilateral allocate aid according to their interest. This mean that they prioritize diseases that may affect their domestic populations — potentially under-funding the most pressing diseases in developing countries; (2) Multilateral donors are more responsive to need in the form of global and recipient disease burden. Additionally, these findings support arguments within the foreign aid literature which suggest that multilateral organizations are better at identifying and addressing humanitarian need.

As many studies of other types aid have concluded, aid allocations can be and are distorted by donor interests. Disease specific aid is no exception. These analyses extend the foreign aid literature to the understudied area of development aid for health and find disturbingly similar results of both theoretical and practical importance. In contrast to much of the literature on development aid for health, these findings lend support to the argument that development aid for health is subject to similar political pressures and constraints as other forms of foreign aid. Thus, it is necessary to extend the theories and study of foreign aid allocations to development aid for health.

It is also essential to consider how the problems and theories of health aid might contribute to the foreign aid literature as a whole. For example, unlike other areas of foreign aid, disease specific aid for health is directed at clearly identifiable and agreed upon problems, with known causes and processes, and concrete solutions. Money to prevent and treat measles is spent on specific activities such as vaccines and immunization clinics — activities scientifically linked to direct, inarguable and effective decrease the spread of measles. The processes involved are well documented and the activities produce measurable improvements. In contrast, democratization aid is spent on a number of activities such as educating and

registering potential voters, training legislative and judicial officers, and supporting political parties and other aspects of civil society (Finkel, Perez-Linan & Seligson 2007, Scott & Steele 2011) — activities which may directly or indirectly lead to improvements to democracy. Yet, even where democratization aid can be linked to such improvements, the process by which it does so remains unclear and a matter for debate and interpretation. The results here suggest that, even in areas of foreign aid where problems and solutions are clear, donors' interest may distort allocations and the benefits. By applying the theoretical insight provide by the study of health, scholar may be better able to address similar questions regarding other forms of foreign aid as well as other issue areas such as environmental cooperation.

Practically, these results suggest that international efforts to improve health and control infectious disease should account for varying political interests and priorities of donors. If, as the findings suggest, bilateral donors are more responsive to diseases that threaten their own populations while multilateral donors are more responsive to humanitarian concerns, it is possible to devise disease control plans and programs that account for these expectations. It is possible for bilateral and multilateral donors to coordinate their disease control efforts, providing a division of labor among various types of donors. For example, because multilateral donors enjoy more flexibility, it is possible that for multilateral donors to fill in funding gaps to diseases that do not threaten and are therefore neglected by bilateral donors. In addition, any consideration of "division of labor" must also account for various philanthropic donors. Organizations such as the Bill and Melinda Gates Foundation, the Rockefeller Foundation, and the Carter Center, all contribute large quantities of aid for health specific and diseases specific research, prevention, and treatment and thus may assist in offsetting the distortions caused by aid flows that reflect bilateral donors' interests. It is essential, however, to also note that bilateral donors remain the largest contributors to development aid for health. While a division of labor among donors may improve the balance of aid and disease burden, attempting to find a true balance will require the cooperation of bilateral donors as well.

These findings also provide promising areas for additional research. Future research should address differences between communicable and non-communicable disease. If the theory presented here holds, the results should show bilateral donors providing more aid funds for communicable diseases to the neglect of high burden non-communicable diseases such as heart disease.

Additionally, although I argue that donors' interests lead to distortion in DAH allocations by individual donors, it is necessary to consider the aggregate effect of that distortion. Development aid for health makes up a substantial portion of health expenditures for many developing states. Discontinuities in aid across diseases is not merely a matter of budget. Indeed, where donors' interest distort aid allocations, the results can be measured in terms of infections, disability and death. If the theory from the previous chapter holds, it should be possible to identify correlations between donor interests and disease specific deaths.

Table 3.1: List of Hypotheses and Independent Variables

Hypothesis	Independent Variables	Level	Data Source
Hypothesis 1	Donor Burden of Disease	Donor	Global Burden of Disease Project Report
Hypothesis 2	Geographic limits	Disease	World Health Organization
Hypothesis 3	Cost per DALY averted	Disease	Jamison et al 2005 or World Health Organization
Hypothesis 4	Immunization	Disease	World Health Organization
Hypothesis 5	Global Burden of Disease	Donor	Global Burden of Disease Project Report
Hypothesis 6	Geographic limits	Disease	World Health Organization
Hypothesis 7	Cost per DALY averted	Disease	Jamison et al 2005 or World Health Organization
Hypothesis 8	Immunization	Disease	World Health Organization
Hypothesis 9	Recipient Burden of Disease	Recipient	Global Burden of Disease Project Report

Table 3.2: Donor Disease Priorities — Interview Results

Organization	Donor Type	Quotation	Recipient Need
The World Bank	Multilateral	Yes	"The World Bank focuses on health initiatives that fit with development goals."
The World Health Organization	Multilateral	Yes	"We work with countries to identify their priorities and design programs that match those priorities."
UNICEF	Multilateral	Yes	"We design interventions to address health issues that cause the most suffering"
European Union	Multilateral	Yes	"Recipient need is a primary consideration in the allocation of health aid"
USAgency for International Development	Bilateral	Yes	"The programs we support are designed to provide the greatest good to most people."
Australian Agency for International Development	Bilateral	Yes	"AusAID focuses on diseases that have the greatest impact developing states."
Swiss Agency for Development and Cooperation	Bilateral	Yes	" SADC focuses on programs that reach the greatest number of people"

Table 3.3: Percentage of Infectious Disease DALYs and Percentage of Aggregate Aid

Disease	% of DALYs	% of Aid
Polio	0	6.4
HIV/AIDS	17.8	46.8
Malaria	13.6	14.8
Tuberculosis	9.3	11
Measles	5.6	2
Pandemic Influenza	0.5	1
Cholera	6.2	0.6
Trypanosomiasis	0.7	0.009
Guinea Worm	0.4	0.1
Intestinal Parasites	1.1	0
Acute Respiratory Infection	31.9	0.8
Leprosy	0	0.3
Dengue Fever	0.16	0.3
Diarrhoeal Diseases	24.6	0.4
Onchocerciasis	0.16	0.2
Non-HIV Sexually Transmitted Diseases	3	3.6
Tetnus	1.9	1.9
Viral Hepatitis	0.5	0
Chagas	0	0.3
Leishmaniasis	0.8	1.8
Menningitis	3.7	0.2
Schistosomiasis	0.6	0.2
Pertussis	3.8	1.8
Childhood Diseases	11	3.7
Tropical Cluster Diseases	4.5	0.6

Table 3.4: Donor Allocations Aggregated by Disease

Variable	Model 1
Global Burden of Disease	112336 (173377.4)
Geographic Limitation	-27000000* (11900000)
Cost per DALY	1265.2* (202.42)
Targeted Disease	3330000* (1180000)
Immunization	-1450000* (121000)
N	1496
$*$ = p-value less than .05	
Fixed Effects coefficients omitted	

Table 3.5: Bilateral Donor Allocations Aggregated by Disease

Variable	Model 2
Global Burden of Disease	-33505 (62943.74)
Donor Burden of Disease	74385.52* (25752.5)
Geographic Limitation	-3271446 (3889037)
Cost per DALY	42822* (67.57)
Targeted Disease	5622850 (3889037)
Immunization	-428933 (3864049)
N	976
$*$ = p-value less than .05	
Fixed Effects coefficients omitted	

Table 3.6: Multilateral Donor Allocations Aggregated by Disease

Variable	Model 3
Global Burden of Disease	139685.9* (51797.6)
Geographic Limitation	-38100000 (33600000)
Cost per DALY	28048.7 (62570.6)
Targeted Disease	7960000* (353000)
Immunization	2700000 (3320000)
N	520
$*$ = p-value less than .05	
Fixed Effects coefficients omitted	

Table 3.7: Multilevel Linear Models for Bilateral and Multilateral Donors

Variable	Bilateral	Multilateral
Donor Burden of Disease	7111.42*(890.5)	
Recipient Burden of Disease	3.139 (5.58)	890.38*(32.2)
Global Burden of Disease	-7203.5 (6728.6)	4056.01* (843.3)
Geographic Limitation	-123491.4*(25804.6)	-101945 (65745)
Cost per DALY averted	2913.4* (248.3)	237.6 (125.8)
Targeted Disease	14960(9164.9)	30473* (68026.6)
Immunization	-90029.3* (23024)	236104.4* (530440.75)
Colonial Legacy	203079.6*(28680.3)	
Recipient GDP/capita	-0.348(0.715)	-4.314 (1.66)
Recipient Population	0.042 (0.042)	2.83* (.155)
N	161148	84500

$*$ = p-value less than .05
Fixed Effects coefficients omitted

Table 3.8: Support for Hypotheses

Hypothesis	Donor Type	Independent Variables	Support
Hypothesis 1	Bilateral	Donor Burden of Disease	Yes
Hypothesis 2	Bilateral	Geographic limits	Yes
Hypothesis 3	Bilateral	Cost per DALY averted	Yes
Hypothesis 4	Bilateral	Immunization	Yes
Hypothesis 5	Multilateral	Global Burden of Disease	Yes
Hypothesis 6	Multilateral	Geographic limits	No
Hypothesis 7	Multilateral	Cost per DALY averted	No
Hypothesis 8	Multilateral	Immunization	No
Hypothesis 9	Bilateral	Recipient Burden of Disease	No
Hypothesis 9	Multilateral	Recipient Burden of Disease	Yes

Chapter 4

Disease Control Activities and Donor Priorities

4.1 Introduction

In this chapter I extend the findings from the previous chapter to the funding of specific disease control activities. The results of the previous chapter suggests that some donors strategically invest disease specific health aid across diseases in order to maximize their benefits. The theory suggests that donors are not only strategic in their allocation of aid by disease, but also in their allocation by activity. Specifically, donors prioritize strategies differently based upon the threat posed by a specific disease. This chapter examines differences in funding by activity across diseases in order to further illuminate donors' priorities.

In the following section, I outline the expectations established in the theory regarding the allocation of aid across disease control activities and develop testable hypotheses. I then address the data and research methods, followed by statistical analyses of the data to test the hypotheses.

4.2 Disease Control Activities and Donor Priorities

Studying disease specific development aid for health offers many advantages, including specific markers for donor interests. Unlike other areas of foreign aid — in which donor interest is generally measured using a combination of trade variables and alliance correlations — donors' interests with regard to disease are easily measured using health variables such as burden of disease. The theory suggests that these variables will affect donors' allocation of

aid across diseases, and the findings in the previous chapter supports this. In addition to these hypotheses, the theory also suggests that donors are strategic in the activities that they choose to fund. Specifically, it suggests that donors prioritize efforts to prevent the spread of disease to their populations over treatment and care of those already infected in developing countries.

As the theory chapter established, the control of communicable diseases is a semi-public good. Although an individual cannot be prevented from enjoying the benefits of disease control, enjoyment of those benefits is not evenly distributed. The enjoyment of improvements to disease control are distributed based upon the geographic spread of the disease. Diseases such as schistosomiasis and trypanosomiasis are geographically limited by the intermediary vectors necessary for disease transmission. As a result, the negative consequences of these diseases are centralized in areas where prevalence is high, while geographic regions outside the range of the intermediary vector remain unhindered. The benefits of improved control of these diseases is only enjoyed by individuals within the diseases geographic range. In comparison, diseases such as pertussis, tuberculosis and influenza spread easily and rapidly from one individual to another through casual contact. As a result, these diseases vary in the degree of threat they pose to populations across the globe. The negative consequences of diseases such as pertussis and influenza are more likely to be shared by the global public. Likewise, the benefits of disease control are shared more widely as well.

The previous chapter used these differences in the negative consequences of infection and the benefits of improved disease control across diseases to examine donors' priorities. As expected, donors' priorities for addressing and controlling these diseases vary based upon how much of a threat each disease is to the donor's constituent population — specifically, bilateral donors allocate aid in ways to maximize their payoff. If donors provide aid based upon their interests, this would provide some explanation for the discontinuity between burden of disease and aid. However, allocation of disease specific aid is not just the distribution of aid across diseases. Donors also allocate disease specific aid across a variety of potential disease

control activities. Just as aid directed a at different diseases produce more or less public consequences, disease control activities also produce benefits that vary across a continuum of publicness.

4.2.1 Disease Control Activities

Efforts to control disease may take many forms — each producing its own range of benefits. For example, efforts to control HIV/AIDS range from improved screening of blood for transfusions, promotion of condom usage, improved access to anti-retroviral medications, education, prevention of mother-child transmission, and medical research, among many others. Each of these activities produces a benefit that has a degree of publicness. Of the activities listed here, medical research produces the most public benefits. Scientific research produces knowledge and information about the disease in question — in this case HIV/AIDS — including cause, mode of transmission, and best practices for prevention and treatment. Because of the high cost of medical research, individuals afford to engage in research without support from a government or donor entity. Research produces knowledge that is then shared and disseminated providing benefits to the public as a whole. In comparison, provision of anti-retroviral medications produces a less public benefit. Anti-retroviral Therapy (ART), provide the benefits of extending the life of an individual with HIV/AIDS — a benefit primarily enjoyed by the individual and thus primarily private. However, this benefit is not strictly private. The extension of the life of an individual infected with HIV/AIDS is also beneficial to the individual's family, as well as providing the more abstract economic benefits to society associated with maintaining a healthy worker. Additionally, provision of ART includes additional public benefits — specifically, a reduction of transmission. Provision of ART alters the incentives of an infected individual. Without ART, an infected individual is living with a shorter shadow of the future. As a result, behaviors that might otherwise be considered dangerous or reckless are of little or no consequence — including actions that might encourage the spread of HIV/AIDS. Where infected individuals have

access to ART, the use of condoms and other safe sex precautions increases (de Mello e Souza 2007, Pisani 2009). Additionally, individuals infected with HIV/AIDS who are also taking anti-retroviral medications have a lower viral load, meaning that the virus is present at lower levels in their body tissues and fluids than in an infected individual who is not receiving ART (de Mello e Souza 2007). This not only extends the life of the individual, but also decreases the likelihood of transmission should an uninfected person come into contact with that individual's bodily fluids. Thus, while provision of treatment may appear to produce strictly private benefits, in fact, it produces a mix of private and public benefits.

Similarly, the extraction of a guinea worm from a patient's leg produces clear private benefits to the patient. Guinea worm is a parasite contracted by drinking water contaminated with small copepods or water fleas that have been infested with guinea worm larva. Once these copepods enter the human digestive track, they hatch into worms that burrow into the body cavity. Upon reaching maturity the guinea worms mate and the female guinea worm migrates to one of the infected individual's extremities — usually a leg or a foot — where it produces a blister. This blister ruptures, revealing the end of the female guinea worm. When the sore comes into contact with water, the worm deposits guinea worm larvae into the water. A single female guinea worm is capable of releasing hundreds of thousands of larvae. These larvae are then eaten by copepods, beginning the cycle again. Treatment for guinea worm includes wrapping the exposed end of the guinea worm around a stick and slowly extracting the worm over the course of weeks or months. The removal of the parasite, although painful, frees the patient of future pain and potential disability as well as hastens the healing of the sore which, if not properly treated, may develop a secondary infection. However, proper treatment of a guinea worm infection also prevents further infections. By preventing exposure to water and extracting the parasite, the proper treatment of guinea worm also reduces the risk of future infection to other individuals that use the same water sources (The Carter Center 2011).

The variation of shared benefit across types of disease control activities provide an oppor-

tunity to further examine the role of donor interest in disease specific health aid allocations. By examining the distribution of aid across various disease control activities, it is possible to address donors' priorities in terms of activities. In addition, examining the distribution of aid across activities within a single disease may help to further illuminate donors interests.

Types of Activities

Efforts to control the spread of infections disease may include any of several types of activities. For the purposes of this analysis I identify eight broad categories:

Prevention: Prevention consists of a collection of activities directed at preventing infection and/or the spread of disease. This category encompasses a variety of activities which vary considerably across diseases. For example, the most obvious prevention activity is the use of vaccinations to prevent infections of measles, polio, tetanus and pertussis. Yet, prevention can also include a variety of other activities such as the distribution of condoms to prevent HIV/AIDS and other sexually transmitted diseases, the use of a filter straw to prevent ingestion of water fleas that cause guinea worm, or the use of pesticide treated bed nets to prevent malaria. These activities not only prevent a single individual from becoming infected, but also provide added benefits to society by decreasing the likelihood of infections in the public as a whole. Immunizing children against polio not only protects the individual child, but decreases the potential for a polio outbreak. Moreover, each individual with polio immunity increases the potential for the eradication of polio entirely — an outcome that would be highly beneficial to populations worldwide.

Treatment: Treatment consists of any curative or life-extending measure taken to combat an infection. Treatment varies considerably across diseases as well as in terms of effectiveness and cost. For example, treatment cholera and other diarrhoeal diseases is generally the administration of oral rehydration therapy — a solution of salts and sugar intended to maintain hydration and electrolyte balance. This treatment is relatively inexpensive, cost-

ing approximately 10 cents per dose and is 90% effective in prevent death (World Health Organization 2010*a*). In contrast, treatment for HIV/AIDs is the administration of anti-retroviral therapy — a combination of at least three anti-viral medications taken daily. ART is expensive, with the average wholesale treatment costing between $2000 and $11,000 per year (prices vary based upon the combination of drugs in the cocktail) (World Health Organization 2010*a*). Moreover, ART is not a curative measure. Although deaths as a result of advanced AIDS has decreased dramatically since the introduction of combination therapy, ART is life-extending, but not a curative measure. Individuals with HIV/AIDS are reliant upon ART for the remainder of their lives. In addition, ART also causes an extensive list of side effects including peripheral neuropathy, liver failure, and mitochondrial toxicity (World Health Organization 2010*a*). Treatments for other diseases include antimalarial medication for malaria, extraction of guinea worm, and antibiotics for acute respiratory infections.

Infrastructure:Infrastructure consists of support for formal structures that support public health including the building of clinic, hospitals, sanitation systems, etc. Building and supporting infrastructure is relatively expensive yet enduring. The construction of a Tuberculosis hospital or a sexually transmitted disease clinic may cost millions of dollars. Yet, once built, the structure itself remains long into the future. However, infrastructure highlights an ongoing concern within the health aid literature. Many recipient states that cannot afford to build hospitals, clinics and sanitation systems, are also incapable of funding the continued use of those assets without donor support. Thus, in many cases, investment in infrastructure is a long term commitment for donors.

Administrative Assistance: Administrative assistance consists of the provision of funds or resources in order to improve the administration of health. Administrative assistance may include a number of activities, including providing advisors for the development of policy, the training of personnel, as well as studies on the effectiveness of various policies and programs.

Research: Research consists of the provision of funds or resources in support of increasing medical and scientific knowledge about a particular disease. This may include data collec-

tion, clinical trials, research conferences, as well as education programs for the training of researchers.

Surveillance/Responsiveness: Surveillance and responsiveness consist of the monitoring, reporting and preparing to address disease outbreaks. The monitoring and reporting of disease outbreaks is undertaken by a diverse network of state and international level organizations. For example, within the United States, the Center for Disease Control monitors and reports on disease outbreaks both within the country as well as globally. The Global Observation Alert Response Network (GOARN), directed by the World Health Organization, collects reports on disease outbreak from medical professionals worldwide and provides recommendations on best-practices for containing and addressing outbreaks to affected countries (**?**). In addition, The Global Public Health Intelligence Network (GPHIN) created by Canada in cooperation with the WHO, collects data on outbreaks through the examination of web reports. After verifying the information, GPHIN provides detailed tracking of outbreaks and is the primary source for WHO reports (Public Health Agency of Canada, 2009). These efforts identify disease outbreaks, provide information to the public, and offer advise for addressing the spread of disease.

Education:Education consists of providing individuals or groups with information in an effort to promote behavioral and/or societal change. Education efforts are diverse and can range from providing information on best practices for preventing or treating a disease, to sexual education. It can include anything from education of families on the proper use of insecticide treated bed nets to prevent malaria, to promotion of safe sex practices.

General/Access: In addition to the activities noted above, many donors also provide aid intended to support and increase individuals' access to health systems. In many developing countries, the primary obstacle to the provision of health services is a general lack of health system support. In countries with low urbanization, many individuals have few opportunities for accessing the health system. In addition, in low income countries, where populations are most vulnerable to infectious diseases, the meager resources available for health are

insufficient for dealing with the overall societal burden of sickness. As a result, donors often provide aid intended to improve services and accessibility for a specific disease.

4.2.2 Globalness, Publicness and Donor Interests

As I argued in the second chapter, the nature of infectious diseases structures donors incentives to provide disease specific aid. Those incentives are a result variations in disease characteristics across diseases. Specifically, that donors have incentive to allocate funds toward diseases that are most likely to threaten their constituent populations. As a result, the geographic limitations, or lack thereof, of an individual disease would impact the amount of money donors contributed for that disease. Diseases that produced negatives on a global scale were expected to be the focus of donors allocations. However, as argued above, donors may also behave strategically in determining which of the activities described above to fund.

I contend that donors have incentive to invest in activities for which the positive results are most global and public in nature. Just as with diseases, different activities produce results at different levels. For example, surveillance and reporting activities on Sudden Acute Respiratory Syndrome (SARS) in 2003 disseminated information about and advice for handling outbreaks of disease. The results of these activities were modified travel plans, enactment of best practices to reduce spread, advance warning to allow for better preparation worldwide, and greater protection of populations everywhere. The benefits associated with surveillance, monitoring and reporting were shared globally — although there some distributional differences may have remained. In contrast, treatment for leprosy, a relatively rare bacterial infection, primarily benefits the single patient being treated.I argue that, just as donors have incentive to allocate resources across disease in a manner to maximize their enjoyment of the benefits, donors also have incentive to allocate resources across activities in order to maximize their enjoyment of the benefits.

Variation Across Activities

To maximize their enjoyment of the benefits, a donor has incentives to select a disease activity that produced the results with the highest degree of public-ness. Specifically, donors would select activities for which the benefits are difficult to exclude others from enjoying and that are not diminished by others' partaking of those benefits. While no activity produces purely public goods, there is variation in degree of public-ness among the results produced. In the previous example comparing surveillance of SARS and treatment of leprosy, the surveillance of SARS produced results that were more public in nature. No individual or country could be excluded from enjoying the benefits of the information that was publicly available. Additionally, no one state's use of the information precluded another state from using and benefiting from the same information. In comparison, the treatment of leprosy produced benefits that were only enjoyed by the patient that received treatment. Others are easily excluded from enjoying those benefits and providing treatment to one patient diminished another's opportunity to enjoy those benefits. If, as I contend, donors allocate aid toward activities with the most public benefits, one would expect donors to provide more funding for surveillance and monitoring than treatment.

Table 4.1 displays the eight disease control categories described above and the relative public-ness of their benefits. As determined by the previous example, surveillance and monitoring produce highly public benefits whereas treatment produces relatively private benefits. In contrast to treatment, prevention produces benefits that are slightly more public in nature. Prevention of a single infection decreases the likelihood of additional infections. For example, the use of insecticide treated bed nets prevents malaria infections. Malaria is spread when a mosquito that has bitten and consumed the blood of an infected person, bites an uninfected person. As a result, preventing a malaria infection through the use of insecticide treated bed nets prevents further spread of the disease. While the one individual's enjoyment of decreased rates of transmission does not prevent others from enjoying similarly

low rates of transmission, these benefits are local. Thus, individuals outside of the range of a single mosquito could be excluded. The same is true for vaccine-preventable diseases. Although all members of the system enjoy the benefits of low transmission rates, the benefits are localized, enjoyed only by those who would have come into contact with the disease had that individual not be vaccinated. Thus, while benefits of prevention are more public than the benefits of treatment, they are also less public than the benefits of surveillance.

Infrastructure, like treatment, has a low degree of public-ness. Distance from hospitals and clinics as well as the cost of treatment effectively exclude large numbers of people from enjoying the benefits these facilities provide. Moreover, the limited resources available for health in developing states necessarily means that the benefits provided by such facilities are rivalrous — providing care for one individual necessarily means there is another than will not get care. For example, in a hospital, every bed used by a patient cannot be used by others. Administrative assistance is similarly low with regard to the public-ness of its benefits . Individuals can be excluded easily from enjoying the benefits of improved policies, and the benefits of some policies may be rivalrous. In contrast, the benefits associated with research are more public. The benefits of data collection, clinical trials and other research activities are non-rival. One individual's use of data or one individual's identification of a potentially useful drug does not hinder another individual from enjoying the same benefits. However, the benefits of research activities can be excludable. For example, a clinical trial that confirms the effectiveness of a treatment produces both knowledge and potential cure. While the knowledge is freely disseminated, individuals can be excluded from the cure through cost. Education also produces moderately public benefits. Education is intended to produce changes in behavior. For example, efforts to debunk the myth that having sex with a virgin will cure one of HIV/AIDS are intended dissuade individuals from engaging in behaviors that have a high risk spreading disease. The benefit of such a behavioral change is a decreased risk of infection for some of those near the individual. This benefit is non-rival, however and individual can be excluded from enjoying the benefits through distance or other factors

(e.g. non-virgins). Finally, activities intended to improve support for and access to health systems produces benefits with relatively low public-ness. While providing more resources for health systems means that more individuals may have access to those systems, the resources available remain limited and thus rivalrous. Additionally, if improvements to health systems are tied to geographic locations, individuals can be exclude geographically.

Donors seeking to maximize their enjoyment of the benefits produced through their aid will allocate funds to the activities that produce benefits that are the most public. Specifically, one would expect donors to provide the highest levels of aid for surveillance and responsiveness activities as well as moderate levels of aid for research and prevention. As a result, I proposed the following hypotheses:

Hypothesis 10: Donors will provide the greatest portion of aid for surveillance and responsiveness activities in developing countries.

Hypothesis 11: Donors will allocate a greater portion of aid for research than other activities that produce less public benefits.

Types of Donors

Just as in the previous chapter, the geographical range of a donor's constituency would be expected to affect the donor's aid allocation behavior. Specifically, bilateral donors, with localized constituencies, would have greater incentive to allocate aid to activities with the most public benefits. As noted in the previous chapter, it is less costly to observe and control the spread of disease elsewhere, than to treat disease at home. Thus, bilateral donors have incentive to invest in surveillance and monitoring as well as supporting the outbreak responsiveness of developing countries. In contrast, multilateral donors have less centralized constituencies with more diverse interests. While the benefit of surveillance is still high, multilateral donors are likely to spread aid more evenly across a greater variety of activities.

Thus, I propose the following hypothesis:

Hypothesis 12: Bilateral donors will provide more aid for activities with greater public benefit (e.g. surveillance, research, and prevention).

Variation Across Disease

The degree of public-ness associated with disease control activities is only half of the story however. Because poor health is centralized in developing countries and disease specific aid is sent to developing countries, there will inevitably be some distributional effects upon the benefits of that aid. This remains the case when discussing disease activities. In the previous example, surveillance of SARS produces arguably public results. Yet, the benefits of surveillance are not always shared with the entire international community. Surveillance of geographically limited diseases such as trypanosomiasis, dengue fever, schistosomiasis, and malaria produce equally public benefits. Those benefits however, are distributed only within the geographic limits of those diseases. Thus, in order develop concrete expectations about donors interests and produce testable hypotheses, it is necessary to consider a combination of the public-ness of the benefits produced by a specific disease control activity as well as disease characteristics that may determine the distribution of those benefits.

As the previous chapter addressed, the geographic spread of a disease may alter donors' interests with regard to that disease. Specifically, bilateral donors, with localized populations, provide less aid for diseases that are geographically limited and pose little or no threat to their constituents. It is also likely that the geographic spread of a disease will alter donors' decisions regarding which disease control activities to fund. Donors have incentive to try to gain the greatest benefit from diseases with wider geographic spread that are a greater threat to their constituents. For example, tuberculosis is transmitted from one individual to another with relative ease through droplet contact. It is also unlimited geographically. In

addition, growing anti-microbial resistance has led to increased difficulty in treating some forms of tuberculosis. Donors not only have an interest in providing more aid for tuberculosis than dengue fever, but donors also have an interest in providing aid for activities that are most likely to safeguard their constituents. Because treatment, infrastructure, administrative assistance and improved access produce primarily local benefits, donors should provide higher levels of funding for activities within the categories of prevention, research and surveillance. Thus, I propose the following hypotheses:

Hypothesis 13: Donors will be more likely to provide aid for surveillance for diseases with no geographic limitations.

Hypothesis 14: Donors will be more likely to provide aid for research for diseases with no geographic limitations.

Hypothesis 15: Donors will be more likely to provide aid for prevention for diseases with no geographic limitations.

The previous chapter provided a theory of donor aid allocations based upon variation in donor interest as a result of disease characteristics such as geographic spread. However, even among bilateral donors, some geographically limited diseases received considerable quantities of aid. Aid allocations for diseases such as trypanosomiasis and schistosomiasis by bilateral donors outside the geographic range of the disease indicate some limited recognition of humanitarian need. The underlying presumption of this project is that examination of aid allocations across diseases will reveal donors' interests and priorities. If aid allocations for geographically limited diseases do indicate donor responsiveness to need, one would also expect that activity level allocations would also violate the assumptions of donor interests. Bilateral donors whose populations are safely outside the geographic limits of tropical

diseases have no incentive to allocate funds toward more public activities as the resulting benefits are as geographically limited as the disease. Thus, one would expect that where bilateral donors provide aid for geographically limited diseases, only a small proportion would be dedicated toward activities with the most public benefits such as surveillance. Indeed, one would expect that in the cases of limited diseases such as malaria and dengue fever, bilateral donors would allocate more aid for activities that provided more private benefits, such as access and treatment. Thus, I propose the following hypotheses:

Hypothesis 16: Donors will more likely to allocate aid toward treatment for geographically limited diseases than diseases with global spread.

Hypothesis 17: Donors will be more likely to allocate aid toward education for geographically limited diseases than diseases with global spread.

Hypothesis 18: Donors will be more likely to allocate aid toward improved access for geographically limited diseases than diseases with global spread.

4.3 Data and Research Design

Within the theory and in practice, the allocation of aid is made at several levels. Donors select to which recipient and for which disease to provide aid. In addition, donors also decide for what activities to provide funding. The primary argument of this project is that donors may make those decisions strategically. If this is the case, then donors will provide greater funding for diseases that are most likely to affect their populations, as supported by the previous chapter. In addition, donors will also provide some/more funding for some disease control activities than others. The levels of decision in this theory are difficult to account for

in statistical models. To test the hypotheses outlined in the previous section, I use the same population. In addition to the coding procedures described in the previous chapter, I also coded the disease control activity supported by each grant. I then organized each activity into eight categories — as described. I coded the disease activity as a nominal variable, which was not used in the previous models.

However, just as in the previous chapter, these grants represent only the cases in which aid was given. Each donor had the opportunity to provide aid to 150 recipient. For each of the recipients, donors had the opportunity to select among 8 categories of disease control activities for each of 25 diseases. Yet, most only provided aid in a fraction of those cases. In order to account for cases where no aid was allocated, I generated a dataset that included all possible donor/recipient/disease/activity combinations and input the aggregate funding in cases where aid was given. For all other cases, the dependent variable of aid allocation by disease control activity is coded as 0.

Because the hypotheses address both the likelihood as well as the level of funding by strategy, the analyses for this chapter will rely upon two different dependent variables. The first, similar to the dependent variable for the previous chapter, is a continuous measure of aid measured in 2000 US dollars. The second is a dichotomous variable of aid in which 1 indicates that aid was received and 0 indicates that no aid was received.

I use many of the same dependent variables described in the previous chapter — specifically global burden of disease, geographic limitation, and donor burden of disease. In addition to these independent variables, I also created a series of indicator variables for disease control activity. I converted the nominal variable of disease control activity described above into 8 indicator variables — one for each category of activity. From the resulting database I am able to aggregate across donor, recipient, disease, and/or strategy.

4.3.1 Research Design

The theory establishes expectations regarding the relationship between types of activities and likelihood of receiving aid as well as the resulting level of funding. Additionally, some of the hypotheses address the relationship between various disease characteristics and the funding of disease control activities. As a result, I use a combination of data description, Ordinary Least Square (OLS), and logistical regression as a preliminary effort to identify patterns in aid by activity.

Several of the hypotheses address the distribution of aid across disease control activities. The theory suggests that strategic donors would allocate more money for some activities than others. In order to provide a broad illustration of how aid is distributed across strategies, I begin by examining the percentage of aid provided for each category of activity. I present descriptive statistics of the distribution of aid across activity for all donors, only bilateral donors, and only multilateral donors. The theory presented above also suggests that one should be able to observe similarities in activity portfolios across similar diseases. Specifically, I expect that the allocation of aid across disease control activities should be roughly equivalent across diseases with similar geographic range. Thus, I disaggregate aid by disease and present the distribution of aid across categories by disease — again providing distributions across all, only bilateral and only multilateral donors.

Following this initial description of aid allocation across disease control activity, I engage in a more thorough examination using a series of logistic and OLS regressions. The first group of models analyzes aggregate amounts of category specific aid across activity. Using the continuous aid variable and the eight indicator variables for disease control activities, I examine potential patters in the volume of aid flows by activity for all donors, only bilateral donors and only multilateral donors. The second group of models addresses the likelihood of aid for a given disease activity based upon disease and donor level variables. I use 8 logistic regressions — one for each strategy — in which the dependent variable is the dichotomous

aid variable described above. Although a very simple and incomplete test of the hypotheses, combined the combination of data description as well as logistic and OLS regression provide a useful first step in identifying donors' interests and priorities with regard to development aid for health. All results are produced by STATA 11.

4.4 Results

Table 4.2 provides an initial description of aid distribution across disease control activity. The first column after the list of disease control activity categories, reports the allocation of aid from all donors by disease control activity. The second column reports the allocation of aid from bilateral donors only, and the third column reports aid by multilateral donors only. These percentages provide some initial support for distinctions between bilateral and multilateral donors, as well as providing a few surprises.

As Table 4.2 reports, donors of all stripes provide the greatest quantity of their funding for prevention activities. Of all aid, 53.1 percent is directed at prevention activities — making it the activity with the highest percentage of funding. This trend holds across both bilateral and multilateral donors. Multilateral donors allocate roughly 44% of their aid toward prevention while bilateral donors distribute roughly 56% of their aid to prevention activities. Prevention activities produce moderately public benefits, as displayed in Table 4.1. Thus, these percentages provide tentative support for Hypotheses 12 and 15. However, the percentages allocated for other public activities, namely research and surveillance, produce no such support for Hypotheses 10, 11, 13 and 14. Approximately 2.5% of all aid is distributed for research activities and 6.1% for surveillance activities. Percentages across bilateral and multilateral donors are quite similar — 3% and 1.1% respectively for research and 5.3% and 8.5% respectively for surveillance activities.

The percentages reported in Table 4.2 also display similarities across donors with regard to other activities. Both types of donors allocate small percentages of aid toward infrastruc-

ture and administrative assistance. Bilateral and multilateral donors also allocate relatively meager percentages of their aid for educational activities — 6.9% and 2.2% respectively.

Yet, there are also some interesting points of contrast. Bilateral donors provide relatively high percentages of aid for activities to improve access to health. At 14.8%, access activities are ranked second in terms of percentage of aid for bilateral donors. In contrast, multilateral donors provide on 2.9% of aid for access activities.

Likewise, although treatment is among the top three activities in terms of percentage of funding for both types of donors, the percentage of aid allocated to treatment differs substantially between the two groups. Bilateral donors allocate 9.2% of aid toward treatment activities — the third highest funded activity by bilateral donors. In contrast, multilateral donors allocate 35.3% of aid toward treatment activities — the second highest funded activity by multilateral donors. In terms of rank, the high priority position of treatment activities among bilateral donors is unexpected. However, the substantial difference between the percentage of aid allocated toward treatment between bilateral and multilateral donors provides some limited support for the theory. Treatment activities provide primarily private benefits — improved health to the individual receiving treatment. Because bilateral donors serve a localized population, treatment activities produce benefits that are less likely to be shared with donors' constituent populations. In contrast, multilateral donors serve a wider regional or global audience. As a result, treatment activities are more likely to provide benefits to some set of a multilateral donors broader audience. Thus, one would expect multilateral donors to spend a greater percentage of aid on treatment than bilateral donors — as supported by the results here.

Although the data presented in Table 4.2 provide an initial examination of how aid is distributed across disease control activities, it does not offer any comparison across different diseases. Tables 4.3, 4.4, and 4.5 offer this comparison. Table 4.3 presents the distribution of aid from all donors across activity by disease. The diseases are sorted by disease spread, with geographically unlimited diseases appearing above the line and geographically limited disease

below. Again, the distribution of aid by activity does not conform to the expectations of the theory. For example, for *no* disease does surveillance/responsiveness received the highest portion of aid. Indeed, a non-HIV/AIDS STDs is a relatively moderate portion of aid used for surveillance. In contrast, both prevention and treatment consistently receive high portions of funding across both geographically limited and unlimited diseases. Although the high percentage of aid spent on treatment is unsurprising for geographically limited diseases — donors can reasonably invest in treatment when the disease does not threaten to spread to donor states — high percentages of prevention and treatment efforts for other diseases is surprising. It appears that, with the exception of HIV/AIDS — where 37.5% of aid is directed toward research — the activities that produce the most public benefits receive lower portions of funding than activities that produce moderately public benefits such as prevention and treatment.

A similar pattern holds when aid is examined by donor type. Table 4.4 presents the distribution of aid from bilateral donors across activity by disease, while Table 4.5 presents the distribution of aid from multilateral donors across activity, by disease. Again, the diseases are sorted by disease spread, with geographically unlimited diseases appearing above the line and geographically limited disease below. Table 4.4 indicates donors' interest in surveillance and responsiveness depends, in some measure, upon the disease. For example, a relatively high percentage of aid for HIV/AIDS, tuberculosis, pandemic influenza, and acute respiratory infection is directed at surveillance and responsiveness activities — 56, 27, 65, and 21 percent respectively. Similarly, a relatively high percentage of aid for meningitis is directed as surveillance. Yet, for many other diseases, bilateral donors allocate no aid for surveillance including viral hepatitis and non-HIV/AIDS sexually transmitted diseases.

As expected, small portions of money are spent on infrastructure and administrative assistance by bilateral donors. However, the data also provide some unexpected results. The data in Table 4.4 indicate that bilateral donors allocate aid for two main activities — prevention and treatment. Across many diseases, bilateral donors put a significant por-

tion disease specific aid toward prevention and treatment activities. Unsurprisingly, among vaccine preventable diseases, prevention generally receives the largest portion of aid — generally more than 80%. Likewise, the theory accurately predicted a greater portions of aid being spent for prevention and treatment in geographically limited diseases, however, the pattern also holds for some geographically unlimited diseases. For example, nearly 90% of aid for cholera is directed toward prevention, while 100% of bilateral aid for viral hepatitis is directed toward prevention. These distribution conflict with the expectations provided by the theory. However, they may be indicators of additional necessary considerations. For example, cholera remains virtually non-existent in developed states and poses little threat populations within bilateral donor states. In addition, the cost of treatment for cholera is quite low. In contrast, the primary means of preventing cholera — the establishment and maintenance of water treatment plants and sewage systems — is quite expensive. These prevention methods also produce long term benefits for all individuals that use it. Bilateral donors may be choosing to invest in long-term benefits that produce benefits that are more public.

Table 4.5 also displays a mix of expected and surprising distribution. Similar to the distributions reported in the previous table, aid is rarely directed toward surveillance and responsiveness. Multilateral donors only provided such aid for five diseases — HIV/AIDS, tuberculosis, pandemic influenza, diarrhoeal diseases and malaria. Allocations for research is equally sparse, calling some portions of the theory further into question.

As predicted, multilateral donors provide only limited aid for infrastructure and administrative assistance. Indeed, multilateral donors provide on aid for infrastructure within the data used here. Also as predicted, relatively high percentages of aid from multilateral donors for geographically limited diseases is directed at prevention and treatment activities. Unexpectedly however, the same pattern holds for many geographically unlimited diseases. Indeed, a high percentage of multilateral aid for HIV/AIDS and tuberculosis is directed at treatment. Similarly, 100% of multilateral aid for acute respiratory infection and diarrhoeal

diseases is directed at treatment.

The distribution of aid across diseases by disease control activity as presented in Tables 4.3, 4.4, and 4.5 fail to support — and, indeed, call into question — Hypotheses 10 and 11. The allocation of aid for surveillance is remarkably small for many diseases, however, with the exception of malaria and leishmaniasis, only geographically unlimited diseases received such aid. Although some of the patterns found here are unexpected, they provide a useful first step in the analysis. The second step is a set of three OLS regressions presented below.

Table 4.6 presents the results of a simple OLS regression in which the dependent variable — amount of aid allocated for each disease by strategy in 2000 US dollars — is regressed with the eight indicator variables for categories of disease control activity. I excluded the general/access category to act as a baseline as it is the least defined of the categories. The first model includes aid from all donors. Within this model, prevention related activities receive significantly more aid —more than $100,000 more than the baseline strategy of access. The positive and significant relationship for prevention activities remains for both the bilateral and the multilateral donor models. In addition, in the bilateral donor model, treatment activities are also positive and significant. The coefficient indicates that treatment activities receive roughly $7,000 more than the baseline mode of activities for improved access. These findings provide limited support for some of the theory. I expected aid to be higher for activities that produced the most public benefits. Clearly, the evidence here fails to support the hypotheses with regard to surveillance and research. However, the results presented here do offer partial support for the expectation that prevention would receive higher levels of aid than activities that produce less public benefits. Unfortunately, the positive and significant relationship between aid and treatment activities draws the theory further into question.

The complexity of activity level allocations, with potential variations across disease on multiple dimensions, makes parsing out donors' interests difficult. It is clear from the previous analyses that the distribution of aid across disease control activities is not fully explained

by the distribution of benefits associated with each activity. However, it is also important to consider the role of disease characteristics in the selection of activities to fund. Variation in disease characteristics, such as its burden of disease and geographic limitations may make it more or less likely to received aid for a specific type of disease control activity. In order to examine the role of disease characteristics, I conduct eight logistic regressions — one for each activity — to identify to relationship between disease characteristics and the likelihood to received aid for a specific activity. Tables 4.7 through 4.14 display the results of those logistic regressions. The first column presents the model using aid from all donors, while the second and third column present the results using only aid from bilateral and multilateral donors respectively. The standard errors are in parentheses.

Table 4.7 presents the results of a logistic regression examining the role of disease characteristics on receiving aid for prevention activities. As the first column indicates, global burden of disease is a significant predictor of receiving aid for prevention activities — the higher the global burden of a disease, the more likely donors will provide aid for prevention. However, scanning across the next two columns, global burden of disease is only a significant predictor of aid for bilateral donors. The first column also indicates that geographic limitation is a significant predictor aid for prevention. The negative coefficient suggests that geographically limited diseases are less likely to receive aid for prevention — providing support for Hypothesis 14. However, in the next two columns geographic limitation is only a significant predictor of less aid for multilateral donors. A disease being targeted by an international program is also a positive and significant indicator of aid in both the model using all donor aid, as well as the bilateral aid model. Because the purpose of "targeting" a disease is to increase aid in order to address suffering at the individual level, it is unsurprising that donors — who appear to funnel the highest portions of money by disease toward prevention and treatment — would be more likely to provide aid for prevention activities to targeted diseases. It is, however, surprising that a disease being targeted is not a significant predictor of whether a multilateral donor provides aid for prevention activities.

Finally, the bilateral donor model also includes a variable for donor burden of disease. The variable is intended to test assertion that bilateral donors' interest in providing aid for specific activities depends upon the disease in question. Specifically, I suggested in the theory section that bilateral donors would be more likely to provide aid for surveillance, research, and prevention among diseases with higher burden within their own borders, while being more likely to provide aid for treatment among diseases that had low domestic burden. The results presented in the second column of Table 4.7 suggests that this is incorrect. The coefficient for donor burden of disease is negative and significant, indicating that diseases with high donor burden of disease are less likely to receive aid for prevention activities.

Table 4.8 presents the results of a logistic regression examining the relationship between disease characteristics and aid for treatment. Unlike in the previous models, global burden of disease is a significant predictor of receiving aid for treatment activities across all donors. As a result, higher the global burden of a disease increases the likelihood of all donors providing aid to support treatment of that disease. In contrast, geographic limitation is insignificant for all models, as is whether a disease is targeted by and international program. In contrast to this, donor burden of disease, included in the bilateral donor model is positive and significant, suggesting that bilateral donors are more likely to provide aid for treatment in diseases that also affect their domestic populations. Again, this result contradicts the theory. It may, however, be an indication of potential extensions in a different direction. The theory for this project rests upon differences in donor interests as a result of the size and location of their constituents. This result may also be a result of constituent interests. Individual incentives for what kind of activities to engage in may change dramatically when the individual becomes infected. For example, during flu season, a person who has not yet been infected with influenza may be extra vigilante in hand washing and may avoid infected individuals in an effort to prevent infection. Once the individual is infected, however, they're primary interest will likely shift to a focus on treatment. It is, perhaps, the same with bilateral donors. States have an interest in preventing infections while the disease is still

abroad. However, once domestic level infections occur and donors develop strategies for dealing with the disease, its incentives for aid may also change. Although this is purely speculation, it may provide an explanation for this unexpected results and also offers area for potential future research.

Table 4.9 presents the results of a logistic regression examining the role of disease characteristics on receiving aid for infrastructure. Only global burden of disease is a significant indicator of receiving aid for infrastructure. Moreover, within the data, multilateral donors provide no aid for infrastructure. As a result the model for multilateral donors is omitted.

Table 4.10 displays the results for models of administrative assistance activities. Just as with the model of treatment activities, global burden of disease is positive and significant for all three models, indicating that diseases with higher global burdens will be more likely to received aid for administrative assistance activities. Likewise, in the model using all donors, targeted diseases are more likely to receive aid for administrative assistance. In addition the bilateral model indicates that donor burden of disease is a positive and significant predictor of the allocation of administrative assistance aid by disease. Bilateral donors are more likely to support administrative assistance activities for diseases that affect their own populations. Again, these results are unexpected by the theory. Indeed, the relatively localized benefits associated with administrative and policy changes and the training of personnel would lead one to expect a relative disinterest in administrative assistance. However, this may be related to the alternative presented with regard to treatment. Donors with experience in dealing with a particular disease may be more willing to provide administrative assistance regarding that disease to other countries.

Table 4.11 displays the results of the research activities models. As with several of the other models, global burden of disease is a positive and significant predictor of aid to support research activities for a particular disease in the full model and among bilateral donors. However, it is not a significant predictor of multilateral donor allocations for research. Within the multilateral donor model, a disease being targeted by and international program is a

perfect predictor of whether a disease receives aid for research activities from a multilateral donor. The only other variable that is a significant predictor of aid for research activities is donor burden of disease in the bilateral model. However, contrary to the Hypothesis 13, the coefficient is negative — suggesting that bilateral donors are less likely to support research activities for diseases with higher burden within their own population. There are several potential explanations for this. First, it is probable that bilateral donors will be more likely to fund their own research for diseases that affect their local constituencies. Thus, donors are less likely to provide research funds for diseases with high donor burden of disease. Extending this, although donors may prioritize their own research for diseases that affect their populations, they may also be interested in eliminating the burden of research for diseases of no interest to them. By providing aid for research on diseases that do not or rarely affect their own populations, they successfully export research on "unimportant" diseases to countries that should have a great interest.

Table 4.12 presents the results of a logistic regression examining the role of disease characteristics on receiving aid for surveillance activities. The first column indicates, global burden of disease is a significant predictor of receiving support for surveillance activities. However, across the next two columns, global burden of disease is only a significant predictor of aid for bilateral donors. Surprisingly, geographic limitation is not a significant predictor of aid for surveillance — thus failing to support Hypothesis 13. The only other variable that is a significant predictor of aid for surveillance is donor burden of disease in the bilateral donor model. However, contrary to the expectations established by the theory, the coefficient is negative, indicating that donors are less likely to support surveillance activities for diseases that affect their own populations. This result is surprising and unexpected.

Table 4.13 displays the results of the logistic model for allocation of aid for education activities. Again, the global burden of disease is a positive and significant predictor of funds supporting educational activities for a particular disease in both the full model and the bilateral donor model. However, it is not a significant predictor of the multilateral donor model.

Geographic limitation is also a significant predictor within the bilateral donor model, however it is negative — indicating that bilateral donors are more likely to support education activities for diseases with wider geographic spread. However, this is contrary to the expectations established by the theory. Because the benefits associated with education are only moderately public and individuals are easily excluded, it was expected that bilateral donors would be more likely to support education activities for diseases that were geographically limited. Thus, this finding calls Hypothesis 17 into question.

Finally, Table 4.14 displays the results of logistic regression models of aid for access activities. Like most of the other models, global burden of disease is a positive and significant predictor of aid for access activities in the full model. It is also a significant positive predictor of bilateral aid for efforts to improve access as reported in the second column. It is not, however, a significant predictor of multilateral donor aid. The only other significant predictor of support for access activities in these three model is donor burden of disease in the bilateral model. The negative coefficient indicates that bilateral donors are less likely to support access activities for diseases that affect their populations, but more likely for diseases that do not affect their populations. Hypothesis 18 suggested that, due to the relatively localized benefits associated with improved access to medical help for specific diseases, donors would be more likely to provide support for access only among diseases that did not affect their own populations. These result provides initial but limited evidence in support of this Hypothesis. In the case of bilateral donors, support for access is more likely among diseases that have less of an impact on donors.

4.5 Analysis and Conclusion

The results presented in the previous section provide insight into the allocation of aid by disease control activity. However, the findings stand in stark contrast to the expectations established in the theory. Although the previous chapter provided support for donors strategic

selection of diseases to combat, the current chapter does not produce similar results at the activity level. The findings in this chapter suggest that, although donors choose to allocate aid to diseases in a manner that maximizes their enjoyment of the resulting improvements to health, donors are not equally strategic when it comes to selecting disease control activities. Indeed, it seems that although donors — bilateral donors in particular —may choose diseases based upon their own interests, the same donors may allocate aid by activity according to more humanitarian concerns.

The first two hypotheses for this chapter addressed the portion of aid directed at particular activities. Specifically, these hypothesis focused upon surveillance/responsiveness activities as well as research activities. Because these two categories produce benefits that come nearest to being 'public', donors were expected to provide the greatest portion of aid to these activities. Yet, the distribution of aid for various disease control activities, as presented in the first four tables, suggests serious discontinuities between those expectations and actual donor behaviors. Indeed, donors prioritized prevention and treatment activities — activities with moderate or low public benefits. In addition, activities such as surveillance and research that produce more public benefits receive relatively small portions of aid. As displayed in Table 4.6, prevention activities receive significantly more aid than other activities in terms of total aid from all donors and multilateral donors. Moreover, although not significant, the relationship between total aid and both surveillance and research is negative — indicating that the volume of aid for those activities may fall below even the baseline of aid for improving access to care. Thus, the descriptive tables and the OLS regression, clearly lead one to reject the first two hypotheses — Hypotheses 10 and 11. Additionally, a quick scan across the descriptive tables clear indicates that bilateral donors do provide greater portions of aid for activities with greater public benefits. Like the summary of all data, bilateral donors tend to give larger portions of aid to prevention and treatment activities by disease. Indeed, the OLS model indicates that prevention and treatment activities receive total amounts of aid that are significantly greater than the baseline category. These results

lead to a rejection of Hypothesis 12.

Next, I assessed the role of disease characteristics on donors' support for each disease control activity. The next three hypotheses generated for the theory predicted that donors were more likely to provide aid for surveillance, research, and prevention activities among diseases with no geographic limitation. In contrast, the last three hypotheses predicted that donors were more likely to provide aid for treatment, education and access to care among diseases that were geographically limited. The logistic regressions for each category of activity produced mixed results with regard to these hypotheses. The results suggest that while donors are more or less likely to select a variety of activities, it is most likely not a result of the public-ness of the benefits produced by that activity.

Although these results provide a usable first cut at donor selections of disease control activities, it is limited and in need of extension. First, although the descriptive tables provide some summary of activities across diseases, the systematic analyses fail to provide comparison across specific diseases. Given the theory, one would expect diseases with similar characteristics — including global burden of disease, geographic limitations, modes of transmission, etc — to have similar portfolios across activities. For example, HIV/AIDS and tuberculosis comprise similar portions of global burden, are both geographically unlimited, and are spread easily from one individual to another. Likewise, they can share a similar treatment problem — medicine resistance. Therefore, one would expect donors to distribute funding across the same kinds of activities for each of these diseases. The tests provided here fail to provide for such analyses.

In addition, these tests also fail to account for a potentially useful explanatory variable — the cost of the various activities. For example, surveillance and reporting is a relatively inexpensive activity in this technological age. As a result, donors may choose not to allocate as much aid for such activities. In comparison, prevention and treatment for some diseases may be quite costly. It is also possible that donors' interests in surveillance and monitoring is so compelling as to encourage them to produce the good themselves. For example, the

Center for Disease Control in the United States engages in extensive disease monitoring activities.

Finally, these results may also indicate a shortcoming of the theory. Although the results of the previous chapter clearly suggest that donors do behave strategically in their allocation of disease specific aid, the results to do not require the same behavior at subsequent levels of decisions regarding that aid. Indeed, the result presented here suggest that, when distributing money across activities, donors are, perhaps, more humanitarian.

Table 4.1: The publicness of disease control activities

Category	Activities	Public-ness
Prevention	Immunization, Preventive Measures, etc.	Moderate
Treatment	Anti-retroviral Therapy, Antibiotics, etc.	Low
Infrastructure	Clinics, Hospitals, etc.	Low
Administrative Assistance	Advisors, Personnel, etc.	Moderate
Research	Data Collection, Clinical Trial, etc.	Moderate
Surveillance	Monitoring, Reporting, etc.	High
Education	Dissemination of information, Behavior modification	Moderate
General/Access	Health system support, etc.	Moderate

Table 4.2: Percentage of Aid by Strategy

Strategy	% Total Aid	% Bilateral Aid	% Multilateral Aid
Prevention	53.1	56.2	44.2
Infrastructure	0.07	0.1	0
Administrative	4.6	4.3	5.4
Treatment	16.0	9.2	35.3
Research	2.5	3	1.1
Surveillance/Monitoring	6.1	5.3	8.5
Education	5.7	6.9	2.2
General	11.7	14.8	2.9

Table 4.3: Percentage of Aid by Strategy Across Disease

Disease	Geographic Limits	Prevention	Treatment	Infrastructure	Administrative Assistance	Research	Surveillance	Education	General/Access
Polio	No	99.99	0	0	0	0	0	0	0
HIV/AIDS	No	19.2	26.5	0	8.7	0.001	37.5	0.2	7.5
Tuberculosis	No	35.2	48.9	0.4	0.5	0.1	10.6	3	0
Measles	No	97.8	0.4	0	0	0	0	0	0
Pandemic Influenza	No	99.6	0	0	0.3	0	0	0	0
Cholera	No	2.6	95.2	0	0	0	1.9	0	0
Intestinal Parasites	No	100	0	0	0	0	0	0	0
Acute Respiratory Infection	No	0	87.4	0	0.1	3.6	4.9	0	3
Leprosy	No	0	63.4	0.6	0.7	2.3	0	25.6	7
Diarrhoeal Diseases	No	6.8	74.8	0	0	10.8	0.2	0	7.1
Non-HIV Sexually Transmitted Diseases	No	67.9	15.3	0	2.9	2	0	9.9	1.6
Tetanus	No	100	0	0	0	0	0	0	0
Viral Hepatitis	No	100	0	0	0	0	0	0	0
Meningitis	No	45.5	41.2	0	0	2.4	0.9	0	0
Pertussis	No	100	0	0	0	0	0	0	0
Childhood Diseases	No	91.6	8.2	0	0	0	0	0	0.2
Malaria	Yes	51.6	41.1	0	3.9	0.7	0.8	0.8	1.8
Dengue Fever	Yes	93.8	1.2	0	0	4.9	0	0	0
Guinea Worm	Yes	91.5	0	0	4.4	0	0	0	4
Trypanosomiasis	Yes	9.9	90	0	0	0	0	0	0
Leishmaniasis	Yes	0	99.3	0	0	0	0.5	0	0.16
Chagas	Yes	39.4	55.5	0	0	5.1	0	0	0
Schistosomiasis	Yes	50.6	49.4	0	0	0	0	0	0
Onchocerciasis	Yes	34.9	34.8	0	0	0	0	0	30.1
Tropical Cluster Diseases	Yes	18.8	60.2	0	0	24.8	0	0	0

Table 4.4: Percentage of Bilateral Aid by Strategy Across Disease

Disease	Geographic Limits	Prevention	Treatment	Infrastructure	Administrative Assistance	Research	Surveillance	Education	General/Access
Polio	No	99.99	0	0	0	0	0	0	0
HIV/AIDS	No	1.2	2.9	0.1	10.4	0.4	56.1	9.9	17.8
Tuberculosis	No	4.6	39.1	3.1	2.3	0.8	27	0	22.9
Measles	No	94.6	3.6	0	0	0	0	0	0
Pandemic Influenza	No	0	0	0	2.3	.2	64.5	33	0
Cholera	No	89.9	2.9	0	0.2	0	1.9	0	6.6
Intestinal Parasites	No	100	0	0	0	0	0	0	0
Acute Respiratory Infection	No	0	27.9	0	0.1	0.8	20.9	28.6	18.6
Leprosy	No	0	28.4	13.3	1.4	4.5	0	50.2	14
Diarrhoeal Diseases	No	17.6	34.8	0	0	28.3	0.6	0	18.6
Non-HIV Sexually Transmitted Diseases	No	89.9	1.6	0	0.3	4.5	0	9.9	3.6
Tetanus	No	100	0	0	0	0	0	0	0
Viral Hepatitis	No	100	0	0	0	0	0	0	0
Meningitis	No	0	80.9	0	0	0	19	0	0
Pertussis	No	100	0	0	0	0	0	0	0
Childhood Diseases	No	63.4	35.9	0	0	0	0	0	0.7
Malaria	Yes	47.3	26.8	0	3.8	6.4	0	0	15.5
Dengue Fever	Yes	61.3	7.6	0	0	31	0	0	0
Guinea Worm	Yes	91.5	0	0	4.4	0	0	0	4
Trypanosomiasis	Yes	9.9	90	0	0	0	0	0	0
Leishmaniasis	Yes	0	83.8	0	0	0	12.2	0	3.9
Chagas	Yes	8.9	71.3	0	0	19.7	0	0	0
Schistosomiasis	Yes	70.5	29.4	0	0	0	0	0	0
Onchocerciasis	Yes	9.6	34.4	0	0	0	0	0	55.9
Tropical Cluster Diseases	Yes	71.7	0	0	0	28.2	0	0	0

Table 4.5: Percentage of Multilateral Aid by Strategy Across Disease

Disease	Geographic Limits	Prevention	Treatment	Infrastructure	Administrative Assistance	Research	Surveillance	Education	General/Access
Polio	No	100	0	0	0	0	0	0	0
HIV/AIDS	No	27.8	37.8	0	7.9	0	23.3	0.2	2.6
Tuberculosis	No	39.8	50.4	0	0.2	0	8.1	0	0
Measles	No	100	0	0	0	0	0	0	0
Pandemic Influenza	No	82	0	0	0	0	18.1	0	0
Cholera	No	97.4	2.5	0	0	0	0	0	0
Intestinal Parasites	No	100	0	0	0	0	0	0	0
Acute Respiratory Infection	No	0	100	0	0	0	0	0	0
Leprosy	No	0	100	0	0	0	0	0	0
Diarrhoeal Diseases	No	0.2	99.8	0	0	10.8	0.2	0	0
Non-HIV Sexually Transmitted Diseases	No	67.7	27.1	0	5.2	2	0	9.9	1.6
Tetanus	No	100	0	0	0	0	0	0	0
Viral Hepatitis	No	100	0	0	0	0	0	0	0
Meningitis	No								
Pertussis	No	100	0	0	0	0	0	0	0
Childhood Diseases	No	100	0	0	0	0	0	0	0
Malaria	Yes	52.2	42.9	0	3.9	0	0.1	0	0
Dengue Fever	Yes	100	0	0	0	0	0	0	0
Guinea Worm	Yes	0	0	0	0	0	0	0	0
Trypanosomiasis	Yes	0	0	0	0	0	0	0	0
Leishmaniasis	Yes	0	100	0	0	0	0	0	0
Chagas	Yes	49.9	44.9	0	0	5.1	0	0	0
Schistosomiasis	Yes	50	50	0	0	0	0	0	0
Onchocerciasis	Yes	64.6	35.3	0	0	0	0	0	30.1
Tropical Cluster Diseases	Yes	10.4	62.3	0	0	27.2	0	0	0

Table 4.6: OLS Regression of Strategy Aid

Variable	All Donors	Bilateral Donors	Multilateral Donors
Prevention	143532.5.7* (10226.7)	78068* (7903.06)	269404* (25737)
Treatment	4414.3 (10099.7)	7180.9* (823.1))	26708.9 (23410.3)
Infrastructure	-7901 (1045.2))	-10463 (7804.9)	-2974.9 (25418.3)
Administrative Assistance	-1027.5 (1309.1)	-6552 (7512.3)	9694.6 (22461)
Research	-6311.2 (8571.2)	-4183.2 (6027.1)	-2237.8 (22582.1)
Surveillance	-7299.3 (8746.7)	-10205 (6759.3)	-1711.1 (22012.9)
Education	-8038.8 (10277)	-1672.6 (7804.9)	-2974.9 (25443)
N	200	200	200
$*$ = p-value less than .05			

Table 4.7: Logistic Regression of Aid for Prevention Activities

Variable	All donors	Bilateral	Multilateral
Global Burden of Disease	0.008* (0.002)	0.026* (0.004)	0.001 (0.006)
Geographic Limitation	-0.581* (0.212)	-0.409 (0.251)	-1.38* (0.56)
Targeted Disease	0.822* (0.212)	0.781* (0.253)	0.793 (0.471)
Donor Burden of Disease		-0.379* (0.121)	
N	1595	975	520
$*$ = p-value less than .05			

Table 4.8: Logistic Regression of Aid for Treatment Activities

Variable	All donors	Bilateral	Multilateral
Global Burden of Disease	0.022* (0.003)	0.031* (0.005)	0.034* (0.009)
Geographic Limitation	0.342 (0.268)	0.259 (0.321)	1.38 (0.77)
Targeted Disease	0.246 (0.3)	0.209 (0.354)	-0.293 (0.836)
Donor Burden of Disease		0.127* (0.046)	
N	1595	975	520
$*$ = p-value less than .05			

Table 4.9: Logistic Regression of Aid for Infrastructure Activities

Variable	All donors	Bilateral	Multilateral
Global Burden of Disease	0.021* (0.008)	0.038* (0.011)	
Geographic Limitation	-1.16 (1.11)	-1.04 (1.151)	
Targeted Disease	- 0.014 (1.106)	0.004 (1.136)	
Donor Burden of Disease		-0.258 (0.163)	
N	1595	975	
$*$ = p-value less than .05			

Table 4.10: Logistic Regression of Aid for Administrative Assistance Activities

Variable	All donors	Bilateral	Multilateral
Global Burden of Disease	0.021* (0.004)	0.032* (0.006)	0.023* (0.116)
Geographic Limitation	-0.223 (0.363)	-0.182 (0.407)	-0.628 (1.198)
Targeted Disease	0.797* (0.363)	0.729 (0.408)	0.516 (1.183)
Donor Burden of Disease		0.187* (0.074)	
N	1595	975	520
$*$ = p-value less than .05			

Table 4.11: Logistic Regression of Aid for Research Activities

Variable	All donors	Bilateral	Multilateral
Global Burden of Disease	0.25* (0.006)	0.042* (0.008)	0.031 (0.02)
Geographic Limitation	0.885 (0.482)	0.889 (0.55)	2.794
Targeted Disease	0.044 (0.526)	0.058 (0.563)	
Donor Burden of Disease		-0.261* (0.114)	
N	1595	975	440
$*$ = p-value less than .05			

Table 4.12: Logistic Regression of Aid for Surveillance/Responsiveness Activities

Variable	All donors	Bilateral	Multilateral
Global Burden of Disease	0.014* (0.004)	0.032* (0.006)	0.002 (0.01)
Geographic Limitation	-0.497 (0.371)	-0.462 (0.478)	-0.237 (0.638)
Targeted Disease	0.201 (0.405)	0.344 (0.492)	-0.025 (0.785)
Donor Burden of Disease		-0.226* (0.092)	
N	1595	975	520
$*$ = p-value less than .05			

Table 4.13: Logistic Regression of Aid for Education Activities

Variable	All donors	Bilateral	Multilateral
Global Burden of Disease	0.009* (0.005)	0.023* (0.007)	0.026 (0.02)
Geographic Limitation	-1.19 (0.559)	-1.31* (0.645)	
Targeted Disease	-0.351 (0.623)	-0.162 (0.641)	
Donor Burden of Disease		-0.285 (0.158)	
N	1595	975	300
$*$ = p-value less than .05			

Table 4.14: Logistic Regression of Aid for Access Activities

Variable	All donors	Bilateral	Multilateral
Global Burden of Disease	0.017* (0.004)	0.033* (0.056)	0.025 (0.02)
Geographic Limitation	-0.268 (0.343)	-0.307 (0.38)	1.058 (1.653)
Targeted Disease	0.344 (0.371)	0.443 (0.392)	
Donor Burden of Disease		-0.284* (0.101)	
N	1595	975	440
$*$ = p-value less than .05			

Chapter 5

Conclusion

Disease has historically played an important role in shaping societies and politics. Infectious disease accounts for the largest portion of human morbidity and mortality throughout history, affecting lives, economies, and civilizations. Human responses to infectious disease establish patterns of behavior that persist beyond a single infection, and often extend beyond a single community. For example, the removal of lepers from society, a practice described in Leviticus (13:44-46), persisted for thousands of years. Indeed, the United States' Public Health Service Act of 1944 granted the Surgeon General powers of apprehension and detention for those afflicted with leprosy, and was only formally abolished in 1985 (National Hansen's Disease Programs 2011). Similar strategies have been applied to diseases from plague to HIV/AIDS. Moreover, scholars attribute changes in political and religious institutions in medieval Europe to pandemic plague (McNeill 1976, Mack 1992, Hays 1998, Smith-Price 2002), and the design of colonial institutions in part to the threat of disease to immigrants from colonial powers (Acemoglu, Johnson & Robinson 2001). Governments have endeavored to protect their populations from disease, used disease as a weapon against enemies, and collaborated and cooperated with other governments to improve the health of people everywhere. Development aid for health represents one of the most extensive of these efforts to control the spread of disease. Yet, much of the international relations and foreign aid literatures fails to address the politics of health and health aid.

Development aid for health (DAH) provides financial and material support for health systems in developing states. In many low income developing countries, external resources makes up a considerable portion of countries health budget — as much as 45% as in Er-

itrea (World Health Organization 2009). Yet, despite increases in DAH over the last thirty years, there remains a serious gap between the need and available resources for health care in developing countries. Across developing countries, where need is the highest and development aid makes up a significant portion of a countries health resources, the allocation of development aid for health determines not only the quantity of resources available, but also which resources and for whom. As a result, the allocation DAH can have a powerful impact on the distribution of health across developing countries. Decisions regarding the allocation of DAH are largely divorced from individuals in developing states — those most in need. If those decision are made based upon criteria other than need, the misapporpriation of DAH may lead to increased disease, disability, and death.

This dissertation begins with the assertion that development aid for health is subject to many of the same political influences as other types of aid. The foreign aid literature contains a tremendous volume of studies examining the determinants and effectiveness of various types of foreign aid including economic development, military, and democratization. Although DAH has been included as a component of economic development aid, few studies have addressed the allocation of health aid specifically. Indeed, much of the literature views development aid for health as a technical and apolitical issue. If this view is correct, one would expect disease specific DAH to be carefully targeted to diseases that cause the greatest suffering or have the most cost effective solutions. Yet, the few studies that do examine health aid flows suggest that aid allocations do not match disease burden. I argue that these discontinuities are a result of strategic behavior on the part of donors.

Theories of foreign aid allocations suggest that donors allocate aid based upon a combination of recipient need and donors' interests. I extend these theories to development aid for health. I address infectious disease control as a impure-public good — the publicness of which is determined by the geographic spread of the particular disease. Improved control of diseases with global spread, such as HIV/AIDS and tuberculosis, produces benefits that can be enjoyed worldwide. In contrast, improved control of diseases such as schistosomiasis and

dengue fever produces benefits that are only enjoyed by individuals and countries within the geographic range of the disease or its intermediary host. If DAH is allocated based on donors' interests, there should be observable differences in the allocation of aid between geographically limited and unlimited diseases.

In addition, variations across other disease characteristics provide useful tools for examining other aspects of donors' interests and also global and recipient need. For example, burden of disease, which varies by disease and across countries, is used to determine the level of threat posed by a disease to populations in donor states as well as to determine recipient need. Using disease burden, geographic spread, cost, and the availability of vaccinations for disease control, I examine the allocation of DAH in order to identify the political influences that drive these allocations.

I first assess the relationship between levels of aid and donors' interests by disease. In doing so, I address whether development aid for health is allocated in a manner that is consistent with an apolitical nature as assumed in previous literature. In addition, I also examine what disease characteristics result in higher levels of funding and assess differences across types of donors. In doing so, I am able to address differences in donors' priorities across diseases.

Second, I address differences in disease control activities. Just as with disease, different disease control activities produce a variety of benefits that fall along a continuum of publicness. For example, surveillance and monitoring produce information that can be used by all countries. In contrast, treatment produces benefits that are enjoyed primarily by the individual receiving treatment. Assuming that donors are interested in producing the most public benefits, one would expect donors to invest in disease control activities that produce the most public benefits. Thus, for the second portion of this project, I assess the relationship between donors interests and DAH allocations by disease control activities. Specifically, I address whether donors are more likely to allocated aid for disease control activities that produce public benefits for diseases in which improvements to disease control is most publicly

shared. The results of these tests are summarized in the following section. I then discuss the theoretical and policy implications of these finding before discussing future research related to this project.

5.1 Summary of Findings

The two empirical chapters provide mixed results regarding the political nature of DAH allocations. The findings, summarized below, suggest that while donors' selection of disease matches the theory described above, allocation of aid by disease control activity does not follow the same clear pattern.

5.1.1 Selection of Diseases

The statistical analyses in chapter 3 address the relationship between disease characteristics and level of aid. The findings from chapter 3 are summarized in Table 5.1 The analysis begins with the reporting of findings from interviews with representatives from donor organizations and agencies. Although the results of these interviews suggest that the trend of treating DAH as apolitical is correct, a comparison of disease burdens and DAH levels across diseases indicates that aid flows do not match need or policy-makers' rhetoric. Instead, the results suggest that donors allocate development aid for health across diseases with particular attention to specific diseases. For example, HIV/AIDS has become a focal point for DAH allocations.

In addition, the results demonstrate that different types of donors allocate DAH according to different interests. Using disease characteristics, it is possible to identify donors' priorities with regard to disease specific development aid for health. Bilateral donors, which have localized populations with higher levels of accountability, allocate more aid for diseases with wider geographic spread and that account for a higher burden of disease within their own borders. In contrast, multilateral donors allocate more aid for diseases that account

for higher burden of disease within the recipient states. In addition, bilateral donors also prioritize diseases based upon the cost of treatment. Diseases that are easily controlled in developed countries through immunization programs receive less funding. However, diseases that have a higher average cost per DALY averted receive greater bilateral aid. This suggests that bilateral donors hold diseases that are effectively controlled at home as low priorities for foreign aid, yet diseases that are expensive to prevent and treat are of higher priority. In contrast, there is no relationship between multilateral donors and the cost or geographic spread of disease. These findings support the overlying argument of this project — development aid for health is subject to the same political influences as other forms of foreign aid. Just as with other types of aid, DAH is allocated based upon a mix of both recipient need and donors' interests.

5.1.2 Selection of Disease Control Activities

The statistical analyses in chapter 4 address the relationship between donors interests and the allocation of aid for disease control activities. The findings for chapter 4 are summarized in Table 5.2. The analysis begins with summary tables presenting the percentage of aid allocated by disease control strategy and also broken down by disease. These summary tables present a basic picture of how aid is distributed across activities. The results indicate that, across most diseases, donors prioritize prevention and treatment activities — even at the expense of activities that produce more public benefits, such as surveillance and research. These summary tables are followed with three OLS regressions examining the relationship between disease control activity and aid levels. The result indicate that greater levels of aid are provided for prevention activities — as suggested by the summary tables — and, in the case of bilateral donors, treatment activities. These findings stand in stark contrast to the expectations established by the theory. In particular, bilateral donors' prioritization of treatment — activities that produce primarily private benefits — indicates that the interests that drive aid allocation by disease may not be driving allocations by activity.

These models are followed with logistic regressions examining the likelihood of a aid being allocated for a particular strategy based upon disease characteristics. Although the theory predicts that diseases with great geographic spread and donor burden of disease will be more likely to receive aid for surveillance and research activities, this is not the case. Indeed, diseases with lower donor burden of disease are more likely to receive aid for both of these activities from bilateral donors. Bilateral donors are more likely to provide aid for prevention when donor burden of disease is low. In contrast, bilateral donors are more likely to provide aid for treatment when donor burden of disease is high. In comparison, multilateral donors are more likely to give aid for prevention of geographically limited diseases and for treatment of diseases that account for greater portions of global burden of disease.

The findings in chapter 4 fail to support the theory and, in fact, contradict the predicted outcomes. These results suggest that while donors may select diseases for development aid strategically in order to maximize their enjoyment of benefits, when it comes to the selection of disease control activities, donors behave in a more humanitarian manner.

5.2 Theoretical Implications

The analyses in this dissertation provide several theoretical insights. First, the analysis of development aid for health by disease demonstrates that the allocation of DAH should not be viewed as apolitical or technical decisions. Just as with other types of foreign aid, development aid for health is subject to political influences. Although it appears that recipient need is a factor for some donors, donor interests is also a powerful predictor of disease specific allocations. In addition, expectations regarding the aid behaviors across types of donors — bilateral versus multilateral — appear to hold in the context of allocations of DAH.

In addition, the lack of congruence between the findings in chapters 3 and 4 suggest that aid decisions are made at several levels which are, potentially, subject to different decision-making criteria or interests. The foreign aid literature has long considered foreign

aid decisions to be a two stage process — the first stage involves "gatekeeping," or the selection of recipient countries, and the second stage involves deciding up the level of aid (Cingranelli & Pasquarello 1985). However, the results here suggest that, in attempting to parse out donors' priorities, one must also consider how and why aid is allocated across activities.

Finally, these findings provide theoretical implications for the cooperation literature. The results of these analyses indicate that the incentive structures of individual actors will affect outcomes, even in situations where agreement is high. Unlike other areas of cooperation, health and disease provide issues with high levels of agreement. All actors agree upon the nature of the problems faced. Information regarding prevention, treatment, and control of disease is widely available and the effects are directly observable. Yet, despite this high level of agreement, donors' responses to differing incentive structures — in particular, domestic interests — can result in misallocation of disease specific aid and the undersupply of a public good.

5.3 Policy Implications

Several policy implications develop as a result of these findings. Primarily, the results of chapter three suggest that disease specific development aid for health is subject to political influence. The result of these influences is the misallocation of aid across diseases. All actors agree upon the ethical and normative outcomes expected from development aid for health. The distribution of development aid for health affects the control of disease worldwide, especially in the developing world. Yet, were donors respond to a constellation influences other than need, the results are a suboptimal allocation of aid — leaving some diseases with far fewer resources than necessary.

This misallocation is increased when one considers the similarities across donors. The largest portion of development aid for health if provided by bilateral donors. These donors are

overwhelmingly developed democracies that generally lie outside the geographic limitations of many diseases. Thus, if donors' aid allocations are the result of interests — interests that are shared across donors — the misallocation of DAH is multiplied. Such distortions will not only determine which diseases received aid, but will have a profound impact on morbidity and mortality in developing countries.

In addition to these normative concerns, the allocation of DAH based upon donors' interests also has consequences for recipient states. Recipients, desperate for increased health resources, will have incentive to focus on programs directed at diseases that are more likely to threaten populations in developed states, regardless of their own domestic need. This in turn may create further distortion — rewarding states for ignoring their own health priorities. In contrast, recipients may attempt to use such incentives to transfer funds from disease programs of interest to bilateral donors in order to better fund domestic health concerns. For example, if a recipient is aware of bilateral donors' inclination to fund HIV/AIDS programs, it may choose to invest greater health resources in programs for geographically limited diseases such as malaria and dengue fever, expecting donors to fill the gap in funding for HIV/AIDS.

Finally, differences across bilateral and multilateral donors suggest that multilateral donors are better able to address humanitarian concerns. As a result, efforts to devise effective partnerships among donors should include a mix of bilateral and multilateral donors or an effective division of labor. If bilateral donors responsiveness to domestic influences creates shortcomings across some diseases, multilateral donors may rightly be the appropriate alternative. The unfortunately flaw in this argument is the relative difference in total fund. Bilateral donors remain the primary source of development aid for health. Thus, even with a division of labor among donors in which multilateral donors took on primary responsibility for geographically limited diseases, funding shortfalls and gaps would still occur.

5.4 Future Research

The literature on development aid for health has thus far been driven primarily by policy scholars. Although these efforts have produced several important studies, there is much work to be done and ample room for contributions from the political science literature. This dissertation raises several research questions and directions for additional research. First, the inconclusive findings of chapter 4 clearly indicate that additional research is needed in order to parse out how and why donors select disease control activities. Unlike the findings in chapter 3, donors do not appear to fund activities based upon the benefits they might receive. This may be explained in several ways. It may be the result of an additional level of decision-making. It may also be the result of differences in domestic interests. Further research is needed to parse out these questions.

In addition, the foreign policy literature provides several illustrations of future directions for studies of health aid. First, like other areas of foreign aid, health aid is subject to the same questions of effectiveness. Does health aid result in decreases in morbidity and mortality? By examining disease specific aid allocations at the country level as well as disease specific morbidity and mortality rates, it is not only possible to determine the effectiveness of DAH, but also determine if misallocations as described in the previous section result in changes in morbidity and mortality across diseases. Also, this project does not address recipient selection. The data for this project would lend themselves well to a model examining recipient selection for DAH.

The identification of a particular disease on which to focus large quantities of development aid is, as of yet, and understudied and undetermined process. One explanation for this process might include the role of domestic audiences. In the United States, HIV/AIDS awareness increases pressure for policy-makers to take action with regard toward that disease, whereas the relative lack of information regarding acute respiratory infections may prevent action. Likewise, this process might be the result of donor band-wagoning, in which the

identification of a problem and provision of funding by one donor encourages other donors to act in a similar manner. Such activities would undoubtedly lead to aid misallocation. As of yet, these processes are unexamined, but deserve further attention.

Finally, there remains ample room for further testing and theorizing. The theory presented in this dissertation could also be extended to other health comparisons. In particular, examining the differences between DAH allocations for infectious versus non-communicable diseases may shed further light on donors priorities. Because non-communicable disease are not subject to person-to-person transmission and spread, one would expect DAH for these disease to differ considerably from infectious disease. In addition, one of the first projects following the dissertation will be to complete data collection and testing while including development aid for health allocations from philanthropic foundations. Moreover, the findings of chapter 3 and 4 suggest that there are additional processes involved in the allocation of DAH that are not accounted for by the theory. For example, the importance role of a disease being targeted by an international program suggests that some level of collaboration is occurring and may have an effect upon aid allocations and outcomes.

In sum, although this dissertation serves as a first step into investigations of development aid for health, there remains much work to be done. This dissertation has highlighted the influence of political considerations in the allocation of DAH. However, there remains a substantial gap in the foreign aid literature. In order to understand allocations of development aid for health and its affect on health in developing countries, further research is necessary.

Table 5.1: Summary of Disease Specific Findings

Donor Type	Independent Variables	Findings
Bilateral	Recipient Burden of Disease	No relationship between recipient need and level of aid
	Donor Burden of Disease	More aid for diseases that affect donors' domestic populations
	Geographic limits	More aid for diseases with global spread
	Cost per DALY averted	More aid for disease with higher cost
	Immunization	Less aid for diseases easily controlled in donor states
Multilateral	Recipient Burden of Disease	More aid for diseases with higher burden within recipient state
	Global Burden of Disease	More aid for disease with higher global burden
	Geographic limits	No relationship between geographic spread and level of aid
	Cost per DALY averted	No relationship between cost and level of aid
	Immunization	No relationship between ease of control and level of aid

Table 5.2: Summary of Disease Control Findings

Donor Type	Findings
Bilateral	More aid for prevention and treatment
	Less likely to give aid for prevention if donor burden of disease is high
	More likely to give aid for treatment if donor burden of disease is high
	Less likely to give aid for research if donor burden of disease is high
Multilateral	More aid for treatment
	More likely to give aid for prevention of geographically unlimited disease
	More likely to give aid for treatment of diseases with high global burden of disease

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