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**A Rival to the West?
Comparing the Effects of Chinese and World Bank Aid
on Health Outcomes in Sub-Saharan Africa**

Isabel Jane DoCampo

Westfield, New Jersey

A Thesis presented to the Undergraduate Faculty
of the College of William and Mary in Candidacy for the Degree of
Bachelor of Arts

International Relations

The College of William and Mary
May 2015

APPROVAL PAGE


This Thesis is submitted in partial fulfillment of
the requirements for the degree of

Bachelor of Arts



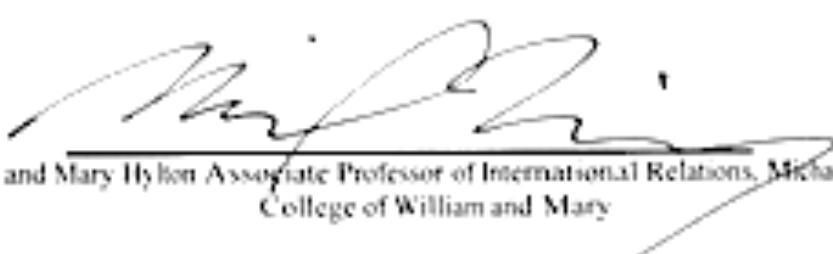
Isabel Jane DeCampo

Approved by the Committee, May 2015



Committee Chair

Assistant Professor, Philip Roessler
College of William and Mary



George and Mary Hylon Associate Professor of International Relations, Michael Tierney
College of William and Mary



Visiting Assistant Professor - Health Professions Advisor, Beverly Sher
College of William and Mary

ABSTRACT

The international community has come to criticize existing foreign aid practices for their poor coordination, misguided programming, and ineffective implementation strategies. China's controversial aid policies pose an alternative to dominant Western aid paradigms, as they thwart conventions of conditionality and good governance paramount to traditional donors. This thesis evaluates Chinese health aid as an alternative to Western health aid via the impacts of each on sub-Saharan African health capacity, commitment to health, and overall health outcomes. Results indicate that Chinese aid does not significantly impact health in sub-Saharan Africa, while World Bank aid displays strong significant relationships with improvements to government commitment to health and overall health outcomes.

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ACKNOWLEDGEMENTS

I would first like to thank Professor Philip Roessler, for his guidance and many valuable directions throughout this project, and for his support of my work over the past two years. I wish to acknowledge Professor Michael Tierney for his suggestions and thoughtful criticisms of this thesis. I would also like to thank Dr. Beverly Sher, for her participation on my thesis committee and her inspirational teaching, without which I would not have discovered my passion for international health.

Thank you to my parents, for their unconditional love and support, and to Ryan Warsing and Madeleine Murphy, for their careful editing, patience, attendance at many a thesis event, and their friendship.

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Introduction

For more than a decade, tension between Chinese and Western aid philosophies has increased with China's rising influence in Africa. China's development finance has been characterized by political non-interference and an emphasis on infrastructure. These policies contradict well-established Western aid strategies prioritizing good governance and donor conditionality, and have attracted a wide array of criticisms from Western donors and aid scholars alike.¹ As such, the viability of Chinese aid has been fiercely debated, despite its ready acceptance by African governments.

China's 2014 announcement of its plans for the Asian Infrastructure Investment Bank (AIIB) represents an institutionalization of these highly contested Chinese aid practices. The United States has already criticized this action as a "deliberate effort to undercut the World Bank," one that will fail to meet international safeguards or improve conditions in developing states.² However, in gaining the support of traditional U.S. allies, including Britain, Germany, France, and Italy, China's development bank, and consequently its development policies, have gained newfound credibility. This development represents a major step toward the validation of Chinese aid practices, as well as a potential blow to the Western aid paradigm, which has been ascendant since the founding of the World Bank and the International Monetary Fund.³

These recent events, in conjunction with criticism of Western aid practices from prominent scholars such as William Easterly and Dambisa Moyo, point to a potential

¹ Woods, Ngaire, "Whose Aid? Whose Influence? China, Emerging Donors and the Silent Revolution in Development Assistance," *International Affairs* 84, no. 6 (2008): 1205-1221.

² Perlez, Jane, "U.S. Opposing China's Answer to World Bank," *The New York Times*, 2014. http://www.nytimes.com/2014/10/10/world/asia/chinas-plan-for-regional-development-bank-runs-into-us-opposition.html?_r=0

³ Higgins, Andrew and David E. Sanger, "3 European Powers Say they Will Join China-Led Bank," *The New York Times*, 2015.

shifting authority in the world of development finance.⁴ As such, debates regarding the efficacy of Western and Chinese policies are ever more important. Aid effectiveness is notoriously hard to capture, making concrete analysis of these divergent practices a difficult task. Furthermore, China's refusal to release official development finance information has made any quantitative evaluation of its practices nearly impossible. However, AidData, a think tank based at the College of William & Mary that specializes in the geocoding of development finance, has collected and released media-derived Chinese aid information.⁵ This new data finally allows scholars to empirically compare Chinese and Western aid.

The following study analyzes the impact of Chinese aid vis-à-vis Western aid on health in sub-Saharan Africa. As per the 2005 Human Development Report, humanitarian endeavors are increasingly viewed as the primary purpose of foreign aid; thus, evaluation of health aid shall be the primary focus of this study.⁶ Additionally, 2015 marks an important juncture for health in developing countries: the culmination of the UN's Millennium Development Goal initiative. Begun in 2000, the UN tasked states in development to improve a variety of health indicators by 2015. Among these indicators were maternal mortality, infant mortality, and other gauges of disease burden.

However, with the initiative drawing to a close, many sub-Saharan African states have yet to meet the health targets set by the MDGs. All sub-Saharan African states have

⁴ Easterly presents a vehement criticism of conditional aid policies. Easterly, William. "The Cartel of Good Intentions: The Problem of Bureaucracy in Foreign Aid." *The Journal of Policy Reform* 5, no. 4 (2002): 223-250. Moyo argues that developing countries are worse off as a result of aid dependence. Moyo, Dambisa. *Dead Aid: Why Aid is Not Working and How There is A Better Way for Africa*. Macmillan, 2009.

⁵ Strange, Austin, Bradley Park, Michael J. Tierney, Andreas Fuchs, Axel Dreher, and Vijaya Ramachandran, "China's Development Finance to Africa: A Media-Based Approach to Data Collection," *Center for Global Development Working Paper* no. 323 (2013).

⁶ Williamson, Claudia R, "Foreign Aid and Human Development: The Impact of Foreign Aid to the Health Sector," *Southern Economic Journal* (2008): 188-207.

achieved declines to infant mortality since the 1990s, but children in rural or poor households are disproportionately affected and progress was not sufficient to meet the MDG for 2015. The state of maternal mortality is dismal; some sub-Saharan countries have made no improvements or have seen increases to maternal mortality ratios since 1990.⁷ Even as the disease burden from HIV/AIDS and malaria is decreasing, Sub-Saharan Africa bears an inordinate proportion of cases. Despite improvements and concerted effort on the part of many states, the region remains underequipped with medicine and vaccines, and measures to reinforce health personnel training and recruitment move slowly.⁸ As a result, the health care systems of sub-Saharan Africa often suffer from a lack of human resources, supplies, and infrastructure, as well as poor provider coordination and availability of treatment.⁹ Moving forward, sources of foreign aid must consider the effectiveness of their policies to better assist developing countries in achieving better health. Thus, this thesis evaluates predominant strategies for foreign assistance at a critical juncture in both aid and health development.

More precisely, this paper analyzes the effect of Chinese health aid vs. World Bank health aid on health outcomes in a sample of sub-Saharan African countries. I conceive that health outcomes are fundamentally a function of a given government's healthcare capacity, or its structural, financial, and personnel resources, and its

⁷ *MDG Report 2012: Assessing Progress in Africa Toward the Millennium Development Goals*: United Nations Development Programme, 2012.

<http://www.undp.org/content/dam/undp/library/MDG/english/MDG%20Regional%20Reports/Africa/MDG>

⁸ "Health Systems in Sub-Saharan Africa: What is their Status and Role in Meeting the Health Millennium Development Goals?" *African Health Monitor* no. 14 (2012).

⁹ Travis, Phyllida, Sara Bennett, Andy Haines, Tikki Pang, Zulfiqar Bhutta, Adnan A. Hyder, Nancy R. Pielemeier, Anne Mills, and Timothy Evans, "Overcoming Health-Systems Constraints to Achieve the Millennium Development Goals," *The Lancet* 364, no. 9437 (2004): 900-906.

institutional commitment to health: its willingness to invest in its people.¹⁰ As such, I argue that Chinese and World Bank aid have differential effects on these two underlying pillars of healthcare due to fundamental differences in their aid policies.

The aid policies of China and the World Bank diverge primarily in their use of tied aid and conditionality. Based on evaluation of each policy, I hypothesize that Chinese investment improves health capacity more effectively than that of the World Bank because of its employment of tied aid. Chinese tied aid bypasses governments by necessitating that Chinese contractors implement projects; aid delivered through Chinese firms avoids diversion by corrupt recipient governments. Furthermore, Chinese aid is typically allocated towards infrastructure projects to directly improve capacity, without addressing government incentives.¹¹ Conversely, World Bank aid should impact commitment to a greater degree than Chinese aid due to policies of conditionality. Western conditionality frequently mandates that a recipient state achieve standards for good governance when they receive aid. In doing so, recipient states that accept Western aid are compelled to improve their bureaucratic standards and accountability ratings, hopefully to the benefit of health commitment. But, such requirements may hinder capacity improvements by imposing a heavy bureaucratic toll on developing states.¹²

To test the differential effects of Chinese and World Bank aid policies in sub-Saharan Africa, I undertake a regression analysis of aid on health indicators in Angola, Cameroon, Ethiopia, Ghana, Guinea, Kenya, Liberia, Niger, Nigeria, Rwanda, Senegal,

¹⁰ Becker, Loren, Jessica Pickett, and Ruth Levine, "Measuring Commitment to Health." *Global Health Indicators Working Group Report*, Washington DC, USA: Centre for Global Development (2006).

¹¹ Walz, Julie and Vijaya Ramachandran, "Brave New World: A Literature Review of Emerging Donors and the Changing Nature of Foreign Assistance," *Center for Global Development Working Paper* no. 273 (2011).

¹² Easterly, William, "The Cartel of Good Intentions," 2002.

and Tanzania. Controlling for socioeconomic status in these sub-Saharan African states, I estimate the impact of capacity and commitment variables on health outcomes, the impact of aid on capacity and commitment, and the overall relationship of Chinese aid vs. Western aid on health outcomes. Findings suggest no significant relationship between Chinese aid and health or indicators for capacity and commitment. World Bank aid, on the other hand, is significantly related to improvements in government commitment to health and overall life expectancy, as well as declines in infant and maternal mortality. However, further research is necessary to determine whether or not World Bank health aid has a causal impact on improvements to government commitment or overall health.

Literature Review

The Political Determinants of Poor Health

Public health capacity and government commitment to good health are primary contributors to the health of a nation. Public health capacity involves the “organizational, human, and financial resources that enable responsible authorities to improve health.”¹³ Government commitment to health describes a state’s willingness to rule justly and make investments for the health of its citizenry.¹⁴ Unfortunately, many states in sub-Saharan Africa lack either or both capacity and commitment. According to Mick Moore of the Institute of Development Studies, these deficiencies stem mostly from political underdevelopment, which originates from regimes that are ineffective in pursuing collective interest and are “arbitrary, despotic, and unaccountable.”¹⁵

Moore relates political deficiency in African states to both their colonial formation and current sources of revenue.¹⁶ States formed as colonies were at one point led by local elites dependent on external control; this institutionalized a trend of rule with little regard for the concerns of domestic citizens.¹⁷ Angolan healthcare, for example, is plagued by poor service distribution as a result of its colonial roots. Its colonial health system catered only to Portuguese colonists and settlers and failed to address the needs of the entire population; this inequity was passed down to the current system, which was developed hurriedly after prolonged civil war.¹⁸

¹³ Aluttis C.A., Chiotan C., Michelsen M., Costongs C., and Brand H., *Public Health Capacity in the EU*: European Commission Directorate General for Health and Consumers, 2013, 13.

¹⁴ Becker, Pickett, and Levine, "Measuring Commitment to Health," 2006.

¹⁵ Moore, Mick, "Political Underdevelopment: What Causes ‘Bad Governance’," *Public Management Review* 3, no. 3 (2001): 385-418. 6.

¹⁶ Moore, Mick, "Political Underdevelopment," 2001.

¹⁷ Berry, Sara, "Tomatoes, Land and Hearsay: Property and History in Asante in the Time of Structural Adjustment," *World Development* 25, no. 8 (1997): 1225-1241.

¹⁸ *Angola Health System Assessment*: USAID, 2010. http://pdf.usaid.gov/pdf_docs/Pnadx702.pdf

Since independence, external dependencies have further eroded government capacity and incentives in sub-Saharan African states. Post-colonial states have relied on economies driven by mineral exports and foreign aid to generate revenue. Mineral exports and foreign aid are examples of unearned income, which the government can access without the help or support of the population. When government elites can receive income without citizen labor or taxation, government incentives to engage in domestic bargaining and to practice transparency in public revenue and expenditure are limited.¹⁹ These mechanisms contribute to a lack of institutional impetus for sub-Saharan governments to engage in effective public health decision-making.²⁰

It is important to note, however, that many states in sub-Saharan Africa have made great strides to achieve democracy and economic liberalization and to improve government commitment to domestic interest. Ghana, in particular, made a concerted effort to liberalize its economy in the 1980s, and removed price controls, privatized state agencies, and removed government monopolies over the cocoa industry.²¹ Botswana has seen considerable institutional and economic success, in allowing “a broad cross-section of society to participate in the development process.”²² Kenya has also engaged in initiatives to promote democratic values and civic engagement among citizens.²³ Such

¹⁹ Unearned income exists in contrast to earned income, which involves a state apparatus working in conjunction with citizens to generate revenue. This necessitates domestic bargaining, and ultimately, democracy and civil liberties. Moore, Mick, “Political Underdevelopment,” 2001.

²⁰ Nattrass, N, "Are Country Reputations for Good and Bad Leadership on AIDS Deserved? An Exploratory Quantitative Analysis," *Journal of Public Health (Oxford, England)* 30, no. 4 (Dec, 2008): 398-406.

²¹ Berry, Sara, "Tomatoes, Land and Hearsay," 1997.

²² Hillbom, Ellen, "Botswana: A Development-Oriented Gate-Keeping State," *African Affairs* 111, no. 442 (2012): 83.

²³ Finkel, Steven E. and Amy Erica Smith, "Civic Education, Political Discussion, and the Social Transmission of Democratic Knowledge and Values in a New Democracy: Kenya 2002," *American Journal of Political Science* 55, no. 2 (2011): 417-435.

advancements indicate increasing commitment to societal welfare in many sub-Saharan African states.

Even as these institutional changes have shifted incentives toward public goods provision, potentially increasing demonstrated commitment to healthcare, capacity may still be lacking.²⁴ Sub-Saharan Africa suffers from a brain drain of medical personnel, and some states are “scientifically lagging” due to poor research capabilities.²⁵ Anemic economies result in both low health funding and dilapidating health infrastructure.²⁶ Violence and ethnic conflict contribute to the destruction of health infrastructure and the targeting of medical personnel in politically motivated attacks.²⁷ Additionally, many sub-Saharan governments are unable to organize health services country-wide given the prevalence of under-administered territories.²⁸ These factors contribute to the dearth of human and financial capital allocated towards regional health.

However, the chief hindrances to improved health capacity in sub-Saharan Africa are social, economic, and political imbalances. Health inequality results from the “unequal distribution of power, prestige, and resources” within a society.²⁹ Many low- and middle-income countries maintain large disparities in economic status between social

²⁴ This deficiency is common among sub-Saharan countries, and is particularly demonstrable with regard to the HIV epidemic. Ugandan President Museveni, for example, was praised for his commitment to raising HIV awareness, but inefficiencies in HIV interventions limited Uganda’s ability to combat HIV. Natrass, “Are Country Reputations for Leadership on AIDS Deserved,” 2008.

²⁵ Medical personnel in sub-Saharan Africa receive low income, low social security and benefits, poor job satisfaction and career opportunities, very little protection, and high risk. Doylo, Delanyo, “The Brain Drain and Retention of Health Professionals in Africa,” 2003. On research capacity: Volmink, J. and L. Dare, “Addressing Inequalities in Research Capacity in Africa,” *BMJ (Clinical Research Ed.)* 331, no. 7519 (Oct 1, 2005): 705-706.

²⁶ Doylo, Delanyo, “The Brain Drain in Africa,” 2005.

²⁷ Pedersen, Duncan, “Political Violence, Ethnic Conflict, and Contemporary Wars: Broad Implications for Health and Social Well-Being,” *Social Science & Medicine* 55, no. 2 (2002): 175-190.

²⁸ Bratton, Michael and Eric CC Chang, “State Building and Democratization in Sub-Saharan Africa Forwards, Backwards, Or Together?” *Comparative Political Studies* 39, no. 9 (2006): 1059-1083.

²⁹ Marmot, Michael, “Achieving Health Equity: From Root Causes to Fair Outcomes,” *The Lancet* 370, no. 9593 (2007): 1153-1163.

strata, and health systems frequently fail to cater to socially disadvantaged groups. In a vicious cycle, socioeconomic status largely determines one's health, but public money is too often allocated to health services for the wealthy. Without subsidized care, the poor either decline to use services or risk impoverishment when they need medical attention. Institutionalized gender inequity also obstructs health capacity; underrepresentation of women in government, as well as socially condoned sexual violence, unequal access to property and assets, and female disempowerment contribute to poor female health status, and uneven capacity. Thus, even well-intentioned health systems can "perpetuate injustice and social stratification."³⁰

Traditional Health Aid

In response to persistent health crises in Africa, foreign donors have offered economic assistance to improve African governments' health capacity and realign incentives to strengthen institutional commitment.³¹ Western multilateral institutions and bilateral donors dominate the traditional aid landscape. These actors extend aid to developing countries via Official Development Assistance (ODA). The Development Assistance Committee (DAC) of the OECD defines ODA by strict guidelines. ODA must be issued by an official sector, include concessional provisions, and promote economic development and welfare.³² The DAC emphasizes transparency, social and environmental protections, decreased corruption, good governance, and debt management as essential

³⁰ Marmot, "Achieving Health Equity," 2007.

³¹ Williamson, Claudia R, "Foreign Aid and Human Development: The Impact of Foreign Aid to the Health Sector," *Southern Economic Journal* (2008): 188-207.

³² Manning, Richard, "Will 'Emerging Donors' Change the Face of International Cooperation?" *Development Policy Review* 24, no. 4 (2006): 371-385.

components of development finance.³³ DAC bilateral donors frequently participate in multilateral institutions, emphasize social sector assistance, and employ traditional donor-recipient relationships.³⁴

Traditional sources of development assistance regard health and humanitarian efforts as an essential function of aid. As such, Western multilateral organizations and bilateral actors have increasingly attempted to address health in developing countries with highly regulated programming. From 1999 to 2006, total aid to the health sector more than doubled. DAC health aid is implemented in large part through multi-country initiatives, and 95% of DAC health projects valued at more than \$10 million. The majority of Western aid involves activities relevant to the Millennium Development Goals, such as projects targeting tuberculosis, malaria, HIV, and reproductive health and family planning.³⁵

Conditionality is a pillar of Western aid; donors attempt to reform ruler incentives by offering assistance only if certain standards of good governance or, for example, if health-spending targets, are met.³⁶ Donors have facilitated structural adjustment in sub-Saharan Africa to improve economic efficiency, and thus, improve health and other services.³⁷ Donors have also attempted to relax budget constraints to increase government

³³ *China, Africa and the International Aid Architecture*, African Development Bank, 2010.

³⁴ Walz and Ramachandran, "Brave New World," 2011.

³⁵ Williamson, Claudia R, "Foreign Aid and Human Development," 2008.

³⁶ Good governance, in the context of health, refers to "accountability, transparency, and informational openness; an open, responsive, and evidence-based policy process; inclusion of citizens' views and voice; and operation capacity of government to plan, manage, and regulate policy, financial resources, and service delivery." *Rwanda Health Governance Assessment*: USAID, 2010, 12.

<http://apps.who.int/medicinedocs/documents/s18413en/s18413en.pdf>

³⁷ Sahn, David and Rene Bernier, "Have Structural Adjustments Led to Health Sector Reform in Africa?" *Health Policy* 32, no. 1 (1995): 193-214.

spending on health systems.³⁸ In this way, traditional donors seek to improve health by offering aid in exchange for improved ruler commitment to citizen well-being.

Conditionality also functions to improve state capacity. Traditional donors tend to address issue-specific aid. For example, large financial commitments have been made based on issues like technical cooperation and HIV/AIDS.³⁹ By requiring good governance, donors address democracy measures, accountability, and corruption in developing states.⁴⁰ These factors strengthen the capability of recipient governments and improve health service delivery.⁴¹ Thus, Western donors primarily address capacity building by implementing issue-specific aid alongside interventions to improve government commitment.

However, traditional aid policies have increasingly been the target of criticism, which much of it aimed at policies of conditionality.⁴² Aid delivery is complex and donors often struggle to determine what conditions will sustain growth and development.⁴³ Also, donors frequently fail to specify the sanctions that recipients will receive if they do not comply with conditions. Not only do these failures undermine the credibility of conditionality, but they make monitoring and evaluation difficult.⁴⁴ Additionally, aid may fall prey to the moral hazard problem, hindering the effectiveness of conditionality. Moral hazard with respect to foreign aid “implies a situation in which

³⁸ Mishra, Prachi and David Newhouse, "Does Health Aid Matter?" *Journal of Health Economics* 28, no. 4 (2009): 855-872.

³⁹ Piva, Paolo and Rebecca Dodd, "Where Did All the Aid Go? An In-Depth Analysis of Increased Health Aid Flows Over the Past 10 Years," *Bulletin of the World Health Organization* 87, no. 12 (2009): 930-939.

⁴⁰ Singh, Ajit, "Aid, Conditionality and Development," *Development and Change* 33, no. 2 (2002): 295-305.

⁴¹ Mishra, Prachi, and Newhouse, "Does Health Aid Matter?" 2009.

⁴² It is important to note that because multilaterals place a greater stake on conditionality than do bilateral donors, failures of conditionality are much more present in multilateral aid. Ram, Rati, "Roles of Bilateral and Multilateral Aid in Economic Growth of Developing Countries," *Kyklos* 56, no. 1 (2003): 95-110.

⁴³ Radelet, Steven, "A Primer on Foreign Aid," *Center for Global Development Working Paper* 92, (2006).

⁴⁴ Adam, Christopher S. and Jan Willem Gunning, "Redesigning the Aid Contract: Donors' Use of Performance Indicators in Uganda," *World Development* 30, no. 12 (2002): 2045-2056.

having an insurance policy (or in this case, access to external resources) actually induces riskier (undevelopmental) behavior” on the part of the recipient state.⁴⁵ Successful conditionality requires strong donor commitment to counter the moral hazard problem that deters recipients from implementing reforms. However, no such commitment technology exists; as such, there is low effort on the part of donors to ensure that aid is fully implemented.⁴⁶

The good governance standards imposed by conditionality also involve onerous bureaucracy for recipient states. Rich countries, including DAC donors, are responsible for the funding of multilateral aid agencies. DAC donors define aid output as money disbursed rather than service delivered, and evaluate aid effectiveness in short-term progress. Thus, to ensure continued funding, aid agencies are increasingly implementing elaborate bureaucratic controls on their projects to minimize the risk of corruption and provide guarantees to taxpayers at home that the money is well-spent. In doing so, they produce low-return observable outputs like reports and frameworks and burden the low administrative capabilities of poor countries. Recipients cannot handle the many authorizations, pressures, and requirements imposed by donors due to limited capability and a shortage of expertise.⁴⁷ These controls also prolong aid delivery, contributing to aid inefficiency.

Additionally, while donors seek to increase government health spending by relaxing budget constraints, empirical analysis demonstrates that this action actually achieves the opposite. A Lancet study finds that development assistance for health to a

⁴⁵ Bräutigam, Deborah A. and Stephen Knack, "Foreign Aid, Institutions, and Governance in Sub-Saharan Africa," *Economic Development and Cultural Change* 52, no. 2 (2004): 255-285. 263

⁴⁶ Svensson, Jakob, "When is Foreign Aid Policy Credible? Aid Dependence and Conditionality," *Journal of Development Economics* 61, no. 1 (2000): 61-84.

⁴⁷ Easterly, "The Cartel of Good Intentions," 2002.

state may decrease government health spending. In the presence of health aid, ministries of finance choose to reduce health financing to allocate funds elsewhere. Developing countries seem to treat health aid as a substitution for, rather than a supplement to, government health spending.⁴⁸ This produces states that are dependent on aid to maintain health security, ultimately undermining the key rationale for aid in the first place – improving the quality and the self-sufficiency of healthcare systems.⁴⁹

Rather than improve capacity, Western aid may exacerbate aid inequity or be limited in its effectiveness.⁵⁰ Efforts to bolster health service capacity can be affected by aid fragmentation.⁵¹ Fragmentation is the result of poor donor coordination among the many multilateral and bilateral actors working in developing regions. Many donors try to implement projects with conflicting goals and policies in one area, overwhelming resources and producing uneven results; certain sectors of the population fall through the cracks. To make matters worse, many donors have poor monitoring and evaluation procedures, and do not recognize their own inefficiencies.⁵² Also, multilateral aid in particular is subject to the principal-agent problem.⁵³ Whereas bilateral donors form closer, long-standing relationships with recipients, distant multilateral-recipient

⁴⁸ Lu, Chunling, Matthew T. Schneider, Paul Gubbins, Katherine Leach-Kemon, Dean Jamison, and Christopher JL Murray, "Public Financing of Health in Developing Countries: A Cross-National Systematic Analysis," *The Lancet* 375, no. 9723 (2010): 1375-1387.

⁴⁹ Additionally, this effect threatens the continuation of aid. Donors may lose accountability if development assistance for health does not lead to greater health spending, and may not be able to convince constituents of the value of continuing such aid. Lu, Schneider, Gubbins, Leach-Kemon, Jamison, and Murray, "Public Financing of Health in Developing Countries," 2008.

⁵⁰ Radelet, "A Primer on Foreign Aid," 2006.

⁵¹ Buse, Kent and Gill Walt, "Aid Coordination for Health Sector Reform: A Conceptual Framework for Analysis and Assessment," *Health Policy* 38, no. 3 (1996): 173-187.

⁵² Radelet, "A Primer on Foreign Aid," 2006.

⁵³ The principle-agent problem arises when an agent (in this case, an aid donor) agrees to work for a principal (an aid recipient) in return for certain incentives, but the agreement incurs large costs for the agent. To reduce such costs, the agent may "pursue its own agenda" to the detriment of the principal. "Principle Agent Problem," *The Economic Times*, 2015, sec. Economy. <http://economictimes.indiatimes.com/definition/principle-agent-problem>

relationships involve long and complex chains to link taxpayers with the ultimate beneficiaries of aid.⁵⁴

Mere increases to the amount of health aid do not necessarily improve capacity. Donors – more frequently bilateral than multilateral – tend to align aid targets with their own goals rather than with recipient needs.⁵⁵ Popular issue areas such as HIV/AIDS or technical cooperation receive a large share of health aid, but little is spent on the actual strengthening of health systems. These misaligned priorities may undermine the promotion of low-profile, yet absolutely essential health services in developing countries.⁵⁶ Both multilateral and bilateral donors act on their own perception of altruism, but bilateral donors tend to structure aid around their own national interests and engage with states and issues of political strategic significance.⁵⁷

How has Traditional Aid Changed?

Western aid bodies attempted to address these shortcomings via the Paris Declaration. In 2005, member states of the DAC met and resolved to increase aid accountability, improve specification project timetable and targets, tailor projects to individual countries, and improve project monitoring and evaluation. Additionally, members sought to increase recipient country ownership of aid projects, strengthen development capacity, and simplify aid implementation in fragile states.⁵⁸

⁵⁴ Radelet, "A Primer on Foreign Aid," 2006.

⁵⁵ Bräutigam, Deborah, "Aid 'With Chinese Characteristics': Chinese Foreign Aid and Development Finance Meet the OECD-DAC Aid Regime," *Journal of International Development* 23, no. 5 (2011): 752-764.

⁵⁶ Piva, Paolo and Dodd, "Where Did All the Aid Go?" 2008.

⁵⁷ Ram, Rati, "Roles of Bilateral and Multilateral Aid," 2003.

⁵⁸ *The Paris Declaration on Aid Effectiveness and the Accra Agenda for Action*: OECD, 2005.

But, donors have been slow or reluctant to follow through on these promised reforms. And beyond poverty reduction, DAC donors have not made significant progress toward the goals of the Paris Declaration.⁵⁹ Donors continue to enforce safeguards and standards that prolong aid delivery, and donor coordination remains weak.⁶⁰ While Western sources of aid have scaled back their use of conditional policies, conditionality still exists in weaker forms.⁶¹

Empirical analysis of DAC aid identifies further fallacies in aid implementation. Western aid bodies determine spending priorities at global and regional levels rather than those of recipient countries. 25% of ODA is allocated to multi-country projects, indicating that initiatives are not supportive of individual state needs.⁶² Additionally, living standards in developing countries have not increased, despite increasing aid.⁶³ Thus, Western aid continues to suffer from poor coordination between development partners and high transaction costs at the expense of recipient needs and living conditions.

Chinese Aid

In the last decade, China has assumed a prominent role as a donor to sub-Saharan Africa, but China's approach to development contradicts that of Western institutions. China regards the traditional donor-recipient relationship championed by the West as a

⁵⁹ Walz and Ramachandran, "Brave New World," 2011.

⁶⁰ On safeguards and standards: Walz and Ramachandran, "Brave New World," 2011. On weak donor coordination: Tan-Mullins, May, Giles Mohan, and Marcus Power, "Redefining 'Aid' in the China-Africa Context," *Development and Change* 41, no. 5 (2010).

⁶¹ Walz and Ramachandran, "Brave New World," 2011.

⁶² Piva, Paolo and Dodd, "Where Did All the Aid Go?" 2008.

⁶³ Easterly, "The Cartel of Good Intentions," 2004.

“new form of colonialism.”⁶⁴ Instead, China emphasizes its desire to form development partnerships with recipient states: partnerships rooted in mutual respect for sovereignty, non-aggression, and non-interference.⁶⁵

China’s practice of non-interference with recipient politics implies a rejection of aid conditionality; Chinese development policies do not require the improvement of governance in developing states. They impose fewer requirements and safeguards on aid recipients, thus easing bureaucratic requirements and improving the speed of aid implementation. Chinese aid also addresses capacity problems in developing countries through the use of distinct, tailored projects. Such initiatives are more efficiently targeted towards recipient needs, rather than the multi-country regional initiatives implemented more frequently by Western donors.⁶⁶

Chinese aid primarily targets energy, water and sanitation, education, private sector operations, and health. It attempts to improve productive capabilities and reduce supply-side constraints and transaction costs by emphasizing infrastructure development. These infrastructure projects are implemented with tied aid; construction requires the use of Chinese contractors. Thus, China finances its own companies to implement projects, rather than extending funds to recipient institutions.⁶⁷ This strategy bypasses host governments, potentially avoiding failures of aid delivery due to misguided state incentives or poor implementation capacity.

China’s health aid may be especially involved given China’s employment of ‘health diplomacy.’ Health diplomacy involves political activity to improve health while

⁶⁴ Walz and Ramachandran, “Brave New World,” 2011, 16.

⁶⁵ Walz and Ramachandran, “Brave New World,” 2011.

⁶⁶ Walz and Ramachandran, “Brave New World,” 2011.

⁶⁷ Walz and Ramachandran, “Brave New World,” 2011.

maintaining and strengthening international relations.⁶⁸ China has sought increased political and economic influence in Africa, as well as access to natural resources. In doing so, China has assumed a prominent place in supporting African healthcare systems. Among other things, China's health diplomacy has directly financed new hospitals, teams of medical professionals, and the promotion of effective malaria treatments on the continent.⁶⁹

Chinese Aid in Practice

Western attitudes towards China's unconventional aid strategies are predominantly negative. China's rejection of conditionality has generated the greatest criticism.⁷⁰ Additionally, critics worry Chinese aid may renew indebtedness in low-income countries, and that attractive Chinese policies will replace the Washington Consensus with a 'Beijing Consensus.'⁷¹ This shift will reverse the progress of established donors in replacing conditional aid with "artificial lifelines" that allow recipients to delay reforms for sustainable progress.⁷² Renewed indebtedness and poor

⁶⁸ Thompson, Drew, "China's Soft Power in Africa: From the "Beijing Consensus" to Health Diplomacy," *The Jamestown Foundation* (2005).

⁶⁹ Youde, Jeremy, "China's Health Diplomacy in Africa," *China: An International Journal* 8, no. 1 (2010): 151-163

⁷⁰ The World Bank attempted to address Nigeria's corrupt railways with a \$5 million dollar loan that would not only fix the railways, but also address their fraudulent practices. However, the Chinese offered a \$9 million dollar loan to rebuild the Nigerian rail network with no conditions for reform. Naim, Moisés, "Rogue Aid," *Foreign Policy* 159, (2007): 95-96.

⁷¹ The Washington Consensus on economic policy, developed by the United States as well as U.S. based international financial institutions, iterated a set of liberal economic reforms to be implemented by states to achieve stability. This controversial framework suggested mechanisms for fiscal discipline, trade liberalization, reduced state involvement, deregulation, and privatization that were implemented by the IMF and the World Bank. "Washington Consensus," World Health Organization, Accessed March 31, 2015, <http://www.who.int/trade/glossary/story094/en/>. On the Beijing Consensus: Woods, Ngaire, "Whose Aid? Whose Influence?" 2008, 1208.

⁷² Woods, Ngaire. "Whose Aid? Whose Influence?" 2008, 1208.

system governance may unravel achievements made to health governance and resources available to build capacity.

Critics also point to insufficient labor and environmental standards as a failure of unconditional Chinese policy. Moises Naim asserts that Chinese technology employed in development yields harmful environmental effects. Chinese infrastructure projects undercut the greener standards of agencies like the World Bank with lower benchmarks and “fewer questions.”⁷³ Additionally, Chinese firms operating in African states supposedly turn a blind eye to poor labor relations, under-hiring of African citizens, and violence between Chinese migrants and locals.⁷⁴ By ignoring standards, China offers aid that is equal parts “toxic” and “enormously generous.”⁷⁵

China’s financing of rogue states creates further fodder for international criticism. China declines to intervene in recipient politics, to the chagrin of established, Western donors.⁷⁶ For example, China ignored humanitarian infractions on the part of the Sudanese government in exchange for oil concessions, and continues to provide arms and political support to nondemocratic regimes.⁷⁷ Thus, opponents of Chinese aid maintain that unconditional policies weaken state capacity and do not alter ruler incentives to produce good governance or improved commitment to health.

Ngairé Woods, however, presents a robust defense of China’s development practices, calling criticisms “overplayed.”⁷⁸ Woods contends the international community has overestimated the efficacy of conditionality. As such, accusations of Chinese

⁷³ Naim, “Rogue Aid,” 2007.

⁷⁴ Alessi, Christopher and Stephanie Hanson, “Expanding China-Africa Oil Ties,” *Council on Foreign Relations* 8, (2012).

⁷⁵ Woods, “Whose Aid? Whose Influence?” 2008, 1206.

⁷⁶ Walz and Ramachandran, “Brave New World,” 2011.

⁷⁷ The Sudanese government removed thousands of people from their homes so that China could build a dam in exchange for oil. Alessi and Hanson, “Expanding China-Africa Oil Ties,” 2012.

⁷⁸ Woods, “Whose Aid? Whose Influence?” 2008, 1212.

negligence are often based on flawed pretense. Additionally, aid from emerging donors has not precipitated economic disaster or indebtedness in recipients.⁷⁹ The corruptive influence of Chinese practices appears to be fabricated as well; in fact, corruption indicators have improved in some recipients of Chinese aid.⁸⁰ Deborah Brautigam's seminal work points out that good governance cannot be bought. While China may not be reducing corruption in Africa, it is not making it worse.⁸¹

Additionally, scholars argue that China does not extend blind funding to rogue states. China has supported Zimbabwe by providing aid and military equipment and vetoing UN sanctions after the 2008 election scandal, but has since begun to restrict its support.⁸² Moreover, DAC donors extend the largest amounts of aid to the same states as China; if China is financing corruption, so is the West.⁸³ Skeptics also hyperbolize the nature of the labor practices and standards associated with Chinese infrastructure projects;⁸⁴ China has begun to integrate multinational standards to improve its own policies and those of its subsidiaries.⁸⁵ According to Peter Drysdale, Australian economics professor and government advisor, concerns about Chinese standards are

⁷⁹ Woods, "Whose Aid? Whose Influence?" 2008.

⁸⁰ Angola and Nigeria, states with whom China engages strongly, have shown significant improvements in corruption and governance standards while receiving Chinese aid. Reisen, "Is China Actually Helping Improve Debt in Africa?" 2007.

⁸¹ Brautigam, Deborah, 2009, *The Dragon's Gift: The Real Story of China in Africa*, Oxford: Oxford University Press.

⁸² While China voted against the United States in a Security Council resolution to impose sanctions on Zimbabwe, China has restricted its support in other ways. China has responded to the complaints of other African states by "taking a tougher line with Mugabe," met with opposition politicians, and restricted its arms trade. Woods, "Whose Aid? Whose Influence?" 2008, 1207.

⁸³ Walz and Ramachandran, "Brave New World," 2011.

⁸⁴ Tan-Mullins, Giles, and Power, "Redefining 'Aid,'" 2010.

⁸⁵ Woods, "Whose Aid? Whose Influence?" 2008

“nonsense.”⁸⁶ Though standards can differ between Chinese firms, most seek to respect local labor laws and conditions.⁸⁷

Critics paint China as an ill-intentioned, resource-seeking imperialist. However, supporters of Chinese policies point out that China’s interest in Africa is based on a history of cooperation created in terms of solidarity and development. Chinese aid to Africa is now entwined with geopolitical agendas, intended for economic cooperation as well as resource acquisition. In fact, China’s behavior is no different than that of previous resource-hungry industrial powers. Additionally, scholars have suggested that “China bashing” is itself an exercise of Western interest.⁸⁸ Western criticisms of Chinese aid are the result of a greater ideological battle rather than legitimate concern for aid recipients.⁸⁹

Proponents of Chinese aid assert its theoretical effectiveness. China’s infrastructure projects and use of tied aid has streamlined the delivery process to produce quick and tangible results.⁹⁰ Tied aid also resolves the commitment problem inherent to conditionality by delegating aid implementation to a third party, and eliminates the risk that a developing government might misuse funds or fail to achieve project completion.⁹¹ Also, Chinese infrastructure projects do not inundate local organizations with unworkable bureaucratic requirements.⁹² Chinese firms pay for oil and other resources necessary for project completion, allowing fewer opportunities for cash diversion.⁹³ In this way, well-executed tied aid thwarts corruption and encourages efficient capacity building.

⁸⁶ Perlez, Jane, "U.S. Opposing China’s Answer to World Bank," 2014.

⁸⁷ "Chinese-African Attitudes: Not as Bad as they Say," *The Economist*, 2011, sec. Middle East and Africa.

⁸⁸ Tan-Mullins, Giles, and Power, "Redefining ‘Aid,’” 2010. 864.

⁸⁹ Tan-Mullins, Giles, and Power, "Redefining ‘Aid,’” 2010.

⁹⁰ Tan-Mullins, Giles, and Power, "Redefining ‘Aid,’” 2010.

⁹¹ Svensson, "When is Foreign Aid Policy Credible? 2000.

⁹² Bräutigam, Deborah, "Aid ‘With Chinese Characteristics,’” 2011.

⁹³ Tan-Mullins, Giles, and Power, "Redefining ‘Aid,’” 2010.

China prioritizes recipient participation and country ownership in their aid negotiations. Not only does greater country ownership increase aid effectiveness, but African leaders also appreciate the gesture.⁹⁴ According to Festus Mogae, former President of Botswana, “the Chinese treat us as equals. The West treats us as former subjects.”⁹⁵ African states also appear receptive to China’s extension of health diplomacy, regularly signing treaties inviting medical teams on a bi-annual basis, helping to cover the cost of their stays, and awarding medical teams with national honors.⁹⁶

The current literature regarding Chinese aid offers suggests its effectiveness based on theoretical advantages over more traditional sources. However, the Chinese government has restricted access to its development finance records; because this data is unavailable to the public, there is little empirical evidence that speaks to the impact of Chinese aid on development. As such, it is difficult to determine the effect of Chinese aid on health using available resources.

Synthesis

At base, the Chinese and Western models of aid differ primarily in their use of conditionality and tied aid. Western sources of aid, particularly multilateral organizations, emphasize the need for conditionality and good governance in aid transactions; China, on the other hand, prioritizes noninterference in recipient politics. Additionally, while a small percentage of Western aid is tied to donor-country contractors, the *majority* of Chinese aid is implemented this way.

⁹⁴ Radelet, “A Primer on Foreign Aid,” 2006.

⁹⁵ Walz and Ramachandran, “Brave New World,” 2011, 1217.

⁹⁶ Thompson, “China’s Soft Power in Africa,” 2005.

Tied aid and conditionality strive to improve health-related government incentives and capacity in fundamentally different ways. Conditionality may increase ruler incentives to engage in health system reform by improving governance, but may negatively impact capacity via bureaucratic demands, poor monitoring and evaluation, and prolonged periods of aid delivery.⁹⁷ Tied aid does not address ruler behavior, but rather bypasses government to implement aid quickly and without corruption.⁹⁸

Thus, I hypothesize that Western aid, in its employment of conditionality, produces larger impacts on a government's incentive to improve health care, indicated by several variables for health spending, health policies, and government accountability. However, Western conditionality may have little or negative impact on recipient health capacity; capacity is measured with variables for health personnel, infrastructure, and equipment coverage. Chinese development assistance, on the other hand, may not influence ruler incentives in its employment of tied aid, but it improves capacity to a greater degree than Western aid. Table 1 summarizes these arguments.

⁹⁷ Easterly, "The Cartel of Good Intentions," 2002.

⁹⁸ Svensson, "When is Foreign Aid Policy Credible?" 2000.

Table 1: Hypotheses

	Institutional Commitment	Capacity
World Bank Health Aid	<p>H1: World Bank health aid improves institutional commitment to health.</p> <p>Conditionality increases institutional commitment encouraging improved governance.</p>	<p>H1: World Bank health aid has no effect on or decreases health capacity.</p> <p>Conditionality imposes a bureaucratic toll on developing states that prolongs aid delivery and hinders capacity.</p>
Chinese Health Aid	<p>H2: Chinese health aid has no effect on institutional commitment.</p> <p>Tied aid bypasses recipient governments during aid implementation through the use of Chinese contractors.</p>	<p>H2: Chinese health aid improves health capacity.</p> <p>Discrete, infrastructure-related projects and the bypass of weak governments allows for speedy aid implementation and lessened risk of fund diversion.</p>

Methodology and Operationalization of Health Outcome Measures

This paper analyzes the effect of World Bank and Chinese health aid on health outcomes in twelve African countries. Health outcomes are fundamentally a function of a given government's capacity and institutional commitment to provide healthcare. As summarized in Table 1, I hypothesize that World Bank aid and Chinese health aid impact health outcomes differently based on the degree to which they affect capacity and commitment.

This analysis first establishes the impact of recipient capacity and commitment on health. Health is quantified with three variables: infant mortality per 1,000 live births, number of maternal deaths, and life expectancy at birth.⁹⁹ Infant mortality is the primary indicator of health in developing states; infant mortality is highly sensitive to economic conditions, and it is dependent on a number of societal factors including fertility, water and sanitation, maternal health, female literacy, and GDP. Additionally, data on infant mortality is widely available. Thus, infant mortality is demonstrative of a number of human development outcomes, and its relationship with health aid is easier to determine than that of other health variables.¹⁰⁰

Similarly, maternal mortality is an effective indicator of the overall status of health systems; pregnant women are more likely to survive childbirth in safe and clean environments with access to both well-trained staff and surgical equipment.¹⁰¹ This measure is usually calculated using a maternal mortality ratio (maternal deaths per live

⁹⁹ I obtained all variables describing health from the World Bank Development Indicators database. While the World Bank collects data describing maternal mortality ratio (per 100,000 births), this data is sparse. Data for number of maternal deaths is more complete; while this variable does not provide information as to total births, it describes trends in maternal mortality. World Bank Group, ed, *World Development Indicators 2014*, World Bank Publications, 2014.

¹⁰⁰ Mishra, Prachi, Newhouse, "Does Health Aid Matter?" 2009.

¹⁰¹ Garrett, Laurie, "The Challenge of Global Health," *Foreign Affairs* (2007): 14-38.

births). However, World Bank data for this variable was very limited, so this analysis measures maternal mortality with the number of maternal deaths per year. While this measure does not provide a sense of country comparison (it does not account for differing fertility rates/populations across countries), it does lend insight into in-country trends as to the state of maternal health. Life expectancy is also indicative of a nation's public health standing, given that children and adults thrive in environments with clean water, ample food, and, for example, well-controlled mosquito populations.¹⁰² As such, these three indicators effectively demonstrate a state's overall health status.

In the next two sections I seek to account for variation in these health indicators across a subset of African countries. I first assess whether, consistent with a large development literature, health outcomes are a function of government capacity and institutional commitment. I then analyze the degree to which Chinese health aid and World Bank health aid are leading to improvements in health outcomes via their effects on capacity and commitment.

¹⁰² Garrett, Laurie, "The Challenge of Global Health," 2007.

The Effect of Capacity and Commitment on Health in sub-Saharan Africa

This section serves to establish the salient impact of health capacity and government commitment on infant mortality, maternal deaths, and life expectancy, as outlined above. Data was collected for twelve states in sub-Saharan Africa, including Angola, Cameroon, Ethiopia, Ghana, Guinea, Kenya, Liberia, Niger, Nigeria, Rwanda, Senegal, and Tanzania from 2000 to 2013. All data for capacity and commitment variables and health outcomes is available from the World Bank World Development Indicators database.¹⁰³

Measuring Capacity and Institutional Commitment

Capacity involves the “organizational, human, and financial resources that enable responsible authorities to improve health” and institutional commitment entails a state’s willingness to rule justly and make investments for the health of its citizenry.¹⁰⁴

Outcome indicators for health capacity building include skills, structures, attitudes, organizational processes, resource allocation, actions, policies, and responsibility for health promotion.¹⁰⁵ It is difficult to assess indicators like organizational processes, attitudes, and responsibility in sub-Saharan Africa given data availability; but, the World Bank provides a number of variables that describe actions, policies, structures, and skills.

I have defined births attended by skilled health staff (% of total births), hospital beds per 1,000 population, physicians per 1,000 population, contraceptive prevalence (% of women ages 15-49), improved sanitation facilities (% of population with access), and

¹⁰³ World Bank Group, ed, *World Development Indicators 2014*, 2014.

¹⁰⁴ On capacity: Aluttis, Chiotan, Michelsen, Costongs, and Brand, *Public Health Capacity in the EU*, 2013, 13. On commitment: Becker, Pickett, and Levine, "Measuring Commitment to Health," 2006.

¹⁰⁵ Hawe, Penelope, Lesley King, Michelle Noort, Christopher Jordens, and Beverley Lloyd, *Indicators to Help with Capacity Building in Health Promotion*, Australian Centre for Health Promotion, 2000.

improved access to water (% of population with access) as capacity indicators. The “births” and “physicians” variables account for the medical skill available to populations. Variables for “hospital beds,” improved access to water, and improved sanitation describe medical structures; the latter two also describe the distribution of water and sanitation facilities within a population. Contraceptive prevalence demonstrates coverage of medical care, and could also indicate access to pharmaceutical services, subsidized medication, or sexual health education.

Government commitment to health is more difficult to quantify, as commitment is so deeply intertwined with capacity. Commitment and good governance involve ‘ruling justly’ and ‘investing in people.’¹⁰⁶ I have defined immunization to diphtheria-tetanus-pertussis (DPT, % of children ages 12-23 months), public health expenditure (% of government expenditure), and “Country Police and Institutional Assessment (CPIA) transparency, accountability, and corruption in the public sector rating (1=low and 6=high) as variables that define government commitment.¹⁰⁷ Full DPT vaccination involves three vaccinations, each requiring a trip to the doctor. The Center for Global Development identifies DPT immunization as the best indicator of government commitment to health; this variable demonstrates investment in people in the “strength of the public health system in providing essential services.”¹⁰⁸

Government health expenditure also reflects a government’s willingness to invest in its people. This variable demonstrates the state’s prioritization of health as a public function via its spending decisions. Additionally, government commitment to health is

¹⁰⁶ Becker, Pickett, and Levine, "Measuring Commitment to Health," 2006, 1.

¹⁰⁷ The World Bank defines Immunization, DPT as the percentage of children aged 12-23 who have received three doses (the requirement for adequate immunization) of vaccine. "Indicators," World Bank, accessed March 31, 2015, <http://data.worldbank.org/indicator/all>.

¹⁰⁸ Becker, Pickett, and Levine, "Measuring Commitment to Health," 2006, 2.

established in states with good governance, strong public service administration, and low levels of corruption.¹⁰⁹ As such, I have also included “CPIA transparency” to capture standards of government accountability and commitment to equity in targeted states, which can include accountability to health and health equity.

Control Variables

In estimating the effect of capacity and commitment on health outcomes, I also include a number of control variables that may affect either the provision or efficacy of aid or a country’s health status. GDP per capita is one of the best indicators for economic status, given that it depicts levels of employment, capital, and market productivity.¹¹⁰ Population reflects a country’s size and is necessary to control for the fact that larger countries may receive more aid. Adult female literacy is indicative of maternal health care and social programming in that it indicates “resources and autonomy available to women.”¹¹¹ Adult female literacy rates also impact infant mortality; well-educated mothers are more likely to visit doctors and have healthier pregnancies.¹¹²

The prevalence rates of undernourishment and HIV serve to capture overall disease burden and poor food security.¹¹³ The inclusion of HIV prevalence also controls for receipt of aid, given that states with high HIV burdens are more likely to receive aid

¹⁰⁹ Becker, Pickett, and Levine, "Measuring Commitment to Health," 2006.

¹¹⁰ "A Guide to Womenomics," *The Economist*, 2006, sec. Finance and Economics.

¹¹¹ McTavish, Sarah, Spencer Moore, Sam Harper, and John Lynch, "National Female Literacy, Individual Socio-Economic Status, and Maternal Health Care use in Sub-Saharan Africa," *Social Science & Medicine* 71, no. 11 (2010): 1958-1963.

¹¹² McTavish, Moore, Harper, and Lynch, "National Female Literacy," 2010.

¹¹³ Prevalence of HIV represents the total percentage of the population ages 15-49 infected with HIV. Prevalence of undernourishment represents the total percentage of the population suffering from undernourishment. "Indicators," World Bank, 2005.

than those with lower caseloads.¹¹⁴ I have also controlled for minor and major armed conflict within a state during the designated time period.¹¹⁵

Results

Before describing the results, it is important to describe the structure of the data. The unit of analysis is the country-year. Consistent with existing health studies, all data was averaged over five-year periods (sorted by country) to capture longer-term time trends and minimize outlier effects. All dependent variables are reported in the current period. All independent and control variables are lagged one period to help mitigate concerns about reverse causality.¹¹⁶ OLS regressions thus report the effect of a dependent variable in the current period in relation to independent and control variables in the previous period, and an error term.

These regressions are formulated as such:

$$IM_t = \alpha + \beta_1 C_{t-1} + \beta_2 HIV_{t-1} + \beta_3 LIT_{t-1} + \beta_4 UN_{t-1} + \beta_5 POP_{t-1} + \beta_6 GDP_{t-1} + \beta_7 CONF_{t-1} + u_i$$

$$MD_t = \alpha + \beta_1 C_{t-1} + \beta_2 HIV_{t-1} + \beta_3 LIT_{t-1} + \beta_4 UN_{t-1} + \beta_5 POP_{t-1} + \beta_6 GDP_{t-1} + \beta_7 CONF_{t-1} + u_i$$

$$LE_t = \alpha + \beta_1 C_{t-1} + \beta_2 HIV_{t-1} + \beta_3 LIT_{t-1} + \beta_4 UN_{t-1} + \beta_5 POP_{t-1} + \beta_6 GDP_{t-1} + \beta_7 CONF_{t-1} + u_i$$

where the dependent variables are given by IM_t , which refers to infant mortality in the current period, MD_t , which refers to maternal deaths in the current period, and LE_t , which refers to life expectancy in the current period. C_{t-1} , the independent variable represents individual indicators for commitment or capacity in the previous period. Controls are

¹¹⁴ Mishra, Prachi, Newhouse, “Does Health Aid Matter?” 2009.

¹¹⁵ Variables for prevalence of HIV and undernourishment, GDP per capita, population, fertility, adult female literacy, and CPIA equity for public resource use are available from the World Bank World Development Indicator Database on a country level for years 2000-2013. World Bank Group, ed, *World Development Indicators 2014*, 2014. Armed conflict is available from the PRIO/Uppsala Armed Conflict Database under the same parameters. Themnér, Lotta and Peter Wallensteen, “Armed Conflict, 1946-2013,” *Journal of Peace Research* 51(4), 2014.

¹¹⁶ Mishra, Prachi, Newhouse, “Does Health Aid Matter?” 2009.

given by HIV_{t-1} , LIT_{t-1} , UN_{t-1} , POP_{t-1} , GDP_{t-1} , $CONF_{t-1}$, which refer to HIV prevalence, adult female literacy, undernourishment prevalence, population, GDP, and armed conflict in the previous period, respectively.

The regression results of the effect of different measures of commitment on IM_t , MD_t , and LE_t are reported in Table 2. Model 1 analyzes the effect of immunization coverage on infant mortality, maternal deaths, and life expectancy. Model 2 refers to the effect of transparency on health outcomes. Model 3 describes the impact of public health expenditure on health outcomes.

Table 2: Impact of Commitment Variables on Health Outcomes

	Infant Mortality			Maternal Deaths			Life Expectancy		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Immunization	-1.11* (-0.09)			-123.2* (18.99)			0.20* (0.023)		
Transparency		-12.05 (6.55)			217.49 (1197.6)			2.69 (1.68)	
Health expenditure			-3.65* (0.44)			-320.1* (82.14)			0.75* (0.10)
lag GDP per capita	0.01* (0.002)	0.01* (0.004)	0.002 (0.44)	-0.83 (0.54)	-0.09 (0.78)	-1.39* (0.62)	0.0006 (0.001)	0.0014 (0.003)	0.002 (0.001)
lag Adult female literacy	0.38* (0.14)	-0.47 (0.27)	-0.25 (0.14)	61.09* (28.30)	-84.29 (48.76)	-15.20 (26.96)	-0.09* (0.04)	0.08 (0.08)	0.02 (0.04)
lag Prevalence of HIV	1.73 (1.32)	2.40 (2.78)	1.23 (1.60)	-46.14 (261.5)	615.81 (508.7)	-10.88 (297.1)	-1.05* (0.33)	-1.59* (0.71)	-0.88* (0.36)
lag Prevalence of under-nourishment	-0.19 (0.19)	-0.25 (0.31)	0.02 (0.23)	-47.96 (37.92)	-97.72 (56.73)	-35.25 (43.15)	0.13* (0.05)	0.24* (0.09)	0.09 (0.06)
lag Population	-2.47 E-07* (4.41 E-08)	8.33 E-08 (7.88 E-08)	-2.16 E-08 (4.90 E-08)	0.0002* (8.72 E-06)	0.0002* (0.0000 144)	0.0003* (9.12 E-06)	3.68 E-08* (1.06 E-08)	-1.26 E-08 (2.02 E-08)	-5.36 E-09 (1.08 E-08)
lag Armed Conflict	11.15* (5.15)	-0.19 (11.35)	19.33* (5.93)	-132.1 (1019.1)	597.02 (2076.5)	1011.7 (1102.5)	-3.10* (1.29)	-2.69 (3.07)	-4.07* (1.34)
R ²	0.69	0.43	0.55	0.96	0.96	0.95	0.60	0.54	0.56
N	106	62	106	106	62	106	97	53	97
states	12	12	12	12	12	12	12	12	12

*: significant for two-sided t-test at $\alpha = 0.05$

The regression results of the effect of different measures of capacity on IM_t , MD_t , and LE_t are reported in Table 3. Models 4, 5, 6, 7, 8, and 9 describe the impact of births attended by skilled health staff, contraceptive prevalence, physicians per 1,000 population, improved sanitation facilities, improved water source, and hospital beds per 1,000 population on health outcomes, respectively.

Table 3: Impact of Capacity Variables on Health Outcomes

	Infant Mortality					
	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Births attended by skilled health staff	-0.04 (-0.23)					
Contraceptive prevalence		-1.76* (0.23)				
Physicians per 1,000 population			193.04* (39.77)			
Improved sanitation facilities				0.11 (0.16)		
Improved water source					-.722* (0.26)	
Hospital beds						1.09 -5.17
lag GDP per capita	-0.002 (0.01)	-0.01 (0.01)	0.003 (0.004)	0.01 (0.004)	0.01 (0.004)	-0.01 -0.01
lag Adult female literacy	-0.39 (0.25)	0.12 (0.20)	-0.64* (0.16)	-0.60* (0.20)	-0.30 (0.20)	-0.55 -0.31
lag Prevalence of HIV	4.79 (2.50)	6.48* (1.94)	2.71 (1.94)	5.35* (1.99)	4.33* (1.94)	5.55* -2.70
lag Prevalence of undernourishment	-0.64 (0.40)	-0.54 (0.28)	0.51 (0.34)	-0.40 (0.30)	-0.96* (0.34)	-1.09* -0.45
lag Population	-4.25 E-08 (9.13 E-08)	-5.12 E-08 (5.76 E-08)	-2.44 E-07* (6.85 E-08)	-5.77 E-08 (6.44 E-08)	-1.53 E-07* (6.89 E-08)	3.43E-08 -8.75E-08
lag Armed Conflict	32.24* (8.76)	20.22* (6.98)	10.59 (7.86)	28.04 (7.95)	33.11 (7.36)	22.57 -14.46
R ²	0.23	0.58	0.41	0.24	0.29	0.34
N	90	86	88	106	106	58
states	12	12	12	12	12	12

*: significant for two-sided t-test at $\alpha = 0.05$

Table 3, cont.

	Maternal Deaths					
	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Births attended by skilled health staff	23.01 (-31.75)					
Contraceptive prevalence		-214.12* (34.34)				
Physicians			12958.2 (7471.7)			
Improved sanitation facilities				55.78* (23.85)		
Improved water source					-89.85* (40.46)	
Hospital beds						-1271.22 (927.40)
lag GDP per capita	-5.25* (-1.34)	-5.42* (1.077)	-1.27 (0.71)	-1.23 (0.66)	-1.07 (0.64)	-5.47* (2.32)
lag Adult female literacy	12.31 (34.16)	83.69* (29.97)	-49.95 (30.02)	-67.93* (29.53)	-10.76 (30.69)	9.68 (55.76)
lag Prevalence of HIV	21.22 (344.91)	261.13 (294.18)	215.38 (363.68)	419.48 (298.60)	228.85 (301.14)	411.47 (483.92)
lag Prevalence of undernourishment	-127.77* (55.21)	-130.96* (43.30)	-8.73 (63.36)	-60.94 (44.26)	-141.08* (53.10)	-246.06* (80.98)
lag Population	0.0003* (0.00001)	0.0003* (8.75 E-06)	0.0003* (0.00001)	0.0003* (9.64 E-06)	0.0003* (0.00001)	**0.0003 (0.00002)
lag Armed Conflict	2499.98* (1207.6)	1051.58 (1060.41)	-233.65 (1476.5)	1035.85 (1189.46)	2341.77* (1144.76)	2464.82 (2595.28)
R ²	0.96	0.97	0.96	0.95	0.95	0.96
N	90	86	88	106	106	58
states	12	12	12	12	12	12

*: significant for two-sided t-test at $\alpha = 0.05$

Table 3, cont.

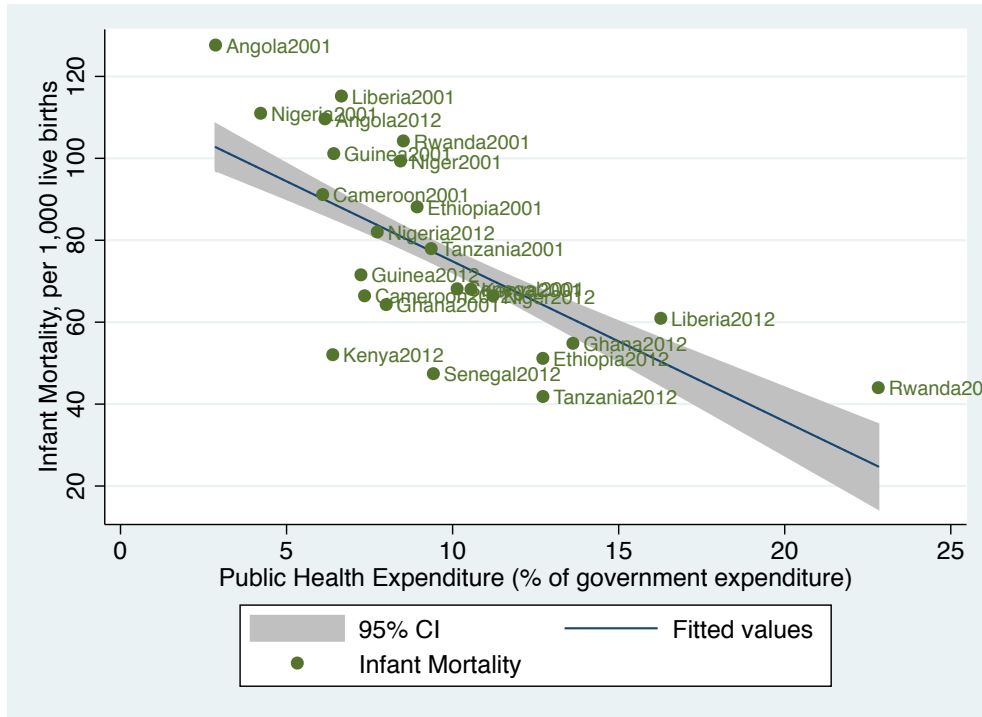
Column1	Life Expectancy					
	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Births attended by skilled health staff	-0.04 (-0.23)					
Contraceptive prevalence		0.37* (0.05)				
Physicians			-31.69* (8.95)			
Improved sanitation facilities				-0.01 (0.04)		
Improved water source					0.16* (40.46)	
Hospital beds						0.07 (1.09)
lag GDP per capita	-0.002 (0.01)	0.0007 (0.002)	0.002 (0.002)	0.0004 (0.002)	0.001 (0.002)	0.002 (0.002)
lag Adult female literacy	-0.39 (0.25)	-0.01 (0.04)	0.10* (0.04)	0.09 (0.05)	0.03 (0.05)	0.12 (0.07)
lag Prevalence of HIV	4.79 (2.50)	-2.24* (0.42)	-1.48* (0.44)	-1.78* (0.43)	-1.55* (0.42)	-2.08* (0.61)
lag Prevalence of Undernourishment	-0.64 (0.40)	0.17* (0.06)	0.07 (0.08)	0.20* (0.07)	0.31* (0.08)	0.31* (0.10)
lag Population	-4.25E-08 (9.13E-08)	1.19E-08 (1.19E-08)	3.52E-08* (1.48E-08)	6.96E-09 (1.37E-08)	2.69E-08 (1.45E-08)	-8.84E-10 (1.91E-08)
lag Armed Conflict	32.24* (8.76)	-4.28* (1.51)	-3.57* (1.78)	-6.79* (1.69)	-7.63* (1.57)	-5.54 (3.15)
R ²	0.23	0.61	0.47	0.28	0.34	0.46
N	90	78	79	97	97	53
states	12	12	12	12	12	12
*: significant for two-sided t-test at $\alpha = 0.05$						

These regressions demonstrate the salient effect of capacity and commitment on health. The relationships between commitment and health are particularly strong. As per

Models 1 and 3, hypothesis testing confirms that the coefficients for DPT immunization and health expenditure are significant for all health measures; DPT immunization and increased health expenditures are highly correlated with decreases to infant mortality and maternal deaths, and increases to life expectancy. Trends in infant mortality are particularly predominant; for every 1% increase of health expenditures as a share of public spending, infant mortality decreases by 3.65 deaths/1,000 live births.

Figure 1, below, demonstrates the significant negative correlation between health expenditure and infant mortality, and the impressive gains to expenditure and health made by states like Liberia and Rwanda between 2000 and 2013. Likewise, immunization coverage demonstrates a significant negative correlation with infant mortality; for every 1% increase in children immunized with the DPT vaccine, there is a 1.11 deaths/live births decline in infant mortality. However, there are no significant relationships reported between transparency and health outcomes, as per Model 2.

Figure 1: Impact of Public Health Expenditure on Infant Mortality, 2001-2012¹¹⁷



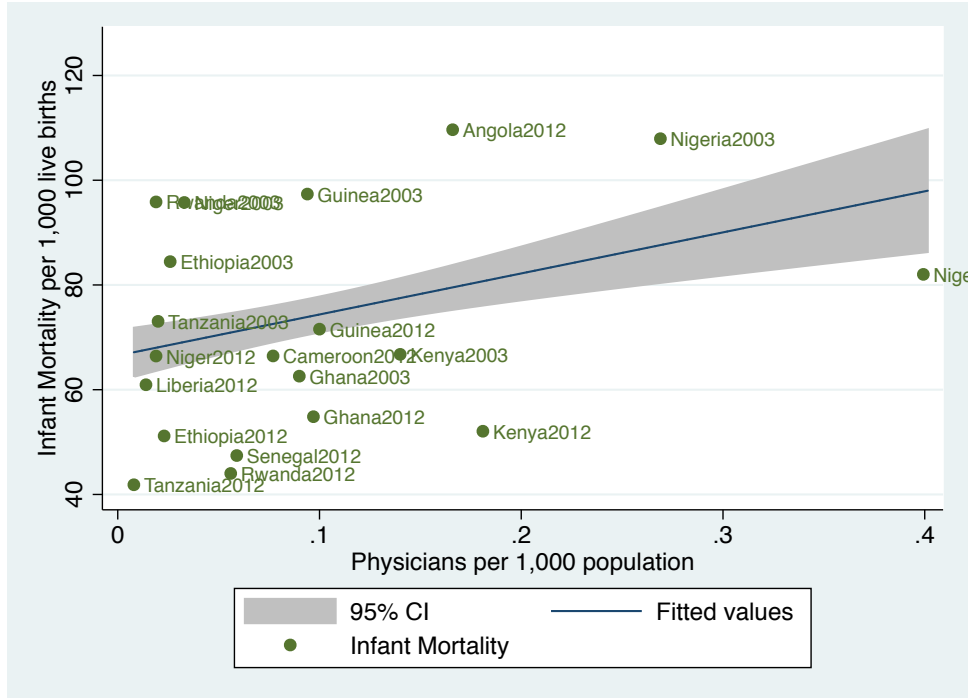
Correlations between capacity and health indicators are less uniform, but they demonstrate that a variety of capacity measures significantly impact health. Model 5 demonstrates that contraceptive prevalence is significant with respect to decreases in infant mortality and maternal deaths and increases in life expectancy. Again, this variable is most highly correlated with infant mortality; for every 1% increase in contraceptive prevalence, infant mortality decreases by 1.75 deaths/1000 live births. Increased access to a water source is also significantly related to life expectancy, maternal deaths, and infant mortality; a 1% increase in water source access contributes to a .722 deaths/1000 live births decrease in infant mortality, a decrease in maternal deaths by 89.85 deaths, and a .155 year increase in life expectancy, as demonstrated by Model 8.

¹¹⁷ All graphical relationships are depicted in terms of the years for which data available across countries is maximized.

Regression analysis also demonstrated significant relationships between maternal deaths and sanitation (Model 7), as well as physicians and infant mortality and life expectancy (Model 6). According to regression output, a 1% increase in sanitation coverage yields an increase in maternal deaths of 55.77. Likewise, a 1 person increase in physicians per 1,000 population yields a 193.04 increase in infant deaths per 1,000 live births and a decrease to life expectancy of 31.69 years. The direction of these relationships is counterintuitive; an increase to physician and sanitation coverage should theoretically improve health indicators.

However, graphical analysis of these puzzling relationships indicates that they are likely driven by the exceptionally poor health status of select states (most predominantly, Nigeria). Figure 2, below, demonstrates that most states, such as Guinea, Kenya, and Ghana, are able to achieve reductions to infant mortality alongside increases to physician coverage. However, while Nigeria and Angola also display a negative relationship between physician coverage and infant mortality, their outlying infant mortality rates skew the relationship upward. Figure 9 (listed in the Appendix) demonstrates a similar effect with regard to maternal deaths and sanitation coverage.

Figure 2: Impact of Physicians per 1,000 Population on Infant Mortality, 2003-2012



Overall, many variables for health capacity and government commitment are significantly related to improvements in health. However, it is important to note that several of these variables are limited by a large number of missing values; these missing values are reflected in the descriptive statistics listed in Table 10 (Appendix). Data averaging prior to analysis greatly reduced the number of missing values in the analysis. But even with this measure, data for CPIA transparency are missing 44 possible values out of a total of 105. Data for hospital beds per 1,000 population are missing 48 values, and data for contraceptive prevalence, births attended by skilled health staff, and physicians per 1,000 population are missing an average of 18 values each. This limitation may have introduced random bias in the regression results, possibly accounting for the lack of significant relationships for many of the above indicators.

Summary

Commitment and capacity are significantly related to improvements in infant mortality, maternal deaths, and life expectancy. In particular, immunization coverage and public health expenditures demonstrate strong direct correlations with life expectancy and inverse correlations with infant mortality and maternal deaths. Contraceptive prevalence and increased access to water are also significantly related to improvements in all health outcomes.

The Effect of Chinese and World Bank Health Aid on Health Policies and Outcomes

Having established a significant association between capacity and government commitment, I now assess if Chinese and World Bank health aid are increasing these intermediary variables and ultimately improving health outcomes. Aid to sub-Saharan Africa is measured in health-related financial commitments from China and the World Bank. All aid information is available from AidData.¹¹⁸ While the World Bank is a multilateral organization, unlike China (a bilateral donor), it is a Western organization for which AidData offers extensive data, and it exemplifies many of the characteristics of Western donors identified in relevant literature. Thus, the World Bank is a fitting representative for Western aid in this analysis.

Twelve states provided the maximum amount of data across both donors: Angola, Cameroon, Ethiopia, Ghana, Guinea, Liberia, Kenya, Niger, Nigeria, Rwanda, Senegal, and Tanzania. After accessing all projects (on every state administrative level) from 2000 to 2013 from the “Chinese Official Finance to Africa” and “World Bank-IBRD-IDA” databases, I condensed the data to include only health-related aid to the aforementioned states. As with the data for health indicators, all aid data was averaged over five years and lagged one year.

Health-related aid includes all aid to the health sector, as well as any other project that indicated “health,” “food aid,” or “water sanitation,” in its description or sector codes.¹¹⁹

¹¹⁸ Data for Chinese aid can be found from AidData’s 1.1.1. research release. Strange, Park, Tierney, Fucks, Dreher, and Ramachandran, “China’s Development Finance to Africa,” 2013. Data for World Bank aid can be found from AidData’s World Bank IBRD-IDA, Level 1, Version 1.0. Strandow, Daniel, Michael Findley, Daniel Nielson, and Joshua Powell, “The UCDP-AidData Codebook on Geo-Referencing Foreign Aid,” 2011. *Uppsala Conflict Data Program* (2011).

¹¹⁹ In expanding my search beyond projects coded in the health sector, projects indicating “health” “food aid” and “water sanitation” include the following sectors: Government and Civil Society, Other Social Infrastructure and Services, Water Sanitation and Supply, Population Policies/Programmes and Reproductive Health, Health, Agriculture, Forestry, and Fishing, Transport and Storage, Emergency

This definition expands ‘health aid’ to include vital health activities that are not directly assigned to the health sector by AidData. Inadequate drinking water, sanitation, and hygiene (WASH) impose severe health risks, particularly to people in low-income areas. WASH is responsible for the majority of the global burden of diarrheal diseases, as well as that of Dengue fever, hookworm, schistosomiasis, and many other infections worldwide.¹²⁰ Thus, aid projects related to water access and sanitation impact global health in a significant manner and are relevant to this study.

Likewise, food insecurity negatively impacts health, again to a greater degree in low-income areas.¹²¹ Insufficient food intake and malnutrition contribute to anemia, infection, and developmental issues in children, as well as hypertension and diabetes in adults.¹²² AidData includes nutrition and household food security in its codes for health sector activities; however, the majority of food aid projects are categorized in the Agriculture or Developmental Food Aid sectors.¹²³ Thus, it is pertinent to incorporate provisions for food aid into this analysis of health assistance. By including health-related projects that have not been assigned to the health sector, I not only increase the size of my data set, but I incorporate critical instances of health funding into the analysis that would otherwise go unrecognized.

Chinese Aid

Response, Unallocated/Unspecified, Other Multisector, Developmental Food Aid/Food Security Assistance, and Women in Development.

¹²⁰ Prüss-Ustün, A., J. Bartram, T. Clasen, J. M. Colford, O. Cumming, V. Curtis, S. Bonjour, et al, "Burden of Disease from Inadequate Water, Sanitation and Hygiene in Low- and Middle-Income Settings: A Retrospective Analysis of Data from 145 Countries," *Tropical Medicine and International Health* 19, no. 8 (2014): 894-905.

¹²¹ Food insecurity refers to the “inability to afford nutritionally adequate and safe foods” Seligman, H. K., B. A. Laraia, and M. B. Kushel, "Food Insecurity is Associated with Chronic Disease among Low-Income NHANES Participants," *The Journal of Nutrition* 140, no. 2 (Feb, 2010): 304-310.

¹²² Seligman, Laraia, and Kushel, "Food Insecurity is Associated with Chronic Disease," 2010.

¹²³ Strandow, Findley, Nielson, and Powell, “The UCDP-AidData Codebook on Geo-referencing Foreign Aid. Version 1.1,” 2011.

OLS regressions measuring the impact of lagged Chinese aid on health indicators

are given by:

$$IM_t = \alpha + \beta_1 CHI_{t-1} + \beta_2 HIV_{t-1} + \beta_3 LIT_{t-1} + \beta_4 UN_{t-1} + \beta_5 POP_{t-1} + \beta_6 GDP_{t-1} + \beta_7 CONF_{t-1} + u_i$$

$$MD_t = \alpha + \beta_1 CHI_{t-1} + \beta_2 HIV_{t-1} + \beta_3 LIT_{t-1} + \beta_4 UN_{t-1} + \beta_5 POP_{t-1} + \beta_6 GDP_{t-1} + \beta_7 CONF_{t-1} + u_i$$

$$LE_t = \alpha + \beta_1 CHI_{t-1} + \beta_2 HIV_{t-1} + \beta_3 LIT_{t-1} + \beta_4 UN_{t-1} + \beta_5 POP_{t-1} + \beta_6 GDP_{t-1} + \beta_7 CONF_{t-1} + u_i$$

Regression output is reported in Table 4. The model is the same, but the independent variable is given by CHI_{t-1} : Chinese health aid in the previous period.

Table 4: The Impact of Chinese Aid on Health Outcomes

	Infant Mortality	Maternal Deaths	Life Expectancy
	Model 10		
lag Chinese aid	9.01E-08* (3.76E-08)	7.29E-06 (5.89E-06)	-2.66E-08* (8.17E-09)
lag GDP per capita	0.001 (0.004)	-1.03 (0.67)	0.003 (0.002)
lag Adult female literacy	-0.68* (0.19)	-52.26 (29.13)	0.11* (0.04)
lag Prevalence of HIV	6.26* (1.98)	422.60 (310.23)	-2.03* (0.41)
lag Prevalence of Undernourishment	-0.47 (0.29)	-78.47 (44.80)	0.25* (0.07)
lag Population	-5.53E-08 (6.19E-08)	0.0003* (9.70E-06)	4.06E-09 (1.28E-08)
lag Armed Conflict	30.30* (7.33)	1970.11 (1149.14)	-7.42* (1.54)
R²	0.28	0.95	0.36
N	106	106	97
states	12	12	12
*: significant for two-sided t-test at $\alpha = 0.05$			

These regressions (Model 10) demonstrate significance with respect to infant mortality and life expectancy, but not maternal deaths. However, the coefficient for infant mortality is positive and the coefficient for life expectancy is negative; the model suggests that an increase to Chinese aid contributes to an increase in infant mortality and a decrease to life expectancy. This relationship contradicts existing studies that find aid has a significant effect in *reducing* infant mortality.¹²⁴

Upon further analysis, however, it appears that these counterintuitive associations are driven by an outlying relationship between Chinese aid and Angolan health. Angola's health profile is the worst of all states included in the analysis. Infant mortality ranges from 128.3 to 106.98 deaths/1,000 live births from 2000-2013, compared to a regional average of 73. During the same period, life expectancy increased from 45.20478 to 51.464 years, compared to a regional average of 55. However, Angola received dramatically higher amounts of aid from China than have the other studied countries, as per Figure 10 (Appendix), likely as a result of Angola's vast mineral resources. These resources have translated into large amounts of aid to a variety of sectors; Angola has accepted a number of development assistance packages from China in exchange for oil or mineral exports that included health-related projects.¹²⁵

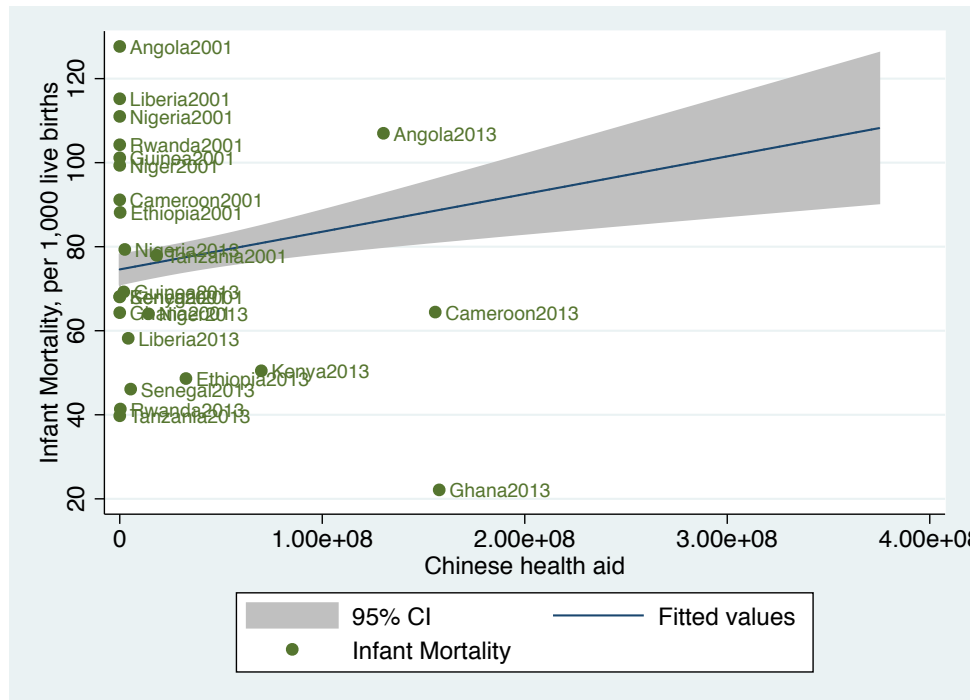
Thus, the combination of these factors accounts for the Angola anomaly, which drives the association between Chinese aid and poor health conditions. This effect is visible in Figure 3; while Angolan infant mortality decreases from 2000 to 2013 along with an increase to its share of Chinese aid, its level of infant mortality is demonstrably higher than the majority of other nations in 2013, skewing the relationship. Additionally,

¹²⁴ Mishra, Prachi, Newhouse, "Does Health Aid Matter?" 2009.

¹²⁵ Bräutigam, Deborah, "Aid 'With Chinese Characteristics,' 2011.

when Angolan data is removed from analysis, hypothesis testing confirms that Chinese aid has no significant impact on either life expectancy or infant mortality, as reported in Table 11 (Appendix).

Figure 3: The Impact of Chinese Aid on Infant Mortality, 2001-2013



For the most part, regressions demonstrate no significant relationships between Chinese aid and health capacity and commitment (Models 11 and 12). These regressions are reported in Table 5 and 6. Here, the model is given by

$$C_t = \alpha + \beta_1 \text{CHI}_{t-1} + \beta_2 \text{HIV}_{t-1} + \beta_3 \text{LIT}_{t-1} + \beta_4 \text{UN}_{t-1} + \beta_5 \text{POP}_{t-1} + \beta_6 \text{GDP}_{t-1} + \beta_7 \text{CONF}_{t-1} + u_i$$

where the dependent variable, C_t , refers to individual variables for capacity and commitment in the current period, compared to the independent variable, Chinese aid in the previous period.

Table 5: The Impact of Chinese Aid on Capacity Indicators

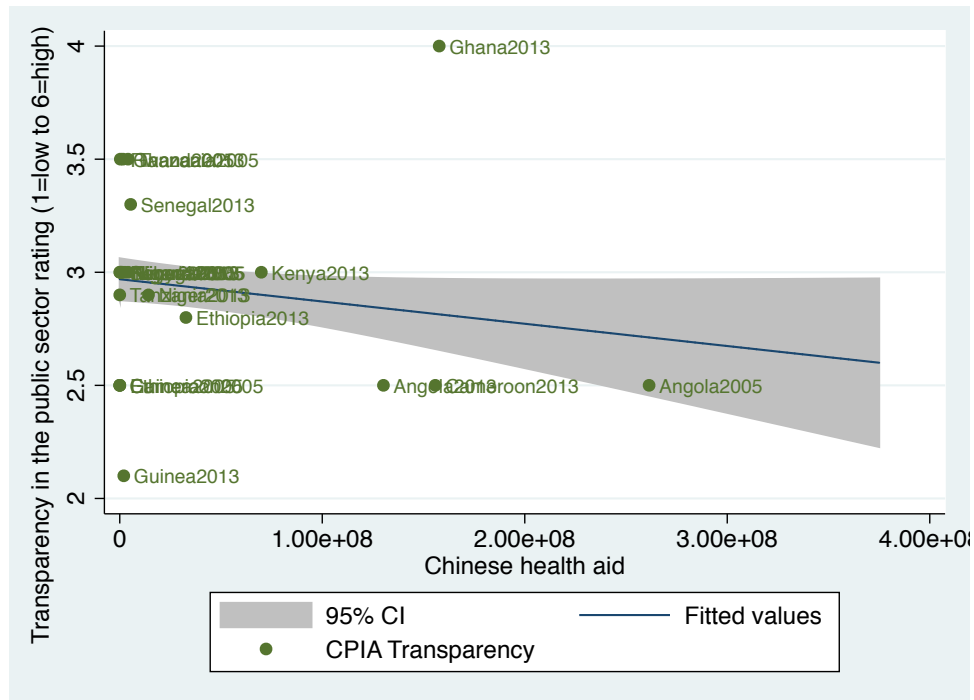
	Births attended by skilled health staff	Contraceptive prevalence	Physicians	Improved sanitation facilities	Improved water source	Hospital beds
Model 11						
lag Chinese aid	-6.52E-08* (2.19E-08)	-2.34E-08 (1.99E-08)	-1.33E-10 (9.64E-11)	-7.40E-08* (2.45E-08)	-2.95E-08 (1.61E-08)	-2.83E-10 (1.49E-09)
lag GDP per capita	0.02* (0.004)	-0.0008 (0.004)	0.00003* (0.00002)	0.03* (0.01)	-0.002 (0.004)	-0.0005 (0.0004)
lag Adult female literacy	0.47* (0.10)	0.43* (0.09)	-0.00003 (0.0005)	0.44* (0.12)	0.37* (0.08)	0.02* (0.009)
lag Prevalence of HIV	-0.79 (1.12)	-0.55 (1.02)	0.02* (0.005)	-2.31 (1.24)	-1.64* (0.81)	0.03 (0.08)
lag Prevalence of Under-nourishment	-0.55* (0.17)	0.24 (0.16)	-0.005* (0.0007)	0.10 (0.20)	-0.67* (0.13)	-0.01 (0.01)
lag Population	-2.27E-07* (3.28E-08)	2.18E-08 (3.03E-08)	1.10E-09* (1.57E-10)	-8.59E-08* (3.83E-08)	-1.23E-07* (2.51E-08)	-2.23E-09 (2.80E-09)
lag Armed Conflict	1.43 (4.07)	-10.67* (3.74)	0.07* (0.02)	11.84* (4.62)	3.72 (3.03)	0.65 (0.44)
R²	0.76	0.58	0.82	0.58	0.63	0.44
N	91	89	95	97	97	64
states	12	12	12	12	12	12
*: significant for two-sided t-test at $\alpha = 0.05$						

Table 6: The Impact of Chinese Aid on Commitment Indicators

	Immunization, DPT	Public health expenditure	CPIA transparency
	Model 12		
lag Chinese aid	-8.61E-08* (2.43E-08)	-7.04E-09 (6.85E-09)	-2.05E-09* (6.42E-10)
lag GDP per capita	0.003 (0.003)	-0.003* (0.002)	-0.0003* (0.0001)
lag Adult female literacy	0.90* (0.12)	0.10* (0.03)	0.03* (0.004)
lag Prevalence of HIV	-4.01* (1.28)	-1.31* (0.35)	-0.26* (0.04)
lag Prevalence of Undernourishment	0.27 (0.19)	0.15* (0.06)	0.01 (0.01)
lag Population	-1.74E-07* (4.00E-08)	1.82E-08 (1.07E-08)	4.23E-09* (1.33E-09)
lag Armed Conflict	-16.51* (4.75)	-3.83* (1.29)	-0.52* (0.19)
R²	0.66	0.24	0.56
N	106	97	74
states	12	12	12
*: significant for two-sided t-test at $\alpha = 0.05$			

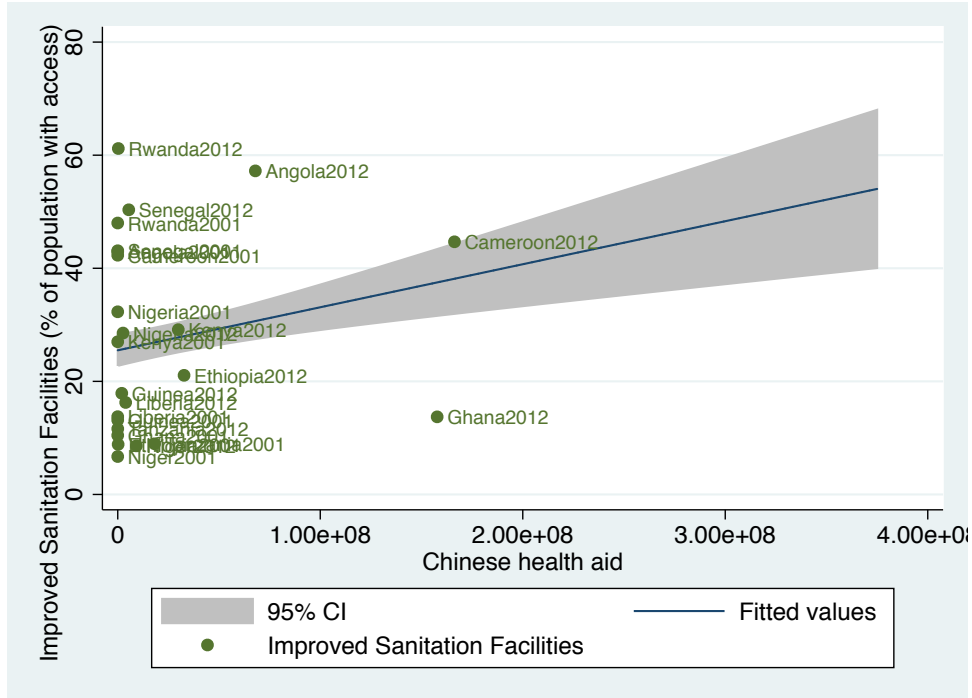
Four significant and negative relationships exist, however, between Chinese aid and CPIA transparency, immunization coverage, sanitation coverage, and births attended by skilled health staff. Again, it is likely that these results are due to outliers. Figure 4 demonstrates the relationship between Chinese aid and transparency; Angola and Cameroon receive very high amounts of Chinese aid but both maintain lower-than-average transparency ratings.

Figure 4: The Impact of Chinese aid on Transparency, 2005-2013



Likewise, the relationship between Chinese aid and sanitation facilities may be skewed by Ghana’s poor sanitation coverage. Ghana received a large amount of Chinese health aid from 2000 to 2012, but its percentage of improved sanitation facilities in 2012 remained much lower than the regional average, as demonstrated in Figure 5.

Figure 5: The Impact of Chinese Aid on Increased Sanitation Facilities, 2001-2012



Figures 11 and 12 (listed in the Appendix), also depict outliers: states receiving extremely high amounts of Chinese health aid report below-average values for immunization coverage and births attended by skilled health staff. Thus, not only does the analysis demonstrate no direct relationship between Chinese aid and health, but it also offers no significant mechanism by which Chinese aid could be influencing the determinants of health (capacity and commitment). This finding rejects the initial hypothesis that China’s use of tied aid improves health capacity.

However, the validity of data on Chinese aid is limited given that it derived from media reports, rather than official reporting from the Chinese government.¹²⁶ This methodology, while the best option available given the lack of official reports, lends itself

¹²⁶ Media reports containing pertinent Chinese aid information are found and coded by student research assistants. Strandow, Findley, Nielson, and Powell, “The UCDP-AidData codebook on Geo-referencing Foreign Aid,” 2011.

to error in that it likely suffers from random bias. Media reports may fail to account for all financial transactions between China and sub-Saharan Africa, or may not include all pertinent sector/commitment information. Thus, the Chinese data suffers the limitation of many missing data points, or aid projects that were omitted from the analysis due to vague activity descriptions. These sources of error may contribute to the insignificant associations between Chinese aid and health outcomes reached by this analysis.

World Bank Aid

OLS regressions describing World Bank aid are reported in Table 7 and demonstrate significant relationships with infant mortality, maternal deaths, and life expectancy. These regressions are given by:

$$IM_t = \alpha + \beta_1 WB_{t-1} + \beta_2 HIV_{t-1} + \beta_3 LIT_{t-1} + \beta_4 UN_{t-1} + \beta_5 POP_{t-1} + \beta_6 GDP_{t-1} + \beta_7 CONF_{t-1} + u_i$$

$$MD_t = \alpha + \beta_1 WB_{t-1} + \beta_2 HIV_{t-1} + \beta_3 LIT_{t-1} + \beta_4 UN_{t-1} + \beta_5 POP_{t-1} + \beta_6 GDP_{t-1} + \beta_7 CONF_{t-1} + u_i$$

$$LE_t = \alpha + \beta_1 WB_{t-1} + \beta_2 HIV_{t-1} + \beta_3 LIT_{t-1} + \beta_4 UN_{t-1} + \beta_5 POP_{t-1} + \beta_6 GDP_{t-1} + \beta_7 CONF_{t-1} + u_i$$

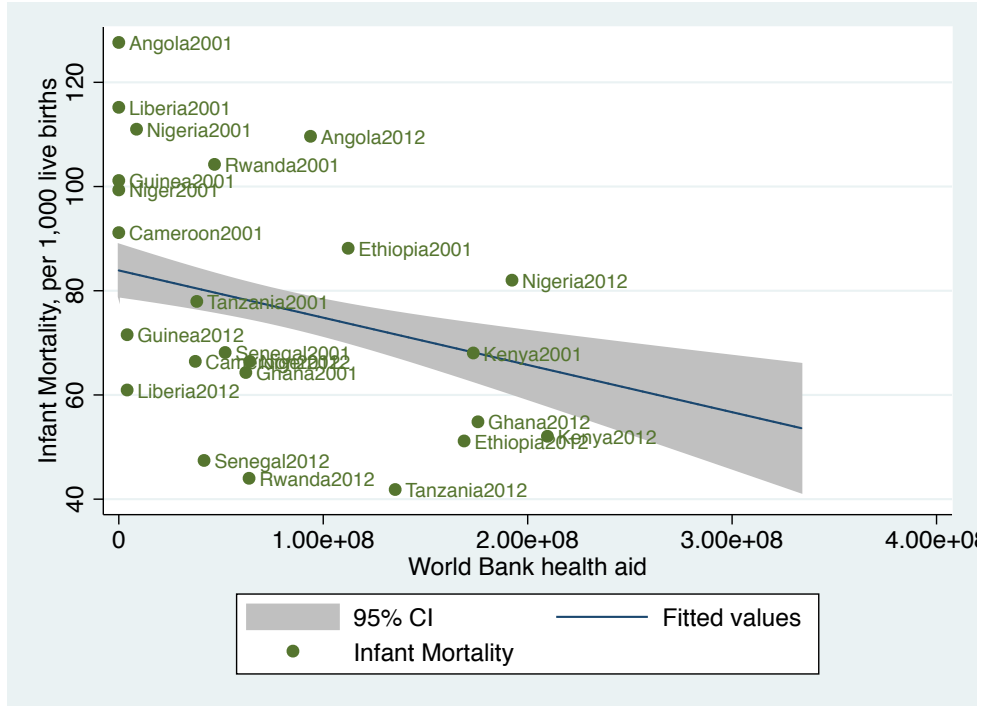
Here, the independent variable is given by WB_{t-1} , or lagged World Bank aid.

Table 7: The Impact of World Bank aid on Health Outcomes

	Infant Mortality	Maternal Deaths	Life Expectancy
	Model 13		
lag World Bank aid	-9.31E-08* (3.70E-08)	-0.00002* (5.53E-06)	2.17E-08* (7.62E-09)
lag GDP per capita	0.01 (0.004)	5.53E-06 (0.61)	0.007 (0.002)
lag Adult female literacy	-0.44* (0.18)	-18.14 (27.39)	0.06 (.04)
lag Prevalence of HIV	4.53* (1.94)	201.99 (290.67)	-1.65* (0.41)
lag Prevalence of Undernourishment	-0.45 (0.28)	-77.96 (42.61)	0.21* (0.07)
lag Population	7.51E-08 (8.31E-08)	0.0003* (0.00001)	-2.52E-08 (1.74E-08)
lag Armed Conflict	26.94* (7.40)	1351.91 (1107.36)	-6.48* (1.57)
R²	0.28	0.95	0.34
N	106	106	97
states	12	12	12
*: significant for two-sided t-test at $\alpha = 0.05$			

For every \$100,000,000 increase in World Bank aid, life expectancy increases by 2.17 years (Model 13). For every \$100,000 increase in aid, maternal deaths decrease by 1.89. The relationship is most striking between World Bank aid and infant mortality. A \$100,000,000 increase to World Bank aid contributes to 9.931 death/1,000 live births decrease in infant mortality. As depicted in Figure 6, most states follow a general trend of increases to aid alongside decreases to infant mortality. Nigeria and Tanzania, in particular, made impressive gains to infant mortality alongside dramatic increases to World Bank aid over the time period. States like Liberia and Rwanda, however, demonstrate the same trend, but achieve significant decreases to infant mortality with only a slight increase to World Bank aid.

Figure 6: The Impact of World Bank Aid on Infant Mortality, 2001-2012



The influence of World Bank aid on capacity and commitment indicators proved more significant than that of Chinese aid; these relationships shed light on the mechanisms by which World Bank aid may be increasing health. Here, the model is given by

$$C_t = \alpha + \beta_1 WB_{t-1} + \beta_2 HIV_{t-1} + \beta_3 LIT_{t-1} + \beta_4 UN_{t-1} + \beta_5 POP_{t-1} + \beta_6 GDP_{t-1} + \beta_7 CONF_{t-1} + u_i$$

where the dependent variable, C_t , refers to individual variables for capacity and commitment in the current period, compared to the independent variable, World Bank aid in the previous period. Regression output measuring the impact of World Bank aid on capacity and commitment is reported in Tables 8 and 9.

Table 8: The Impact of World Bank Aid on Capacity Indicators

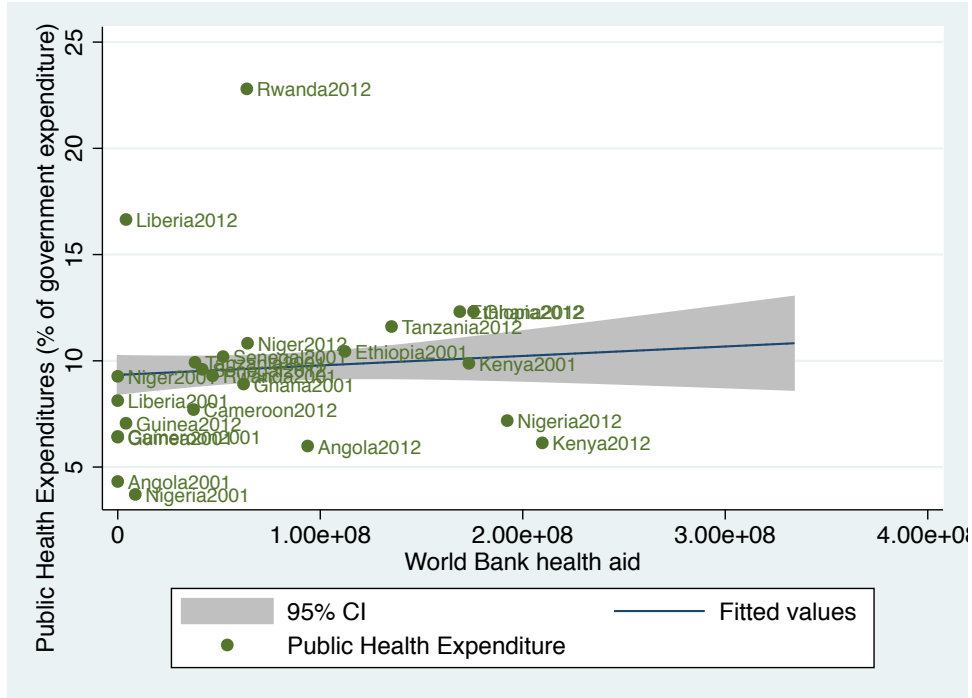
	Births attended by skilled health staff	Contraceptive prevalence	Physicians	Improved sanitation facilities	Improved water source	Hospital beds
Model 14						
lag World Bank aid	-5.10E-08* (1.90E-08)	5.18E-08* (1.67E-08)	-6.58E-11 (9.83E-11)	-5.16E08* (2.30E-08)	-2.06E-08 (1.49E-08)	1.04E-09 (1.45E-09)
lag GDP per capita	0.01* (0.004)	0.001 (0.004)	0.00003* (0.00001)	0.02* (0.001)	-0.005 (0.003)	-0.0005 (0.0004)
lag Adult female literacy	0.51* (0.11)	0.31* (0.09)	-0.0002 (0.0005)	0.45* (0.13)	0.37* (0.08)	0.02* (0.01)
lag Prevalence of HIV	-0.95 (1.14)	0.29 (0.98)	0.02* (0.01)	-1.82 (1.25)	-1.45 (0.81)	0.05 (0.09)
lag Prevalence of Under-nourishment	-0.60* (0.17)	0.25 (0.15)	-0.01* (0.001)	-0.06 (0.20)	-0.74* (0.13)	-0.01 (0.01)
lag Population	-1.29E-07* (4.50E-08)	-5.82E-08 (3.96E-08)	1.23E-09* (2.19E-10)	3.90E-09 (5.25E-08)	-8.73E-08* (3.40E-08)	-3.88E-09 (3.66E-09)
lag Armed Conflict	0.04 (4.16)	-8.38* (3.63)	0.06* (0.02)	11.92* (4.73)	3.75 (3.06)	0.70 (0.43)
R²	0.75	0.62	0.82	0.56	0.59	0.45
N	91	89	95	97	97	64
states	12	12	12	12	12	12
*: significant for two-sided t-test at $\alpha = 0.05$						

Table 9: The Impact of World Bank Aid on Commitment Indicators

	Immunization, DPT	Public health expenditure	CPIA transparency
	Model 15		
lag World Bank aid	5.26E-08* (2.49E-08)	1.24E-08* (6.21E-09)	2.70E-09* (6.88E-10)
lag GDP per capita	0.001 (0.003)	-0.004* (0.001)	-0.0002* (0.0001)
lag Adult female literacy	0.70* (0.12)	0.08* (0.03)	0.02* (0.04)
lag Prevalence of HIV	-2.62* (1.31)	-1.18* (0.34)	-0.21* (0.04)
lag Prevalence of Undernourishment	0.24 (0.19)	0.15* (0.05)	0.01 (0.01)
lag Population	-2.43E-07* (5.60E-08)	3.24E-10 (1.42E-08)	2.12E-10 (1.76E-09)
lag Armed Conflict	-14.41* (4.99)	-3.43* (1.28)	-0.44* (0.19)
R²	0.63	0.27	0.59
N	106	97	74
states	12	12	12
*: significant for two-sided t-test at $\alpha = 0.05$			

World Bank aid is significantly related to increases in all indicators for government commitment to health (Model 15). These results are in keeping with the hypothesis that World Bank aid targets commitment to health with policies of conditionality. Transparency ratings increase by .27 units for every \$100,000,000 increase to World Bank aid; transparency and World Bank aid are the most highly correlated variables in this analysis. \$100,000,000 increases to World Bank aid also yield a 1.24% increase to public expenditures on health and a 5.26% increase to DPT immunization coverage. The relationship between public expenditures on health is depicted in Figure 7.

Figure 7: The Impact of World Bank Aid on Public Health Expenditures, 2001-2012



The impact of World Bank health aid on health expenditures is visually slight, but significant. The simultaneous increases to both health aid and health expenditure are prominent in states like Angola and Ghana, but again, Rwanda and Liberia demonstrate significant increases to health expenditure with only a small increase to World Bank aid. The overall result, however, contradicts theories suggesting the ineffectiveness of development assistance for health in increasing recipient health expenditures. Proponents of this theory suggest that with an influx of health-related funds from abroad, developing countries may opt to divert expenditures ear-marked for health to other areas.¹²⁷ However, the majority of states in this analysis demonstrate increases to health expenditures alongside increases to health aid.

¹²⁷ Lu, Schneider, Gubbins, Leach-Kemon, Jamison, and Murray, “Public Financing of Health in Developing Countries,” 2008.

World Bank health aid also demonstrates statistically significant relationships with a number of capacity indicators (Model 14). For every \$100,000,000 increase in World Bank aid, contraceptive prevalence increases by 5.18%. However, World Bank aid demonstrates negative relationships with sanitation coverage and births attended by skilled health staff. Graphical representations of these relationships suggest that outliers drive these associations. As demonstrated by Figures 13 and 14 (listed in the Appendix), most countries demonstrate increasing relationships (of varying magnitudes) between World Bank aid and sanitation and births attended by skilled health staff. However, despite improvements, some of the top recipients of World Bank aid, such as Ethiopia and Ghana demonstrated persistently lower-than-average sanitation coverage. Similarly, Ethiopia's levels of births attended by skilled health staff in 2001 and 2012 are extremely low, and skew their relationship with World Bank health aid downward.

World Bank aid demonstrates significant association with all indicators for government commitment, in keeping with the hypothesis. Additionally, the Center for Global Development identifies "contraceptive prevalence" as a secondary indicator for government commitment. While contraceptive prevalence is a function of accessible pharmaceuticals and health educators, it may also be dependent on government implementation of family planning programs.¹²⁸ Thus, if we accept this conceptualization of "contraceptive prevalence" as an indicator for commitment, then the World Bank's influence on government commitment over health capacity is further strengthened.

However, the data for World Bank aid is limited in that AidData only reports the World Bank's financial commitments, rather than disbursements. Commitments comprise "new undertakings entered in the year in question (regardless of when disbursements are

¹²⁸ Becker, Loren, Jessica Pickett, and Ruth Levine, "Measuring Commitment to Health," 2006.

expected)” and additions to earlier agreements.¹²⁹ Disbursements, however, reflect the transaction of resources to a recipient country or agency, and may take several years to reach the recipient in full. For this reason, comprehensive disbursement data is difficult to track.¹³⁰ Thus, commitment values for any given year may not reflect the actual amount of aid delivered to a recipient. The use of lags attempts to account for disbursement delay, but a one-year lag may be insufficient without further review of transaction histories. Thus, analysis of World Bank aid may be biased in that yearly transactions may be overestimated, as a sum of commitments rather than disbursements.¹³¹

Summary

The World Bank, in its employment of conditional policies, may improve government transparency, accountability, and service delivery mechanisms to better health. Increases to World Bank aid are significantly related to improvements in infant mortality, maternal deaths, and life expectancy. Additionally, World Bank aid is highly correlated with increases to all indicators for government commitment, and with contraceptive prevalence, which may also provide some indication of institutional commitment to health programming.

¹²⁹ Tierney, Michael J., Daniel L. Nielson, Darren G. Hawkins, J. Timmons Roberts, Michael G. Findley, Ryan M. Powers, Bradley Parks, Sven E. Wilson, and Robert L. Hicks, *More Dollars than Sense: Refining Our Knowledge of Development Finance Using AidData*, *World Development* 39 no 11 (2011), 1891-1906.

¹³⁰ Tierney, Nielson, Hawkins, Roberts, Findley, Powers, Parks, Wilson, and Hicks, “More Dollars than Sense,” 2011.

¹³¹ Data describing Chinese aid is also reported in commitments for the sake of continuity.

Discussion

Does World Bank Aid Cause Better Health?

Empirical analysis points to a significant relationship between World Bank health aid and government commitment to health as well as improvement in health outcomes in twelve African countries. These results are consistent with the theoretical supposition that targeted, conditional aid represents an effective lever to not only improve the livelihoods of citizens in recipient countries but also governance itself. Another important theoretical implication that follows is this suggestion that the bureaucratic impositions and hindrances to capacity from World Bank assistance do not outweigh the institutional changes brought about through conditionality.

Before any conclusions can be drawn, however, it is necessary to ascertain if World Bank health aid is merely correlated with, rather than a precipitate of, both institutional change and improved health indicators. Parallel trends in health aid and decreased infant mortality in countries like Tanzania, Ghana, or Ethiopia, for example, do not prove that better health is the result of conditional World Bank assistance. Surely health conditions and aid policy have an interactive effect—health conditions determine aid policy as much as vice versa.

There are a number of reasons why a donor would extend aid to a particular state. Donors may participate in the business of “picking winners;” countries with pre-existing trends toward better health might receive more attention from opportunistic donors seeking to write easy success stories.¹³² Additionally, donors may allocate more aid to states that have already demonstrated greater commitment to health and/or good

¹³² Rogerson, Andrew, "What if Development Aid Were Truly “Catalytic”?" *Background Note London: ODI* (2011). 3.

governance, in which the health aid is more likely to have a stronger effect.¹³³ To draw firmer conclusions on the causal effect of World Bank aid, further analysis is necessary. At a minimum, if World Bank aid is driving the improvements in health seen since 2000, we would expect infusions of conditional health assistance from the World Bank to *precede* improvements in government healthcare and health outcomes.

To determine if this is the case, I analyzed those countries with the most dramatic improvements in health outcomes and to determine whether World Bank health aid seemed to induce government commitment to healthcare and ultimately better health outcomes. Tanzania, for example, has made significant gains to capacity, commitment, and overall health from 2000 to 2013. These gains correspond to increasing shares in World Bank aid. By 2013, Tanzania achieved an infant mortality rate of 36.4 deaths per 1,000 live births—the lowest in the analysis. Additionally, in the past decade, Tanzania has seen expansions to HIV/AIDS treatment coverage, contraceptive prevalence, births attended by skilled health staff, and access to health facilities.¹³⁴ Transparency ratings declined from 3.5 to 3 over this period, but health expenditures were higher than the regional average and DPT immunization coverage increased from 79 to 91% from 2000-2013. Also, public health spending has increased eight-fold since 2000. Moreover, according to USAID's Health System Assessment for Tanzania, the government has engaged in extensive health sector reform since 1993. Subsequent actions have included

¹³³ Neumayer, Eric, "The Determinants of Aid Allocation by Regional Multilateral Development Banks and United Nations Agencies," *International Studies Quarterly* 47, no. 1 (2003): 101-122.

¹³⁴ *Tanzania Health System Assessment*: USAID, 2010, http://www.healthsystemassessment.com/wp-content/uploads/2012/06/Tanzania_HSA_final_MCDV.pdf

community health funds for poor/rural citizens, a national insurance fund for civil servants, and social security programming to improve availability and access to care.¹³⁵

Thus, the Tanzanian government's demonstrated commitment to health has preceded the analyzed time period, and this infusion of World Bank health aid. It may be that World Bank aid caused improvements to health commitment during the 1990s; however, further research as to the history of Tanzanian/World Bank relations suggests that this may not be true. Despite the implementation of health reforms in 1993, the Tanzanian government failed to commit to economic reforms from 1992 to 1995, prompting the World Bank to scale back its financial support during this period.¹³⁶ This hiccup in the relationship between the World Bank and Tanzania seems to undermine the notion that World Bank aid precipitated Tanzania's surge in health commitment in 1993. Additionally, the data does not indicate any increase to World Bank health aid prompting improvements in health commitment from 2000-2013.

Ghana also demonstrates vast improvements to commitment, capacity, and health outcomes alongside increases to health aid. Ghana's transparency rating is 4/6 for the majority of observed time periods, the highest of any other analyzed state. Immunization coverage reached 90% in 2013, health expenditures met regional averages, and indicators for life expectancy, infant mortality, and maternal deaths improved steadily from 2000 to 2013. While quality and distribution of services are lacking, Ghana's health system is strong; the government has facilitated programs to increase health personnel and increase public insurance coverage.

¹³⁵ *Tanzania Health System Assessment*: USAID, 2010.

¹³⁶ The Hellenier Process, an action of the Danish government, helped Tanzania to restore relations with donors beginning in 1994. Muganda, Anna, *Tanzania's Economic Reforms — and Lessons Learned*: IBRD/World Bank, 2004.

In 2003, the Ghanaian government issued the National Health Insurance Act, an attempt to transition to a uniform national healthcare system, one that would alleviate financial barriers to medical care. Ghana also began to earmark revenue for health spending in 2003 to stabilize public health contributions.¹³⁷ Thus, Ghana made significant demonstrations of government commitment to health in 2003. Data for World Bank aid, however, reveals that health aid to Ghana increased after 2003, rather than before. As with Tanzania, data does not indicate any discernable pattern describing an increase to World Bank health aid followed by an improvement to any commitment indicator or health outcome.

There are no apparent trends in World Bank aid allocation that indicate a causal relationship between World Bank health aid and increased commitment with regard to the analyzed countries. The same can be said of the relationships between World Bank aid and improved health outcomes. Interestingly, World Bank health aid to Ghana increased after 2003, when the government invested heavily in health programming. This suggests that the World Bank may have allocated health aid based on Ghana's already demonstrated commitment. However, this is just one case. Further analysis is necessary to determine the motivations behind World Bank health aid, and whether or not it precipitates improvements to commitment or overall health.

Why Isn't Chinese Health Aid Effective?

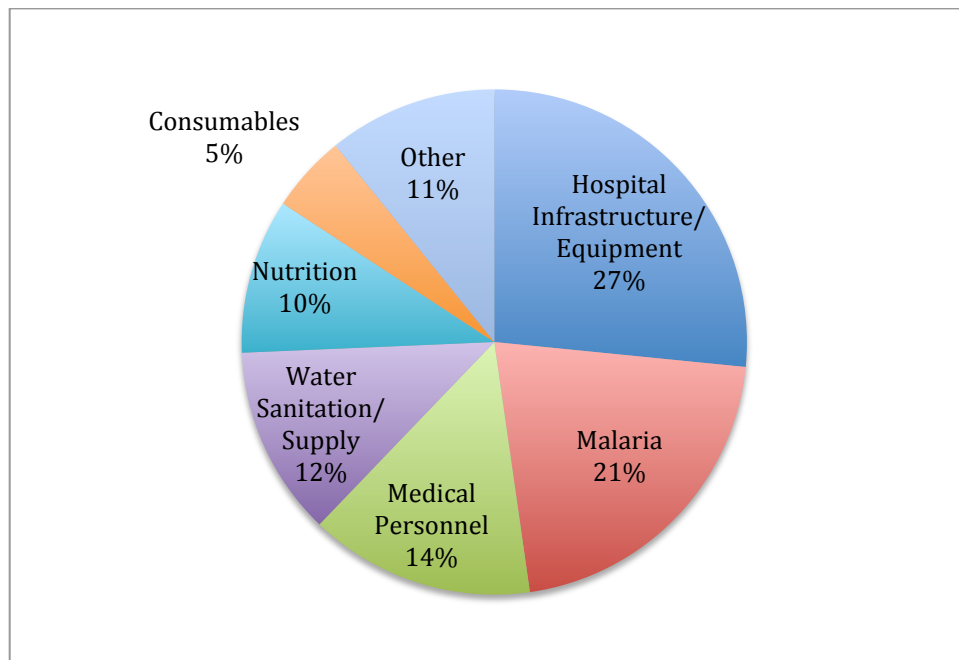
Regression analysis demonstrates that Chinese health aid – after accounting for the outlying health profile of Angola – has no significant impact on infant mortality,

¹³⁷ Saleh, Karima, *The Health Sector in Ghana: A Comprehensive Assessment*, World Bank Publications, 2012.

maternal deaths, or life expectancy. Additionally, results suggest that Chinese aid poses no benefit to either health capacity or commitment. These results do not support the hypothesis that China’s use of tied aid streamlines the aid delivery process, bypassing ineffective government to produce better health capacity.

Why does Chinese aid demonstrate no significant relationship with health? Are critics of the Chinese model correct in that Chinese aid perpetuates bad government and does not improve human development indicators? Expanded analysis of Chinese aid composition may shed light on these questions. Figure 8 demonstrates that Chinese aid is primarily composed of assistance for infrastructure, equipment, and personnel. These results are not surprising, and they support conventional claims that Chinese practices favor infrastructure and short-term outputs.¹³⁸

Figure 8: Chinese Aid Allocation by Sector



¹³⁸ Tan-Mullins, Mohan, and Power. “Redefining ‘Aid,’” 2010

On the other hand, data indicates that World Bank aid is comprised of general health system support and community health development to a greater degree than Chinese aid, as shown in Figure 15 (Appendix). This policy adheres to prevailing theories, which posit that aid aimed at the improvement of overarching health systems is more effective than narrower, area-specific transactions.¹³⁹ Rwanda's agency over its aid allocation is demonstrative of this effect; in the early 2000s, donors extended Rwanda large amounts of aid for HIV-specific programming. Instead, Rwanda used these funds to foster a better primary care system, given that "HIV does not exist in a vacuum."¹⁴⁰ Support for health systems is ultimately more useful than issue-specific aid. It may be that aid for medical consumables and infrastructure operates in a similar way: without a functional system in which to use such infrastructure effectively, health will not improve in the long term. Thus, the disparity in Chinese and World Bank sector allocation suggests that direct increases to capacity may be insufficient to improve health services in poor countries.

However, concentrated Chinese aid to sub-Saharan Africa is a relatively new phenomenon; it may be that Chinese infrastructure aid has not yet taken effect. Furthermore, there is certainly a localized impact of Chinese aid; Jackson Doe Memorial Hospital, which China has helped to construct, was recently the site of the first neurological surgeries performed in Liberia. The hospital's construction has attracted specialized research and medical personnel to Liberia's Nimba County.¹⁴¹ Given the

¹³⁹ Piva, Paolo and Dodd, "Where Did All the Aid Go?" 2008.

¹⁴⁰ Emery, "Rwanda's Historic Health Recovery," 2013.

¹⁴¹ "Liberia: First Brain Surgery Performed at Tappita Hospital," AllAfrica, Accessed May 19, 2015. <http://allafrica.com/stories/201404101087.html>.

localized, rather than system-wide nature of Chinese infrastructure aid, a sub-national analysis may be more prudent to determine its impact in future studies.

Conclusion

The development of new granular datasets regarding Chinese aid provides the academic community with an important chance to empirically evaluate the effect of assistance from this increasingly important donor. China's rising influence in the aid community has coincided with increasingly negative perceptions of established Western practices. However, this analysis demonstrates no statistically significant relationships between Chinese health aid and health capacity, commitment, or overall health. While further analysis and better data are needed to draw more definitive conclusions, it appears that China's employment of tied aid and infrastructure development is not a short-term silver bullet in terms of improving health outcomes. In fact, healthcare policies and health indicators have improved dramatically in the absence of Chinese health aid.

World Bank health aid, on the other hand, is significantly associated with achievements in government commitment and overall health. Again, further analysis of World Bank health aid is necessary to determine if these relationships are truly causal, but these results suggest that the World Bank's conditional aid policies do not appear to undermine healthcare as some critics claim. This affirmation is timely, given the recent challenges posed by China's proposed Asian Infrastructure Investment Bank. While the World Bank would do well to ease the detriments associated with conditionality, such as the bureaucratic burden imposed on recipient states, it appears that traditional aid policies win the day in producing better health outcomes in developing states. And, it is essential that evaluation of aid effectiveness continue, lest donors fall into complacency. Future research to better understand the motivations of World Bank aid allocation could go a

long way in determining whether its policies actually precipitate sustainable developments in healthcare.

APPENDIX

Table 10: Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Year	168	2006.5	4.04	2000	2013
Chinese aid (USD current)	168	2.93E+07	1.27E+08	0	1.00E+09
World Bank aid (USD current)	168	7.15E+07	1.25E+08	0	7.81E+08
Infant Mortality, per 1,000 live births	168	73.22	22.25	36.4	128.3
Number of Maternal Deaths	48	8910	11835.31	980	50000
Life Expectancy at birth, total (years)	156	54.99	4.43	45.20	63.49
Births attended by skilled health staff (% of total)	38	44.96	16.60	5.6	69
Contraceptive prevalence (% of women ages 15-49)	36	20.49	11.43	5.6	51.6
Physicians, per 1,000 population	45	0.01	0.10	0.01	0.41
Improved sanitation facilities (% of population with access)	156	27.82	17.02	6.6	63.8
Improved water source (% of population with access)	156	60.84	11.65	29	87.2
Hospital beds per 1,000 population	28	1.09	1.15	0.1	6.3
Immunization, DPT (% of children, ages 12-23 months)	168	69.71	20.84	25	99
CPIA Transparency, accountability, and corruption in the public sector rating (1=low 6=high)	104	2.93	0.48	2	4
Public health expenditure, (% of government expenditures)	156	9.96	4.25	2.86	24.01
Population, total	168	3.44E+07	3.97E+07	2891968	1.74E+08
Prevalence of HIV,	168	3.03	2.08	0.4	9.3

total, (% of population ages 15-49)					
Prevalence of undernourishment (% of population)	156	26.40	12.48	5	55.7
Armed Conflict (0= no conflict, 1= minor conflict, 2 = major conflict)	168	0.28	0.51	0	2
GDP per capita USD current	168	811.58	964.91	112.24	5783.37
Adult female literacy rate (% of females ages 15 and above)	29	41.94	20.57	8.94	77.89

Table 11: Impact of Chinese Aid on Health Outcomes, No Angola

TABLE 4	infant mortality	maternal deaths	life expectancy
lag Chinese aid	-2.19E-09 (4.11E-08)	4.29E-06 (7.37E-06)	-6.91E-09 (9.48E-09)
lag GDP per capita	-0.02 (0.01)	-5.70E+00 (1.15)	0.005 (0.002)
lag Adult female literacy	-0.65 (0.15)	-35.91 (26.55)	0.14 (0.03)
lag Prevalence of HIV	8.24 (1.51)	602.72 (271.03)	-2.48 (0.33)
lag Prevalence of Undernourishment	-1.34 (0.25)	-199.30 (45.61)	0.33 (0.05)
lag Population	-2.96E-08 (4.91E-08)	0.0003 (8.79E-06)	3.06E-09 (1.04E-08)
lag Armed Conflict	26.61 (6.04)	1684.51 (1082.30)	-5.57 (1.32)
R²	0.43	0.96	0.54
N	100	100	92
states	11	11	11
*: significant for two-sided t-test at $\alpha = 0.05$			

Figure 9: Impact of Improved Sanitation Facilities on Maternal Deaths, 2001-2012

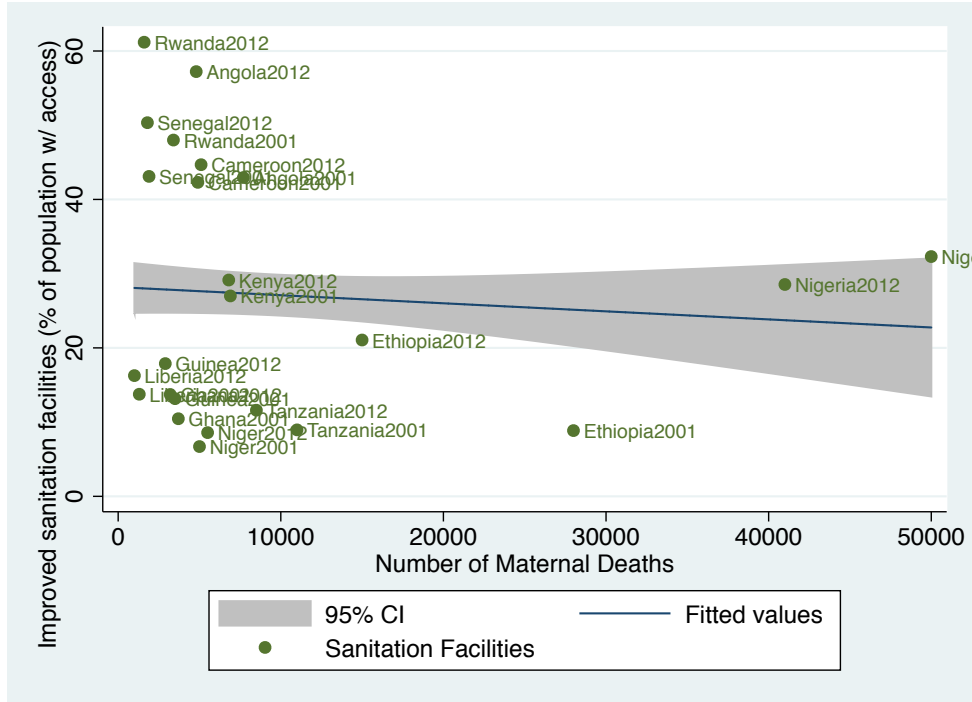


Figure 10: Chinese Aid Allocation by Country

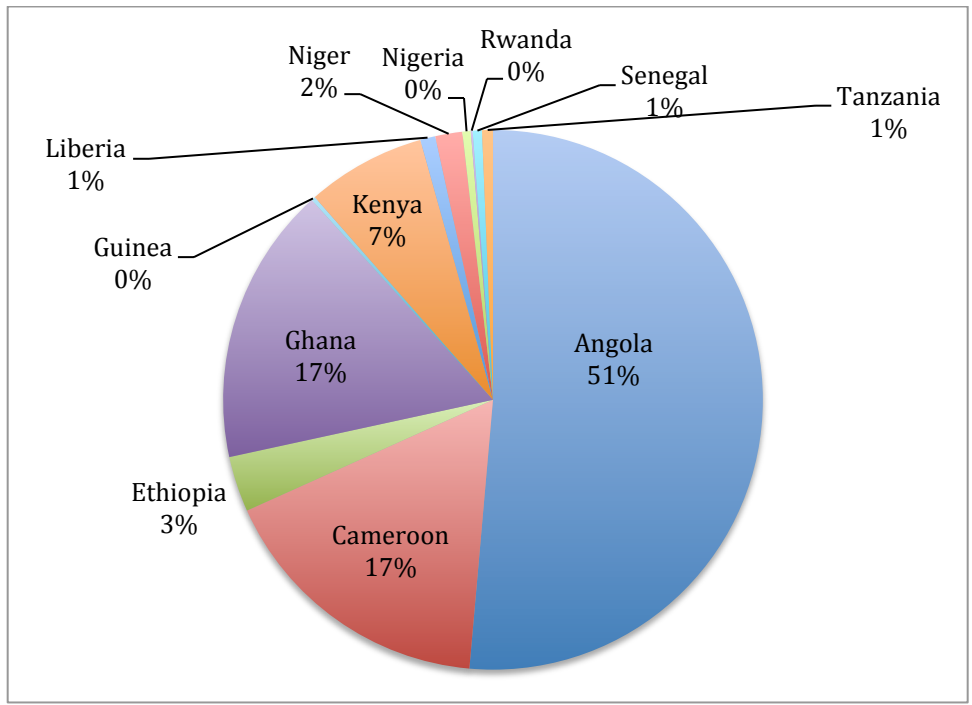


Figure 11: Impact of Chinese Aid on Immunization Coverage

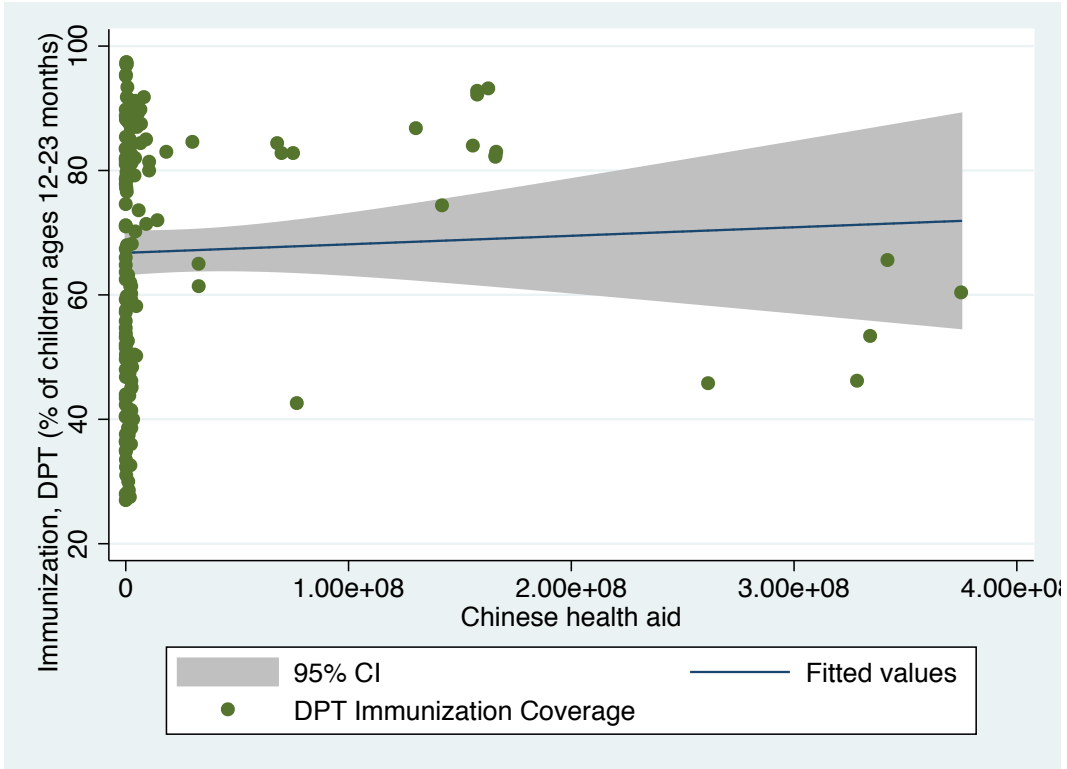


Figure 12: Impact of Chinese Aid on Births Attended by Skilled Health Staff

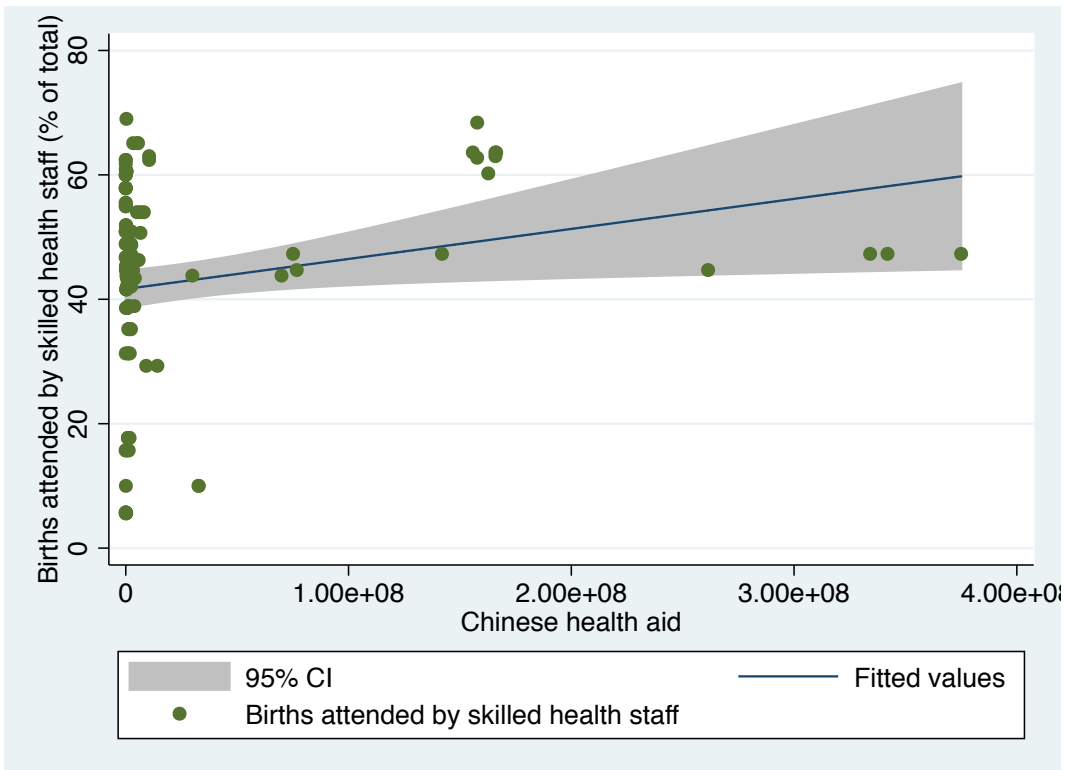


Figure 13: Impact of World Bank Aid on Improved Sanitation Facilities, 2001-2012

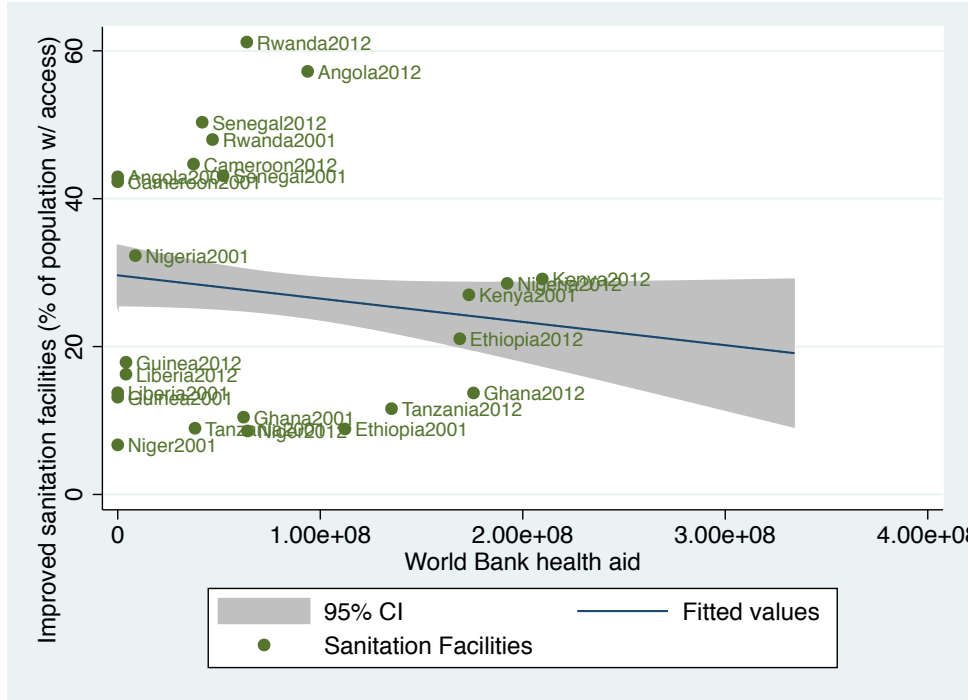
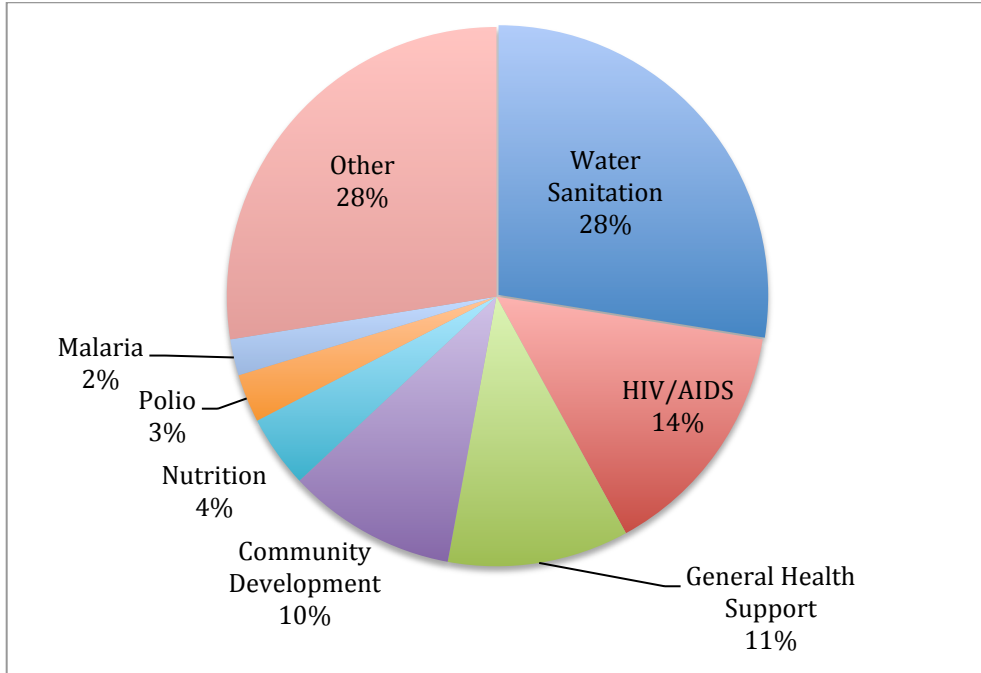


Figure 14: Impact of World Bank Aid on Births Attended By Skilled Health Staff, 2001- 2012



Figure 15: World Bank Aid Allocation by Sector



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