

**Seeing Beyond Service: Redefining the Problem of Water and Sanitation Service Delivery
in Resource-Limited Settings to Enable Effective Solutions**

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ABSTRACT

The purpose of this study was to examine the effectiveness of water and sanitation service delivery in resource-limited settings using two different social theories (modernization and world system). Understanding that barriers to effectiveness are rooted in global structures that tend to present at local levels helps redefine the problem leading to comprehensive policies and practices. The guiding research questions included an identification of an *effectiveness gap* in services delivered in developed countries compared to those in developing countries. This study included a survey of water and sanitation professionals gauging their opinions on trends within the sector. Survey respondents demonstrated that the sector tends to align with localized (i.e. modernist) approaches. This may explain the perpetuation of differential patterns in water and sanitation access and associated diseases and deaths in developing countries. Through a case study of Partners In Health (PIH), a medical-oriented non-governmental organization used as a proxy for water and sanitation organizations, this work illustrated why personal and organizational philosophies and perspectives influence how we organize and act. It concludes with a discussion of engineering decision making through the lenses offered by modernization and world system theories; presents an organizational structure that allows organizations to overcome theoretical and geographic boundaries; and offers a set of recommendations learned from PIH and those the sector does well. This research shows how water and sanitation organizations, practices, and policies that consider local and global forces are more effective at delivering services in developing countries than those focusing solely on local forces.

I dedicate this work to girls living in poverty – may they one day have the same choices as my girls.

In memory of Norris 206.

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Chapter 1 INTRODUCTION

1.0 Background

Water is a basic human need. It is also a requirement of modern human activity that facilitates food preparation, bathing, fire protection, agriculture, and industry. Societies have developed, adapted, and adopted technical practices to enhance their collection and distribution abilities for these multiple uses. Practices for household water use, the focus of this study, demand particular attention, as they are essential for vibrant and healthy communities. Household water must be free of contaminants to prevent a majority of water-related diseases. Infectious water-related diseases, however, are part of a waterborne cycle that includes excreta. Thus, societies have also developed sanitation practices for safe disposal of human wastes and personal hygiene practices in order to break the waterborne cycle. While water and sanitation services account for economic and other societal benefits, their health benefits are of significant importance.

Service delivery remains a challenge in developed countries, but services drastically diminish risks associated with water-related diseases. However, in developing countries nearly 1 billion people lack access to clean drinking water and 2.5 billion people lack access to adequate sanitation. Each year diseases such as typhoid and cholera, and water contaminated with natural and anthropogenic substances kills nearly 5 million people, the vast majority of whom live in poverty (WHO 2000). By comparison, HIV/AIDS and TB together claims approximately 3.5 million deaths a year (WHO 2008). Safe drinking water, adequate sanitation, and basic personal hygiene can prevent water-related diseases. This study aims to address the disparity in service delivery that exists between resource-rich communities and resource-poor communities.

While engineers are at the forefront of service delivery, provision of water and sanitation is not merely a technical problem - it cuts across social, political, and economic disciplines. Members of the water and sanitation sector, to include engineers, economists, and social scientists, have long debated the most effective approaches for delivery of water and sanitation services.

Nowhere is this debate louder than in the international development community assisting developing countries with their infrastructure. Since U.S. President Harry Truman ushered in the development era with his Point Four Program, professionals, policy writers, and scholars have deliberated technical solutions for delivery of services, the mandate for water-related assistance, and how to and who should finance these services. As the debate continues, many billions of people, living largely in poor and marginalized communities, continue to suffer from an age old problem that does not defy solutions.

A survey of current literature reveals discordant views regarding the effectiveness of water and sanitation services for the control of water-related diseases. On one hand, optimistic observers point to increased access to services and positive projections of the world meeting the Millennium Development Goal for safe drinking water by 2015. Recent years have seen a growing consensus that point-of-use systems and latrines will lead to high percentages of people having access to safe water and sanitation. The World Health Organization hails these household water treatment and safe storage technologies as “lead[ing] to dramatic improvements in drinking water quality and reductions in diarrhoeal diseases (WHO 2010).” From this point of view, cure for water-related diseases has been discovered and it is just a matter of time before everyone has access.

Critics, on the other hand, call attention to the widening gap between advances in access and the degree of effective water-related disease control in those communities bearing the greatest disease burden. Decentralized technologies (those managed at the household and community levels) cited in scholarly literature, promoted by many engineering-related non-governmental organizations, and published in reports by organizations such as the UN and World Bank often fail to meet user's needs. Many detractors point to the cost of systems that are more effective and the inability or unwillingness of individuals and/or communities to make payments, while others suggest that communities fail to operate and maintain their systems. But deaths from water-related diseases, numbering in the millions annually, are the most compelling rebuke to optimism (Farmer 2010).

Even as access to water and sanitation increases, it is difficult to document health benefits on global water-related disease incidence. Yet, in the current decade, water-borne pathogens will infect billions of people who lack unsafe drinking water, toilets, and/or the means for personal hygiene and more than fifty million people will die from related preventable diseases unless access is not only increased, but also made more effective. For whatever reason, the world is not treating this as a typical global health crisis (not in relation to how small pox was eradicated or how WHO is managing the H1N1 pandemic). Unlike air-borne diseases, most water-related diseases (with the exception of those transmitted via insects and other live vectors) are self-contained. That is, one must perform a deliberate act (i.e. eat food prepared with or drink unsafe water) in order to ingest pathogens. Because of the nature of most water-related diseases, the world has relegated them to those living in poverty.

To suggest that the sector is doing all that it can and that improvements take time is to accept millions of annual deaths that could be prevented. People often make the lay argument, rather callously, that everyone dies eventually and that attrition associated with infectious diseases curbs the global exponential population growth rate. Over the next forty years, growth rates in developed or industrialized countries will be relatively static, while the boom will continue to occur in developing countries. One projection estimates that the population in developed countries between 2000 and 2050 will remain approximately 1.5 billion. Populations in developing countries over the same time period will rise from 6 to over 10 billion (Rekacewicz 1997).

The lay argument continues with a call for birth control in developing countries to stem this unfettered growth. Yet, evidence suggests that poverty, not sexual activity or promiscuity, is the greater predictor of population growth. In other words, populations with their needs met are more likely to have lower birth rates than those suffering from poverty (Sachs 2005). Left unchecked, global population will fall to “the tragedy of the commons” as world resources will not be able to meet population demands (Hardin 1968). In this way, poverty is *the* global health crisis. Not only does it condone many preventable diseases (which should cause us a grave moral concern if nothing else), it threatens all of humanity as a scourge of the earth. Thus, poverty and all of its consequences on human and environmental health is a significant moral hazard wanting renewed problem solving techniques. This work aims to address one subset of these problems.

This study attempts to characterize current policies and practices of local water and sanitation services the sector delivers across resource-poor communities. It then describes in some detail one community-based organization’s (Partners In Health – PIH) efforts to implement effective

solutions in some of the most confining contexts. A key to PIH's success is accounting for the crippling poverty that so often plays a central role in determining who does or who does not benefit from interventions. By illustrating how the water and sanitation sector can make improvements learned from PIH, I try to show how other sectors can overcome similar problems. In this way, this research hopes to awaken the obligation and capability of those who can elevate the dignity of people living in poverty.

1.1 The Role of Sociological Theories

Most studies of service delivery failure demonstrate that the problem is predominantly one of designing and implementing programs that are appropriate to the needs of the population the program serves (Cairncross and Feachem 1993; ECSP 2008; Farmer 2010). Countless examples of program failure exist formally in the literature and people share them informally at conferences. Typical reasons for failure might include a lack of money, electricity, local technical expertise, or inaccessible replacement parts. Effective programs account for these barriers. Yet, implementing them proves to be challenging and results (as measured by national morbidity rates for water-related diarrhoeal diseases) continue to be inconsistent across contexts despite significant improvements and progress, both in scholarly research and professional practice. Moreover, services delivered in rich countries are far more likely to reduce the risk of water-related diseases than those in poorer countries.

Structural forces play a significant role in the perpetuation of infectious diseases prevalent especially among those living in poverty – prevention and treatment are not merely isolated cognitive interventions. These forces, such as one-sided trade agreements, poor labor conditions,

or crippling debt to foreign banks are the root causes of poverty. In a conceptual, but realistic, way, a community suffers a typhoid epidemic because they lack the necessary systems that provide clean drinking and adequate sanitation (lacking either the actual technology or the means to operate and maintain it). They lack it because there is no effective municipality. There is no municipality because the regional and national governments are weak and/or inept. Their historical position within the global economy often predates their ability to govern. Their position is associated with these larger social, political, and, predominantly, economic forces (the tools of controlling global economics). In this way, the local is intrinsically linked (if not at the mercy of) the global.

Scholars and professionals alike place current praxis and pretexts for its shortcomings inextricably in the proximal (that is, the local). As this work demonstrates, the sector fails to consider the influence of distal forces perhaps missing a set of variables in its models. This research posits that national differences in service delivery are due in large part to an inadequate theoretical understanding of approaches for infrastructure in resource-limited settings. Without a more complete understanding of how proximal and distal social, political, economic, and technical factors influence practice and policy, the gap between rich and poor is likely to persist. Modernization and World System theories are dominant sociological theories explaining international development. The former predicts a country's development on internal social, political, and economic conditions as it evolves from a traditional to a modern state. In contrast, the latter predicts a country's ability to develop on its external position within the global economy in which a few, powerful core nations exploit natural and human resources in weak, peripheral ones as semi-peripheral countries both exploit and are exploited. In short,

modernization theory tends to focus on local variables within the geographical boundary of a nation, whereas world system theory considers variables external to national boundaries. When used together, these two theories complement each other accounting for a wide range of variables in order to facilitate this research. The following sections present the objectives of this work and explain how the remainder of the document is organized.

1.2 Research Objectives

This critical analysis attempts to improve current comprehension of why water-related diseases persist in developing countries by testing two, complementary development theories (modernization theory that and world systems theory). With broader perspective these theories offer, it then seeks to explore how the sector can adapt its practices and adopt those from other sectors in order to move past the current impasse. To address this goal, the research set out to answer four questions:

1. How effective are water and sanitation practices in developing countries, and how do contextual barriers influence sector effectiveness?
2. How does the water and sanitation sector define context, and how does this perspective influence their practice?
3. How do organizations in other, related sectors deliver effective services in resource-limited settings?
4. How can the water and sanitation sector deliver services that are more effective in resource-limited settings?

The complexity of methods required to answer these questions mirrored those of the problem.

This study employed mixed methods in order to explain multiple aspects of service delivery across varying contexts through theoretical lenses of modernization and world system theories

(refer to Chapter 2, Section 2.7 for an explanation of these concepts). Existing data from the World Health Organization (WHO) and other development institutions and a review of water and sanitation literature was used to answer Question 1. A web-based survey of water and sanitation professionals was employed to answer Question 2 using descriptive and inferential statistics, while case-based methodologies were implemented to explain Question 3 through triangulation of multiple data sources and single-case explanation building. Access to effective water-related organizations was unattainable. Partners In Health admitted entry into their organization and was also of great interest due to their unique approach – a community-based approach dependent on paid health workers that enables them to serve millions of patients each year and curb diseases in areas of high prevalence and confining local conditions. While PIH is primarily a medical organization, like the water and sanitation sector, they provide public health related services. Established sociological theories provide the means to relate results from the PIH case study to the water and sanitation sector and to other sectors associated with development in a systematic method. The following subsections present how the document is organized.

1.3 Presentation of the Research

This work includes four other chapters presenting a review of pertinent literature, research methods, presentation of results, and discussion and conclusion. The following subsections provide summaries of each chapter.

1.3.1 Chapter 2 – Literature Review

This scale of this research is at the macro-level. The literature covering the topic of water and sanitation in developing countries is rich and vast. This chapter is not meant to be a

comprehensive review, but merely a summary of important background information and debates within the literature. It starts with a discussion about the context of international development, a phenomenon new to the 20th Century ushered in by U.S. President Harry Truman during in his 1949 Inaugural Address. Part I of this chapter then describes the current state of the water and sanitation sector using Millennium Development Goals as a metric of sector effectiveness. Part II describes barriers to service delivery with an emphasis on technical aspects and debates, but also highlights critical literature, a set of work often devoid of sector participation. It then transitions to an argument that water and sanitation service delivery is a problem related to poverty. Since poverty is a social problem, this chapter introduces of social theories as tools used to analyze such problems. It concludes with a categorization of barriers to effective service delivery grounded in theory, using modernization and world system theories as heuristic guides.

1.3.2 Chapter 3 – Mixed methods

Chapter 3 details an embedded, mixed methodology used to examine the theoretical foundation of current water and sanitation practices, as well as the approaches of Partners In Health (PIH) as a proxy for effective and accessible water and sanitation organizations. Part I describes a three-part, web-based survey of water and sanitation professionals to explain attitudes and opinions of sector policies and practices through descriptive statistics and coding techniques. The second part explains robust case-based methodologies to investigate approaches PIH. It details the development and implementation of semi-structured interviews, document analysis, and qualitative tools to analyze data.

1.3.3 Chapter 4 - Results

Chapter 4 presents both sets of findings from the two separate studies. Part I organizes overall data from the web-based survey related to barrier/obligation/capacity, trends within the sector, and explanations of shortcomings within the sector. It also includes comparisons across different demographic groups and a discussion as to why these differences exist. Part II offers findings from the case study and begins to draw distinctions between survey findings (i.e. current water and sanitation philosophies and practices) and case study findings (i.e. PIH's approach to service delivery). Results demonstrate that a unique organizational philosophy exists within PIH; illustrates how they have organized to overcome theoretical and geographic boundaries because of their beliefs; and presents several principles of practice enabling their effectiveness.

1.3.4 Chapter 5 – Discussion and conclusions

Chapter 5 begins with a general discussion related to the interconnectedness of the local and global, as well as theory and practice. It argues that has water and sanitation praxis converges with a theoretical understanding of the problem, new solutions will become available that enable effective service delivery. It then illustrates a possible organizational structure necessary to facilitate this new approach. The discussion concludes with a recommendation of eight principles of practice built upon existing water and sanitation efforts, as well as lessons learned from Partners In Health. It then presents several avenues for future research and methods to disseminate findings and ends with several thoughts about what it means to be sick in poor in the modern age and the sector's response to suffering.

The outcomes of this research have the potential to redefine practices and policies of service-related international assistance. Intellectual merits include contributions to research methods, interdisciplinary studies, and engineering education, while making broader impacts by addressing several industry-supported “calls to action” and codes of ethics, as well as expanding the influence of social theories on technical policies and practices. The following subsections illustrate these merits and impacts in detail.

1.4 Intellectual Merits and Broader Impacts

This work addresses issues related to improving health through water and sanitation service delivery in developing countries more effectively than current practices and policies. However, it asserts that practices cannot change until professionals understand how and why they do what they do. By explaining problems through social theories (in lieu of ideology), policy and practice may align more closely. Improving this praxis within water and sanitation may also inform other development sectors.

1.4.1 Intellectual merits

Intellectual merits of this work include:

1. This study defines clear, addressable research objectives and methodologies to study an extremely complex and complicated problem with the potential to improve public health. This proposal investigates questions empirically using mixed-methods that include quantitative data from a survey and qualitative data from complementary interview and document analysis. Social theories underpin a guiding proposition that provides a framework to guide data collection for and analysis of this engineering-related problem.

2. The findings have the potential to shift current ideologies within public health engineering practice and research and expand the participation of engineers in interdisciplinary research. It also extends case-based research methodologies that are emerging as a robust method within engineering.
3. The research topic is significant and unique in that it ties together two bodies of research: engineering infrastructure with social sciences. This research is potentially transformative because it may well lead to a fundamental shift in the way engineers think about and approach socio-technical problems.
4. Research results may have a profound influence on international developmental policy as U.S. backed financial institutions seek ways to improve project impacts and returns on development investments in resource-poor countries.
5. This body of work reinforces professional calls to transform undergraduate and graduate engineering programs with a particular emphasis placed on the inclusion of social sciences and theories, as well as the pragmatic inclusion of engineering frameworks within social science research and education.

1.4.2 Broader impacts

Broader impacts of this work include:

1. The outcomes of this project enhance science and technological understandings of a socio-technical problem rooted across disciplines. This responds directly to the numerous calls to action such as those proclaimed by the National Academy of Engineers and American Society of Civil Engineers. Through analytical analysis of the Partners In Health's approach, a model aimed at specific health care interventions in resource-poor

communities across the globe, the findings hold the potential to disseminate not only across public health fields, but also throughout all scientific and engineering fields associated with socio-technical issues.

2. This project expects to demonstrate that socio-technical macro-level barriers associated with the world system affect project success at the micro-level. Engineers may then become advocates for social justice in order to overcome these barriers. In so doing, this work benefits all of national, indeed global, society by demonstrating a more equitable progress promised to each one of us by modernity, regardless of geography.

Chapter 2 LITERATURE REVIEW

2.0 Overview and Background

This chapter details past efforts of the water and sanitation sector, its current state, and then sets a theoretical foundation to explain shortcomings of service delivery in resource-limited settings.

This chapter aims to answer Question 1: How effective are water and sanitation practices in developing countries, and how do contextual barriers influence sector effectiveness? Part I assesses the current state of the water and sanitation sector through review and analysis of data reported by The World Bank and World Health Organization. It concludes with a definition of a gap in the quality of services offered in developing countries compared to those offered in developed countries. Part II provides an overview of water and sanitation practices in resource-poor settings. It then presents social theory as a tool that enables a more comprehensive perspective to understand differential patterns in access to water and sanitation and related diseases between geographic settings. Barriers to effective service delivery are then characterized using variables associated with the supporting theories.

In order to begin the conversation, it is important to situate this study within the broader context of international development. The roots of this context run deep. President Harry Truman's 1949 Inaugural Address (which later became known as *Point Four*) provides a historical backdrop of developmental policy. It is thick with language, themes and ideology that continue to guide U.S. foreign policy and general development thinking. A full understanding of the speech and its context is vital to understanding current trends. A brief summary follows this analysis illustrating trends that have evolved from Truman's Point Four strategies into the 21st Century. This

overview places the current state of the water and sanitation sector within the broader concepts of development studies.

2.0.1 Roots of International Development

During his 1949 Inaugural Address (which became known as his *Point Four Speech*), U.S. President Harry Truman ushered in not only the age of international development, but predicted globalization as it is today. After two world wars and a global economic depression, he urged Americans to lead the world into a new age of peace and harmony saying (1949),

Today marks the beginning not only of a new administration, but of a period that will be eventful, perhaps decisive, for us and for the world. It may be our lot to experience, and in a large measure bring about, a major turning point in the long history of the human race. The first half of this century has been marked by unprecedented and brutal attacks on the rights of man, and by the two most frightful wars in history. The supreme need of our time is for men to learn to live together in peace and harmony.

One could dedicate an entire study analyzing this speech. The important take away for this study is understanding the historical context of the Point Four speech and how it continues to influence development policy. Truman laid out four major courses of actions towards peace and harmony that included (Truman, 1949):

1. “Unflinching support to the United Nations and related agencies” as it would be “strengthened by the new nations which are being formed in lands now advancing toward self-government under democratic principles.”
2. A continuation of programs for “world economic recovery.” This included the European recovery program (i.e. the Marshall Plan). “The purpose of that unprecedented effort,” said Truman, “is to invigorate and strengthen democracy in Europe, so that the free people of that continent can resume their rightful place in the forefront of civilization and can contribute once more to the security and welfare of the world” once they “achieve the

status of self-supporting nations once again.” Programs also included carrying out “our plans for reducing the barriers to world trade and increasing its volume. Economic recovery and peace itself depend on increased world trade.”

3. The strengthening of “freedom-loving nations against the dangers of aggression” that included treaties such as that which led to the formation of the North Atlantic Treaty Organization and military support to allies stating, “we will provide military advice and equipment to free nations which will cooperate with us in the maintenance of peace and security.”
4. “...embark[ing] on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas.”

It is important to understand the context of this speech. The Russians were growing their United Soviet Socialist Republic, as the US and Europe were recovering from the war and figuring out the shape and impact of a post-colonial world. Truman laid out these objectives as a direct affront to what he called “the false philosophy of communism;” the Cold War was slowly developing.

These four courses of action marshaled several dominant policy and ideological artifacts of the late 20th Century, some of which included: the conceptual division of the world into first, second, and third worlds¹; the dominant (if now bureaucratic) role of the UN; Europe’s key role as a powerful participant in globalization and that its way of life was meant to be kept at the forefront

¹ The vast majority of those nations newly formed were former European colonies that gained their sovereignty after WWII. US and USSR jockeyed for control over these self-identified “Third World” nations in turning them First World (democratic) or Second World (communist). Even after joining the UN, the majority of these countries are today’s poor nations and their old “third world” label is now synonymous with the poverty gripping them today.

of civilization; the success of the Marshall plan still copied today so many times over; the relationship between democracy and reducing barriers to world trade; the role of military support to key allies; and the reliance on scientific advances and industrial progress used to improve and develop undeveloped areas. The main thesis of his proclamation stems from the Age of Enlightenment, a Euro-centric philosophy initiated in the 18th Century and characterized by a belief in the power of reason, the rights of people for self-rule, and scientific advancement to overcome problems of the world. However, not until the late 1940's did powerful nations begin to work with other nations in assisting their path towards these ideals – towards modern development. Thus, Truman spent much of his time during this address to define this last course of action, the role of international development in the modern age.

In 1949, more than half of the world lived “in conditions approaching misery” (today nearly two thirds of the world lives in poverty), where food was inadequate, diseases crippled poor populations, and “economic life [was] primitive and stagnant.” This poverty was “a threat both to them and to more prosperous areas.” Truman recommended several key policies that have shaped the course of international development. First, Truman said,

For the first time in history, humanity possesses the knowledge and skill to relieve the suffering of these people. The United States is pre-eminent among nations in the development of industrial and scientific techniques. The material resources which we can afford to use for the assistance of other peoples are limited. But our imponderable resources in technical knowledge are constantly growing and are inexhaustible. I believe that we should make available to peace-loving peoples the benefits of our store of technical knowledge in order to help them realize their aspirations for a better life.

This statement demonstrates the importance placed on technical knowledge for international development and its purposed ability to overcome poverty. Technical expertise was and is a key piece of international development assistance. However, he went on to hint of conditions of

assistance – it will only be for “peace-loving peoples,” those who choose the First World over the Second (democracy and free markets over communism).

While technical assistance was a cornerstone of his policy, he also highlighted the importance of financial assistance saying,

And, in cooperation with other nations, we should foster capital investment in areas needing development. Our aim should be to help the free people of the world, through their own efforts, to produce more food, more clothing, more materials for housing, and more mechanical power to lighten their burdens.

It is interesting to note his use of the term “through their own efforts.” A common theme in contemporary development is “give a person a fish, feed them for a day; teach a person to fish and feed them for life.” This harkens back to the notion of creating “self-supporting nations” following the European recovery program. Two misnomers fell out. First, Europe underwent a *reconstruction*, whereas most developing nations were, and still are, starting from a very different place. Secondly, the strength of Europe and the U.S. before and after the war depended (as they still do) on other states – no nation has ever reached a fully ‘self-supporting’ status.

While powerful countries should not use programs or policies to control another country through dependence, this notion as seeped into engineering practice such that self-supporting ideals is a major design criteria (now termed ‘operational sustainability’). Regardless of semantics, the notion of Truman’s vision was that through technical and financial assistance transported by democracy, a new world order would emerge that would unite all peoples and bring peace on earth.

This new vision would be a new post-colonial, post-imperial world in which all people would prosper, not only a few wealthy nations. Part of this vision included decoupling colonial-era

interests in favor of local people. Truman emphasized the need to balance “guarantees to the investor” with “guarantees in the interest of the people” saying,

Such new economic developments must be devised and controlled to the benefits of the peoples of the areas in which they are established...The old imperialism-exploitation for foreign profit-has no place in our plans. What we envisage is a program of development based on the concepts of democratic fair-dealing.

This new ideal foretold the era of globalization suggesting that all countries,

...will greatly benefit from a constructive program for the better use of the world’s human and natural resources. Experience shows that our commerce with other countries expands as they progress industrially and economically...Slowly but surely we are weaving a world fabric of international security and growing prosperity.

We see today, through global economic crisis, how interconnected the world has become (and how ridiculous is the notion of countries being self-supporting). Whether intentional or not, this “fabric” has led to a certain level of security - traditional nation-state wars are too costly to this way of life as world wars would disrupt global trade and, thus, national economies and security. (Of course, now the majority of threats come from non-state actors such as Al Qaeda or states not fully woven into the global economic fabric such as North Korea and Iran.)

The world *has* become interwoven through economic progress and trade. To achieve this, he spoke of a world bank in order to support “a worldwide effort for the achievement of peace, plenty, and freedom.” There is no mention of who decides and how they determine the best use of the world’s resources. Yet, global human and natural resources would be essential for the expected increases in production stating, “greater productivity” was “the key to prosperity and peace. And the key to greater production is a wider and more vigorous application of modern scientific and technical knowledge.”

The notion of technology enabling increased productivity and prosperity, while protecting natural resources for continued progress (albeit, an implicit notion of Truman's), even guides contemporary sustainability policy. Indeed, it provided the foundation of the Brundtland Report, the World Commission on Environment and Development's report that offered a key definition of sustainable development as "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations (WCED 1987)." The idea is that through technology, the spread of democracy, and free world trade, humans have a greater potential for peace and prosperity.

Social, political, and economic freedoms, coupled with technology and scientific advancement, encourage great human potential and are the ideals upon which modern society is built.

However, at the time, it was unique for Truman to call for an expansion of this vision through institutional international development assistance. The last 60 years saw the unfolding of policy initiatives laid out during this address with positive outcomes, but also unattended and unintended consequences. While the ideals spoke to a powerful moral imperative, political motive was significant.

In retrospect, winning the Cold War seems to be a driving force of international development – using the promise of progress to spread an artificial democracy (countless are the examples of open and covert U.S. and European support of international leaders who were known thugs and thieves of development capital as long as those leaders kept their allegiance to the first world). As we have learned time and again (and continue to repeat in Iraq and Afghanistan), democracy

and nation-building in general must come from within, not from outside of a given country. Yet, major advances in food production, disease prevention, and infrastructure have diminished much of the world's misery. Countries such as India, China, and Brazil now wield global influence when before, poverty was their impediment to prosperity. At the same time, many countries that were poor in 1949 are still poor in 2010, even as world trade flourishes. That progress has varied greatly between nations and that such a glaring gap in inequality seems to grow, not shrink, in this global age, may be one of the greatest mysteries, if not disillusionments, of our time. A brief summary of how policies and practices evolved offer some comprehension of this gap and provides a basis to make claims about the current state of the sector.

2.0.2 Historical Evolution of Development Practice and Policy

Knowing the historical evolution of development practice and policy leads to an appreciation of their complexities. The book Despite Good Intentions: Why Development Assistance To The Third World Has Failed provides a robust summary of this evolution (Dichter 2003). It begins with engineering models of planning and ends with a focus on human rights and governance. An important detail is that while practices and policies have evolved, its been more of a layering process in which people have not discarded previous practices, but have added to them as they continue to face challenges and mixed results. Table 2.1 on the following page summarizes the primary themes of international developmental evolution; a brief description of each era follows the table.

Table 2.1 Historical Evolution of Development Practice and Policy (adapted from Dichter 2003)

Theme	Ere of Implementation	Key Concepts
Engineering and planning model	1945-1960	Mechanical process of imitation and replication. Emphasized capital formation, export-led growth, and large infrastructure projects.
Economic development	1960s	Focus on human capital, education, and technology transfer. Added a realization that development is a process, not a program.
Basic human needs and social equity	1970s	Focus on poverty reduction and resource redistribution through integrated rural development, added an emphasis on nutrition, health, education, and local involvement in decision-making.
Sustainable development	1980s	Realized the importance of private investment and entered in the era of structural adjustment programs to control national spending. Witnessed the boom of globalization and local, indigenous NGOs.
Human rights and governance	1990s – present	Placed a greater emphasis on human rights and the necessity of democracy. The era of nation-building and the importance of stable countries for global security.

The engineering and planning model mimicked policies that supported the Marshall Plan. Economists were the dominant theorists, while engineers were the primary designers and executors. It promoted self-sufficiency, import substitution, and large infrastructure projects to promote growth. It ignored the nature and maturity of national political systems, literacy levels of local populations, the nature of culture, religion, ethnicity and geography. It was based on the notion of ‘trickle down’ with a focus on nations instead of people and communities (if nations improve, then so will their people).

The economic development model grew out of response to former model's mechanistic ways. It emphasized the importance of human capital, education, labor force development, and technology transfer. It promoted trade versus import substitution and local manufacturing of all goods as well as technical assistance. It also recognized that most developing countries had rural populations and agricultural-based economies. The colloquialism of "Give a man a fish" grew from this era, as did "brain drain" (the phenomenon where educated people leave their country for better opportunities in developed countries). During this era, planners acknowledged the inherent complexities and multi-dimensionality of development and began to incorporate grassroots influences.

Development experts identified a growing gap between rich and poor, even as gross domestic products were growing. Thus, they turned their attentions to meeting basic human needs with an emphasis on social equity. At the same time, their policies reflected social shift in their own countries as the world was grappling with the strain of growing population on natural resources. This era saw the introduction of "appropriate technology" rooted in America's "back-to-the-land movement," but was criticized then for keeping the third world in the bush. This era also witnessed the growth of humanitarian interventions despite governmental invitation, especially in the fields of disaster relief and refugee assistance. Additionally, the poor were now seen as experts and further incorporated in the decision-making processes – international experts were no longer the experts. Most remarkable was the focus on integrated rural development emphasizing the need to incorporate all aspects of community life in projects. However, the bulk of these interventions failed because the scope of these projects were often too large for any one group and the need too numerous for meaningful impact.

Realizing that “development” was not enough, the 1980s saw the addition of sustainable development. All of the previous initiatives required long-term operations and maintenance. Thus, the development community began placing an emphasis on national policies for growth and limited debt spending supported by international, private financing. This was the age in which the International Monetary Fund and others introduced structural adjustment programs meant to curtail public spending on education and health care while at the same time privatizing many industries and services. It saw the growth of local, indigenous NGOs and the privatization of international assistance.

Practices and policies continue to adapt these previous means and methods as well as evolve with globalization. The past twenty years saw a focus on human rights and a concerted effort to promote democracy. Planners realized that democracy is a key component to Western-based development, but that it cannot be created from the outside. Thus, interventions have placed a great emphasis on helping populations establish their own democracies, to promote fair and open elections, and to advance declarations of universal human rights. This latest brand of development also drives national security policy as witnessed in Iraq and Afghanistan. The belief holds that citizens of stable nations are far less likely to become terrorists than citizens disenfranchised from globalization.

Despite the evolution of practice and policies, adapting to contemporary trends and adopting new methods based on lessons learned, the gap between rich and poor remains. Now that initiatives include large public works projects, technical assistance, basic human needs, integrated development, private investment, participatory involvement of poor people, gender specific

technologies, economic sustainability models, promotion of human rights, and democratic elections, development seems to be at an impasse. The water and sanitation sector is no different. Evolution within the sector mirrors that of development at large. Despite increased efforts, changing practices to address local constraints, technological advances, and numerous declarations of “water and sanitation for all”, one sixth of the world lacks access to clean drinking and a third lacks access to adequate sanitation. As the following section details, even if all people in the world had access to clean water and sanitation (as the United Nations defines access), water-related disease would persist attributing to millions of preventable deaths each year. A characterization of the current state of water and sanitation interventions is the next step in understanding the complex and interconnected problem of epidemics in resource-limited settings. As this study will show, the problem demands solutions well beyond technical realms as social, political, and economic forces shape local context. Decoupling these forces from solutions may be a key factor to extent differences in access and disease between rich and poor communities.

Part I - Current State of the Water and Sanitation Sector

2.1 Overview of Current State of the Sector

This section aims to answer the first part of Question 1: How effective are water and sanitation practices in developing countries? Many actors and organizations participate in the provision of water and sanitation services in developing countries. No data exist that provides complete annual expenditures or outcomes from all interventions. Additionally, because of the numerous actors involved and that individual countries and communities are responsible for overseeing the delivery of services, no uniform standards for design, construction, operations, maintenance,

monitoring, evaluating, and regulating the sector exist. Thus, there is no way to write about the current state of the sector in absolute terms. However, industry reports offer some indication of sector performance. Multilateral development institutions such as the United Nations and World Health Organization provide uniform, global recommendations and country and regional level data on certain aspects related to water and sanitation. Also, the World Bank provides periodic reports related to its expenditures and returns on investment. These reports and data provide a means to generalize the sector to a relatively high degree. As the following sections illustrate, the sector faces challenges related to the environment, finances, management, and scalability. While the sector has made many advances, many segments of global population remain wanting for effective services.

2.1.1 Challenges facing the water and sanitation sector

The World Bank (Bank) is the leading lending institution for international development and a major sponsor of water-related infrastructure projects. Of the all Bank project approved since 1997, 1,834 (31%) were related to water, accounting for \$54.3 billion or 10% of its total portfolio. These projects provide a representative sample of recent water and sanitation project. The Bank's Independent Evaluation Group (IEG) recently completed an assessment of this portfolio reflecting the state of the water and sanitation sector (World Bank 2010). It highlighted many of the challenges facing the Bank including:

- Limited success with full cost recovery for water and sanitation services, with the realization that cost-recovery models often price out many of the poorest people; the vast majority of Bank project rely upon full cost recovery, while they admit that most services

in rich countries receive some level of government subsidy so that people in developed countries do not pay for the full price of services.

- Developing effective demand management strategies that encourage water users to reduce their water use. Costs can be used to control reasonable water-use level. The Bank struggles with finding optimum supply and demand pricing for many of its customers.
- Broadening access to sanitation, realizing that water services alone do not adequately address customer needs.
- Fighting industrial and agricultural pollution; countries struggle with enforcing environmental regulations.
- Restoring degraded aquatic environments.
- Urban and coastal migration places a significant strain on natural resources as well as service area expansion.
- Monitoring and evaluating project outcomes; the Bank funds infrastructure, not services for which weak states are responsible.

This last challenge is of particular concern for health-related aspects of water and sanitation.

The World Health Organization (WHO) states, “A significant amount of disease could be prevented especially in developing countries through better access to safe water supply, adequate sanitation facilities and better hygiene practices.” The Bank has increasingly focused on water-related infrastructure projects. For example, 47 countries borrowed for water 1997, whereas in 2007 the Bank had 79 countries borrow for water-related projects. However, it has decreased its focus on monitoring health outcomes of this work. There has been a declining emphasis in monitoring and evaluation (M&E) of economic returns, water quality, and health outcomes of its

water portfolio. Several reasons for this are that M&E is difficult in resource-limited settings and that it requires resources that could be used elsewhere. Only 1 of every 10 Bank water projects completed since 1997 listed health as an objective. Those approved more recently (fiscal 2002-06) “are even less likely to have been justified by health benefits, to have explicit health objectives, or to plan to collect health indicators (World Bank 2010).”

A global study showed that one of every five samples taken from existing water systems failed to meet national drinking water standards for microbiological contaminants, yet little capability exists to enforce changes to improve quality (WHO 2000). Without sufficient monitoring of health outcomes, linking access to improved health is challenging. The United Nation’s program of Millennium Development Goals includes provisions for water and sanitation. This program drives much of the current policy of the sector. Thus, it is important to understand how they influence the sector.

2.1.2 Millennium Development Goals

In September 2000, building upon a decade of major United Nations’ conferences and summits, world leaders adopted the United Nations Millennium Declaration with an overarching aim to reduce extreme poverty. The MDG program reflects the evolution of international development described previously. They committed their nations to a new global partnership termed the Millennium Development Goals (MDGs), a series of measurable, time-bound targets – a first for international development². With a deadline of 2015, the eight MDGs form a blueprint agreed to

² The MDGs are the first time the international community has set *measurable* goals, but not the first set of targets for water. The goal for the 1980s was “Water and Sanitation for All by 1990.” This goal went unmet.

by all the world's countries and leading development institutions. Table 2.2 summarizes the MDGs.

Table 2.2 Millennium Development Goals

MDG	Focus
Goal 1	Eradicate extreme poverty and hunger
Goal 2	Achieve universal primary education
Goal 3	Promote gender equality and empower women
Goal 4	Reduce child mortality
Goal 5	Improve maternal health
Goal 6	Combat HIV/AIDS, malaria, and other diseases
Goal 7	Ensure environmental sustainability
Goal 8	Develop a global partnership for development

Twenty targets and more than sixty indicators quantify progress towards the goals. MDG 7, Target 3 (termed MDG 7c) contains a target specific to water and sanitation. MDG7c aims to halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation against 1990 baseline data. Many countries have made moderate to strong progress towards this goal. Before reviewing progress related to MDG7c, it is important to understand how the UN operationalizes the goal. Table 2.3 on the following page presents definitions and explanations program components.

While MDG7c defines success as providing access to water and sanitation infrastructure, note that it omits to measure the effectiveness of these interventions (i.e. potential health outcomes). Access is an input, not an outcome. The program depends upon the assumption that access as defined will have positive health outcomes, but the UN does not link them empirically. However, access remains a valuable metric to explain the current status of the sector.

Table 2.3 MDG definition of access to improved drinking-water sources and to improved sanitation (UNICEF and WHO 2008)

Descriptor	Description
Definition	<p>Access to improved water source is the percentage of population with access to an improved drinking water source in a given year.</p> <p>Access to improved sanitation is the percentage of population with access to improved sanitation in a given year.</p>
Associated terms	<p>Improved drinking water sources are defined in terms of the types of technology and levels of services that are more likely to provide safe water than unimproved technologies. Improved water sources include household connections, public standpipes, boreholes, protected dug wells, protected springs, and rainwater collections. Unimproved water sources are unprotected wells, unprotected springs, vendor-provided water, bottled water (unless water for other uses is available from an improved source) and tanker truck-provided water.</p>
Associated terms (continued)	<p>Reasonable access is broadly defined as the availability of at least 20 liters per person per day from a source within one kilometer of the user's dwelling.</p> <p>Sustainable access has two components with respect to water: one stands for environmental sustainability, the other for functional sustainability. The former insists on environmental protection through limiting extraction of water to a capacity below what is actually available. The latter reflects programme sustainability in terms of supply and management.</p> <p>Improved sanitation facilities are defined in terms of the types of technology and levels of services that are more likely to be sanitary than unimproved technologies. Improved sanitation includes connection to a public sewers, connection to septic systems, pour-flush latrines, simple pit latrines and ventilated improved pit latrines. Not considered as improved sanitation are service or bucket latrines (where excreta is manually removed), public latrines and open latrines.</p>

The need still exists to link access and health benefits. WHO provides data associated with water-related disease. For the year 2000, WHO's Statistical Information System (WHOSIS) provides data for "Death among children under five years of age due to diarrhoeal diseases" (a grouping of all infectious waterborne diseases) as a percentage of the total under five population. This data is graphed against percent access for each country in order to interpret effectiveness of current water and sanitation service delivery later in this chapter illustrating current progress of health benefits against access. Before moving on, it is important to define technical aspects of access as defined by leading multinational institutions.

2.1.2.1 Water and Sanitation Ladders

The Joint Monitoring Programme for Water Supply and Sanitation (JMP) is a joint effort between United Nations Children Fund (UNICEF) and WHO monitoring MDG7c progress. JMP acknowledges the complexity of increasing access to water and sanitation infrastructure. One way it accounts for this is by including a ladder, or a series of phased interventions based on various technical alternatives for water and sanitation provision. For water, the ladder contains three rungs: ‘unimproved sources’, ‘other improved sources’, and ‘piped water on premises’. Access to ‘piped water’ or ‘other improved’ sources satisfies MDG7c, whereas access to ‘unimproved’ sources do not. Table 2.4 presents definitions for each rung.

Table 2.4 The water ladder (adopted from UNICEF and WHO 2008)

Rung	Definition
Piped Water on Premises	Piped water on premises includes household water connections located inside user’s dwelling, plot or yard.
Other Improved	Other improved water sources include public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs and rainwater collection.
Unimproved	Unimproved drinking water sources include unprotected dug wells, unprotected springs, cart with small tank/drum, tanker truck, surface water (lake, pond, stream, canal, irrigation channel), and bottled water.

The sanitation ladder contains four rungs: ‘open defecation’, ‘unimproved’, ‘shared’, and ‘improved’. Access to ‘improved’ or ‘shared’ sanitation facilities satisfies MDG7c, whereas access to ‘unimproved’ or ‘open defecation’ does not. Table 2.5 on the following page presents definitions for each rung. The inclusion of “ladders” emphasizes the importance of including phased interventions. The idea is that each community strives for the top rung, but that is not always possible. Thus, these definitions provide a means to ensure a minimum standard that can still meet the needs of users. The Joint Monitoring Programme’s 2008 report *Progress on Drinking Water and Sanitation* provides a summary of ladder-related progress by region.

Table 2.5 The sanitation ladder (adopted from UNICEF and WHO 2008)

Rung	Definition
Improved	Improved sanitation facilities ensure hygienic separation of human excreta from human contact. They include: <ul style="list-style-type: none">• Flush or pour-flush toilet/latrine to:<ul style="list-style-type: none">○ Piped sewer system○ Septic tank○ Pit latrine• Ventilated improved pit (VIP) latrine• Pit latrine with slab• Composting toilet
Shared	Shared sanitation facilities of an otherwise acceptable type shared between two or more households. Shared facilities include public toilets.
Unimproved	Unimproved sanitation facilities do not ensure hygienic separation of human excreta from human contact. Unimproved facilities include pit latrines without a slab or platform, hanging latrines and bucket latrines
Open Defecation	Defecation in gutters, streets and sidewalks, fields, forests, bushes, bodies of water, or disposal of human feces with solid waste. ¹

The report summaries illustrate the existence of an over-reliance on ‘middle-rung’ alternatives in developing regions (especially in Southern and South East Asia and Sub Saharan Africa) (UNICEF and WHO 2008). These middle-rung alternatives are those that require limited resources, rely on labor-intensive means and methods, and are easier to maintain than capital intensive, resource-dependent solutions (i.e. top rung alternatives). The sector uses the term ‘appropriate technologies’ to describe these middle rung alternatives (Cairncross and Feachem, 1993). These metrics drive the MDG program. The following subsection details MDGs as a means to gauge sector effectiveness. However, one of the greatest shortcomings of this program is that no link exists between meeting these definitions and ensuring positive health outcomes.

2.1.3 Measuring sector effectiveness via access and Millennium Development Goals

Reviewing the World Bank’s Top 10 borrowers are their progress towards MDG7c provides a sample to infer the current state of water and sanitation delivery in resource-limited settings.

Table 2.6 on the following page presents access data, MDG 7c progress, and provides several demographic markers compiled from various sources for this research. It illustrates mixed results for meeting MDG7c even for the Top 10 borrowers (50% of these countries will meet MDG7c) alluding to the challenges of providing access to water and sanitation even when a country has access to financial capital. However, even with access improving, water-related deaths of children under five never went below 10% in 2000. A country's external debt position (whether it is a net debtor to the Bank or a net creditor) appears to have little influence on effectiveness.

Table 2.6 Top 10 International Development Association borrowers and water-related performance¹

Country	Access to Water (%) ²			Meet MDG? Y/N	Access to Sanitation (%) ²			Meet MDG? Y/N	WBI ³	External Position	GNI Rank ⁴
	'90	'00	'06		'90	'00	'06				
India	71	82	89	Y	14	23	28	Y	20.3	Debtor	154
China	67	80	88	Y	48	59	65	Y	11.8	Creditor	122
Vietnam	29	51	65	Y	52	77	92	Y	10.4	Debtor	156
Pakistan	86	88	90	N	33	48	58	Y	14.0	Debtor	155
Tanzania	49	53	55	N	35	34	33	N	17.2	Debtor/H	183
Uganda	43	56	64	Y	29	32	33	N	16.8	Debtor/H	192
Ethiopia	76	83	92	Y	-	65	67	N	16.6	Debtor/H	196
Bangladesh	78	79	80	N	26	32	36	Y	20.0	Debtor	177
Nigeria	50	49	47	N	26	28	30	N	15.7	Creditor	169
Sri Lanka	67	77	82	N	71	81	86	N	13.0	Debtor	136

1. Compiled from: (UNICEF and WHO 2008; WHOSIS 2009; World Bank 2010)

2. Per MDG 7c (UNICEF and WHO 2008)

3. WBI = waterborne illness as defined by “deaths among children under five years of age due to diarrhoeal diseases” in 2000

4. Per World Bank's Indicators Database of Gross National Income based on Purchasing Power Parity (GNIPPP) in 2007 (World Bank 2008).

MDG7c progress is based on aggregate progress at the global level. That is, while Table 2.3 presents a 50% MDG7c success rate for the Top 10 Bank borrowers, having India and China alone meet their MGD for access to water means that the world will meet this goal by 2015 (UNICEF and WHO 2008). However, JMP reports certain findings in disaggregate form that highlights certain disparities masked by total numbers. JMP distinguishes findings between regions and urban and rural areas.

2.1.3.1 Regional differences

JMP divides the world into 9 separate regions that include: Commonwealth of Independent States (many countries that formally comprised the United Soviet Socialist Republic), Northern Africa, Sub-Saharan Africa, Latin American and Caribbean, Western Asia, Eastern Asia, Southern Asia, South-eastern Asia, and Oceania. JMP also differentiates between developed and developing regions. For water, all regions are on track to meet MDG7c by 2015 except Sub-Saharan Africa and Oceania (even while the World Bank reports African water projects as its most successful region during the last five years, although they make no distinction between Northern and Sub-Saharan Africa). Comparing developed and developing regions, JMP forecasts 99% access to water throughout the developed world versus 86% access in developing countries by 2015. Success in meeting MDG7c for sanitation is more challenging than water. JMP estimates that the world will not meet MDG7c for sanitation and only six regions (Western Africa, Latin America and Caribbean, Northern Africa, South-eastern Asia, Eastern Asia and Developed Regions) are on track to meet their targets. JMP forecasts 100% access to sanitation throughout the developed world versus 71% access in developing countries by 2015. While regional differences highlight global-level disparities, JMP also tracks national progress between rural and urban communities.

2.1.3.2 Urban/rural differences

JMP also distinguishes differences in access to water and sanitation services between urban and rural areas. In 2006, people in urban areas had, on average, 18% greater access to water. This matched the difference within developing regions, whereas the difference between urban and rural access in developed countries was only 3% in favor of urban areas. However, stark

contrasts in water access between urban and rural areas exist in Oceania and Sub-Saharan Africa (54% and 35% in favor of urban access respectively). Large differences in access to sanitation between urban and rural areas persist in developing countries. The average difference is 32% in favor of urban areas and is fairly consistent across all regions. However, the urban/rural divide is great between developed and developing regions. The divide is only 4% (100% vs. 96% in favor of urban areas) in developed regions, whereas it is 32% (71% vs. 39% in favor of urban areas) in developing regions. Reasons for a focus on urban areas that may lead to these disparities include (Feachem 1983):

1. Political unrest and revolutions generally start in urban areas.
2. More immediate and greater health impacts occur in urban areas.
3. Greater demand for improved water supplies in urban areas because alternative sources are rare or grossly polluted.
4. Greater population densities in urban areas support more individual connections – these can be metered for cost recovery and to control use.
5. Technical skills required to maintain systems are usually more available in urban areas.
6. People are more concentrated in urban areas so construction costs are lower.

Other disparities exist beyond urban and rural areas. This literature review included deeper analysis of secondary data to determine if difference exists between individual countries, economic strength of countries, and health benefits. This analysis provided a deeper understanding about the depth of the problem of differential access and disease.

2.1.3.3 Additional disparities within the water and sanitation sector

Using data on 135 countries available from WHO's Statistical Information System and the World Bank's Indicators Database, additional disparities were found within the water and sanitation sector not accounted for by JMP. These include:

1. Country-level differences.
2. Economic differences.

3. Differences in health benefits.

Figures 2.1 and 2.2 on the following page demonstrate country-level disparities masked by global and regional data for access to water and sanitation respectively. For the countries analyzed, 38.5% will meet MDG7c for water. This is enough for the world to meet the global target of MDG7c for water because population numbers in several successful countries are high (namely China and India). However, 72 countries will fail to meet their goal. *Additionally, 10% of all countries analyzed will actually regress from their 1990 baseline for water by 2015.*

Regarding sanitation, 28.9% of countries analyzed will meet MDG7c. The world will fail to meet its sanitation target while 81 countries will fail to meet their goal. Similar to water, *10% of all countries analyzed will actually regress from their 1990 baseline for sanitation by 2015.* Figure 2.2 presents country-level sanitation progress

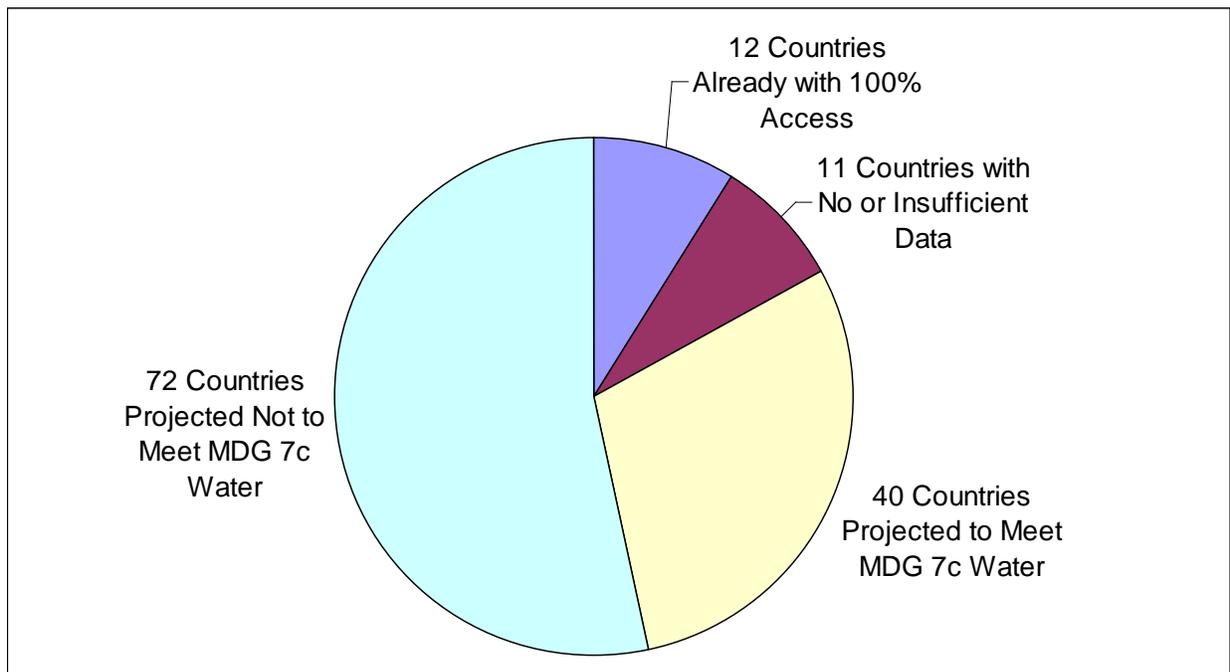


Figure 2.1 Country-level projections for meeting MDG 7c for water in developing countries by 2015

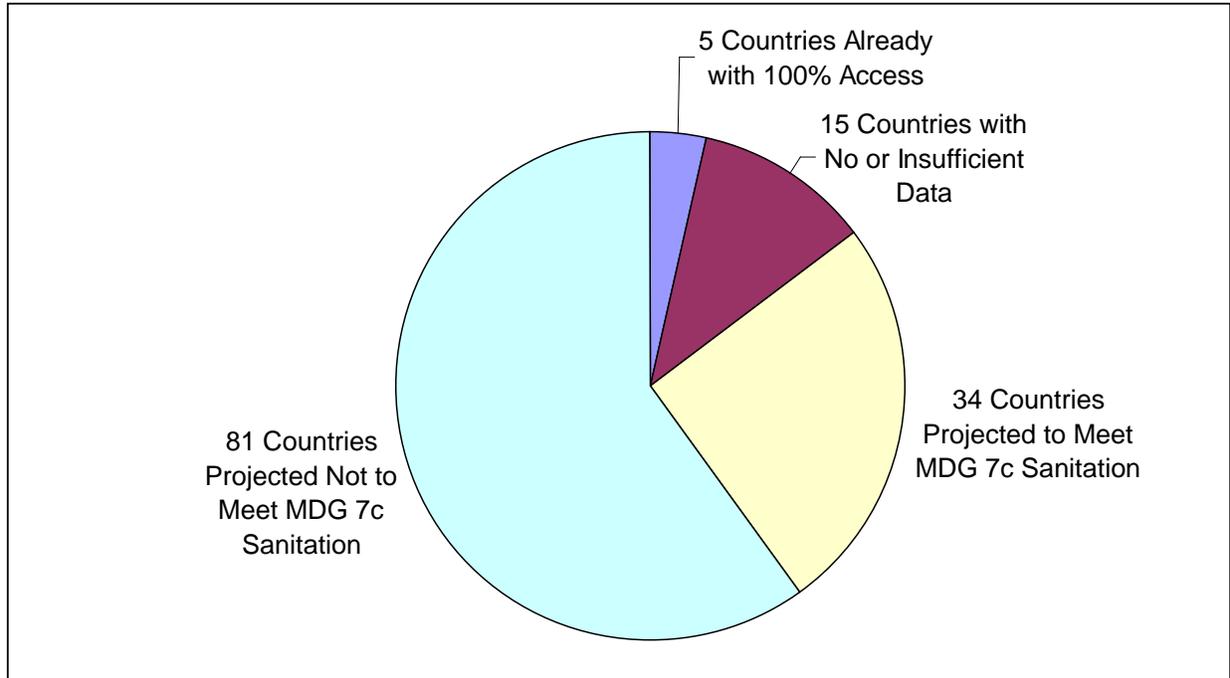


Figure 2.2 Country-level projections for meeting MDG 7c for sanitation in developing countries by 2015

A second set of analyses demonstrated, to no surprise, a positive relationship between a country's economic standing and their ability to increase access to water and sanitation services. Note the GNI per capita provides a basis for all economic analysis in this report per International Monetary Fund recommendations (Senhadji 2000). The stronger a country's economy, the more likely it has greater access to water and sanitation. Similarly, the stronger a country's economy, greater is the likelihood that waterborne illness is decreased. Refer to Appendix A for figures related to these findings.

A third analysis sought to draw comparisons between national mortality rates of children under five due to diarrhoeal diseases and national rates of access to water and sanitation services. Refer to Appendix A for figures related to these findings. Comparing countries on these metrics and their related economic standing illustrate a striking disparity between rich and poor. Refer to

Figure 2.3 that presents disease versus access among the top and bottom quartile of countries as related to economic standing.

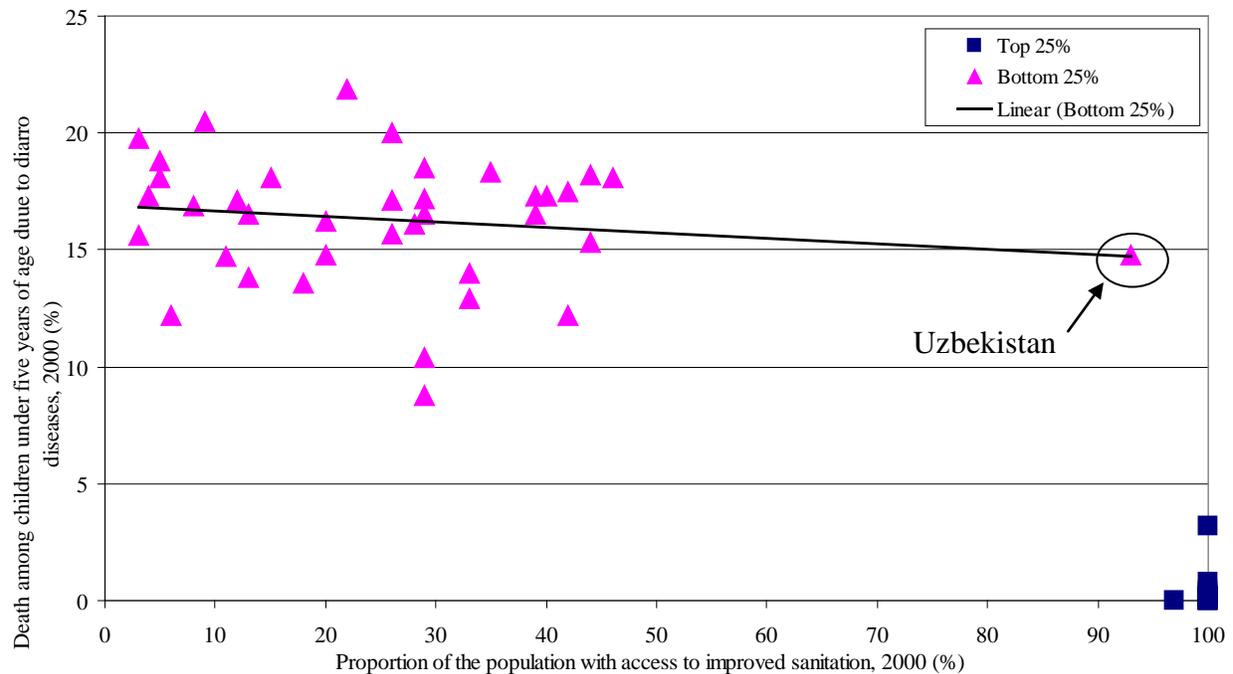


Figure 2.3 Disparities in access and disease between very rich and very poor countries

Figure 2.3 reveals a glaring inequality between the Top 25% and Bottom 25%. A trend line of best fit data among very-poor countries shows a very low level of effectiveness based on health. While this regression lacks rigorous analysis, it illustrates that the poorest countries shoulder a large portion of disease burden related to water borne diseases than more wealthy countries. Additionally, this figure highlights how access to sanitation does not necessarily equate to effective health outcomes. Take the outlier for example. In 2000, 93% of Uzbekistan’s population had access to improved sanitation facilities, yet 14.8% of all children under five were dying from infectious water-related diseases.

2.1.4 Summarizing the current state of the sector

Access to water and sanitation is increasing in many resource-limited communities. However, the information presented calls into question the effectiveness of this access. Figure 2.5 illustrates a more quantified explanation of an *effectiveness gap*, the difference in outcomes for water and sanitation services in developed countries between those in developing countries. Services provide access to “improved” drinking water and sanitation facilities. While the UN definition of “improved” services is rather vague (recall that improved access includes types of technology and levels of services that are more likely to provide safe water and adequate sanitation than unimproved technologies), decreasing risks of water-related diseases to levels similar to those in developed countries should be an achievable expectation. However, based on the trend line of the data presented in Figure 2.5 on the following page, if all countries had 100% access to existing water and sanitation services, then 7% of all children under five would still die from preventable water-related diseases (note from Figure 2.4 the gap between the very rich and very poor is nearly 15%). This 7% difference between what is achievable and what current approaches deliver quantifies the effectiveness gap in water and sanitation services between developed and developing countries.

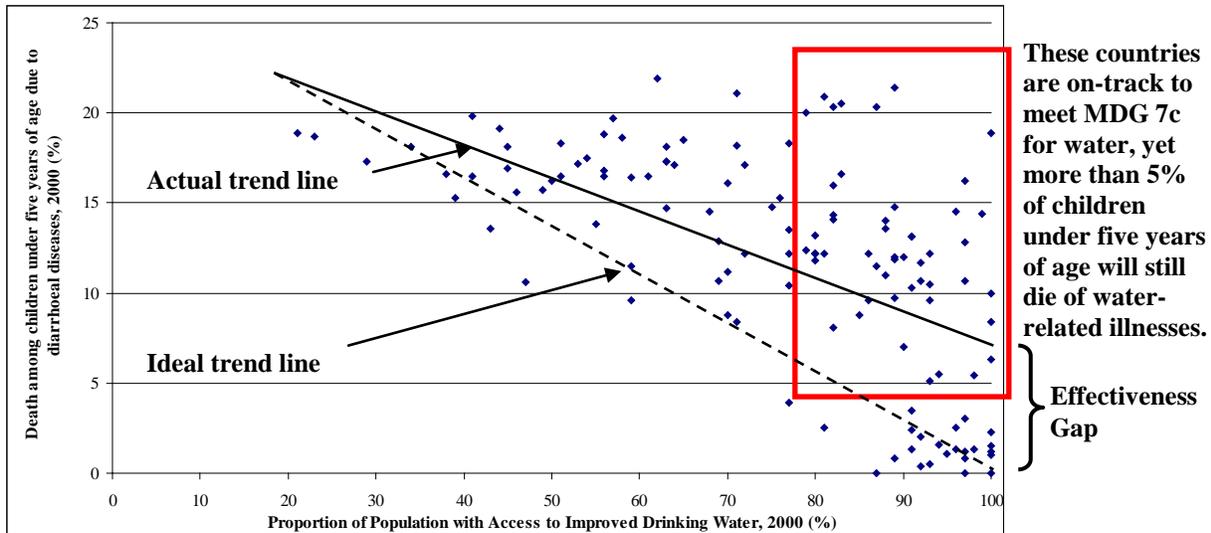


Figure 2.5 The Effectiveness Gap. This figure illustrates that access to improved drinking water reduces death among children under five years of age. However, it illustrates that a high percentage of water-related deaths still occur despite access to improved drinking water sources (WHOSIS 2009).

However, the effectiveness gap also includes other limitations and challenges that define the current state of the water and sanitation sector in developing countries. These include:

1. Disparities in access exist between rural and urban communities.
2. Poor national-level progress on MGD7c. Less than half of all countries will meet the MDG for water, while less than one-third will meet the MDG for sanitation. Access to water and sanitation in 10% of all developing countries has decreased since 1990.
3. The focus on access (not to mention the vague definition of that access) in lieu of health outcomes lower expectations on the water and sanitation sector.
4. Meeting MDG goals in a particular country may still leave much of the population without access. For example, Chad is on track to reach its MDG7c water goal. If successful, half of its rural population will still lack access to water. No MDG Phase 2 exists that accounts for the second half of all people after 2015.
5. Countries in the lowest economic quartile shoulder the heaviest disease burden. Access relies more on “other improved sources” in these very resource-limited countries and

success in countries with relatively more wealth may mask the disparities in very poor countries.

The second research question offers a means to begin the process of understanding the existence of an effectiveness gap and related limitations and challenges. This question asks, What are the barriers to effective service delivery in developing countries? Much has been written about this topic. While a full literature review of the past 60 years of water and sanitation-related research is beyond the scope of this review, it is important to highlight major themes and debates within the sector. The next section highlights technical aspects of service provision, presents sociological theories to understand the problem of differential access in developing countries, and then uses these theories to categorize local and system barriers to effective water and sanitation solutions.

Part II - Barriers to effective water and sanitation delivery in resource-limited settings

2.2 Overview of Part II

This part contains four sections. Section 1 provides an overview of internal sector analysis presenting dominant themes within water and sanitation literature and summarizes lessons learned over 60 years of experience. This literature is situated within a broader discourse and critique related to international development. Thus, the second section places infrastructure-related assistance through NGOs and development institutions in the context of globalization. This literature provided a perspective required for critical analysis of current water and sanitation delivery practices in developing countries. In order to move the work from critique to investigation, section 3 turns to social theories of international development. This study uses

modernization and world system theories, two competing theories that together offer a more expansive perspective to examine the effectiveness gap. This part concludes with categorical groupings of possible barriers to effective service delivery including social, political, economic, technical, and systemic categories based on variables associated with modernization and world system theories.

2.3 Water and sanitation practices in developing countries

This section provides an overview of dominant topics within literature related to water and sanitation in developing countries and concludes with a critical analysis of service delivery within the broader framework of international development. The discussion includes a summary of water-related disease epidemiology, technical aspects of water and sanitation service delivery, health outcomes, and economics of supply. However, before proceeding, it is important to understand the mandate for increasing water and sanitation access.

2.3.1 Water, Sanitation, Human Rights, and a Mandate for Services

Water is a basic human need. For millennia, individuals were capable, able, and responsible for meeting their own needs. However, today public and private municipalities provide the vast majority of services for which people pay. These services require complex technologies to collect, treat, and distribute water and governments regulate service providers to ensure high levels of service. When people are unable to pay for services and/or governments are unable to regulate them, interventions are necessary. In the United States, federal and state governments have subsidized municipalities for the delivery of clean drinking water and adequate sanitation for decades. Many international development efforts assist countries with their services. These

efforts have mandates rooted in social morals (people respond to others when in need) and economic logic (with clean drinking water, people are less likely to be sick and people less likely to be sick are more likely to work), but also in human rights documents.

Beginning in the 1700's, The Enlightenment Era brought individual rights to the fore of Western culture that initiated movements for other rights such as political, economic, and human. Human rights are protected by international standards that ensure the freedom and dignity of individuals and communities and concern relationships between individuals and the State (WHO 2003).

Codified in 1948, Article 25 of the Universal Declaration of Human Rights (UDHR) states (UN 1948):

Everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including food, clothing, housing, and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.

Water was not included among food, clothing, housing, and medical care, yet one can reasonably infer that water is an implied right protected by the UDHR.

Other international instruments are more explicit about human rights to water such as Article 14(2) of the Convention on the Elimination of All Forms of Discrimination Against Women (1979) which specifies that States parties shall ensure to women the right to “enjoy adequate living conditions, particularly in relation to water supply” and Article 24(2) of the Convention on the Rights of the Child (1989) stipulates that States parties must combat disease and malnutrition “through the provision of adequate nutritious foods and clean

drinking-water” (UN 2002). Other reports provide detailed information about specific standards associated with implementing these rights and more recent reports have included access to sanitation as an additional right inferred to all people (UN 2007; WHO 2003). Ratifying related treaties requires member countries to respect, protect, and fulfill obligations of human rights of their citizens.

That human rights are the responsibility of the state is an important distinction. The UN, WHO, nor NGOs are not responsible to protect rights. Yet, many national governments are in no position to ensure the rights of its citizens. Anticipated health benefits are a primary driver of promoting and ensuring human rights. The following section provides an overview of water-related diseases, many of which remain quite prevalent despite 60 years of assistance and continued advances in water and sanitation technologies.

2.3.2 Overview of water-related diseases

The term *water-related diseases* captures a wide array of infectious diseases associated with water categorized in four groups (Cairncross and Feachem 1993):

1. Water-borne: diseases such as cholera, hepatitis A, amoebic and bacillary dysentery, and typhoid spread through contaminated water and fecal-oral pathways.
2. Water-washed: diseases such as trachoma, leprosy, skin sepsis and ulcers spread by a lack of hygiene practices (either behavioral or due to a lack of water and soap).
3. Water-based: diseases such as Schistosomiasis and Guinea worm spread primarily through worm-based vectors whose life-cycle depends upon aquatic invertebrates such as snails.

4. Water-related insect vectors: diseases such as malaria, yellow fever, dengue fever, sleeping sickness, and river blindness spread by insects (as hosts) whose life-cycle depends upon water (i.e. mosquitoes and flies).

As Figure 2.6 illustrates, these diseases account for a considerable portion of global disease burden.

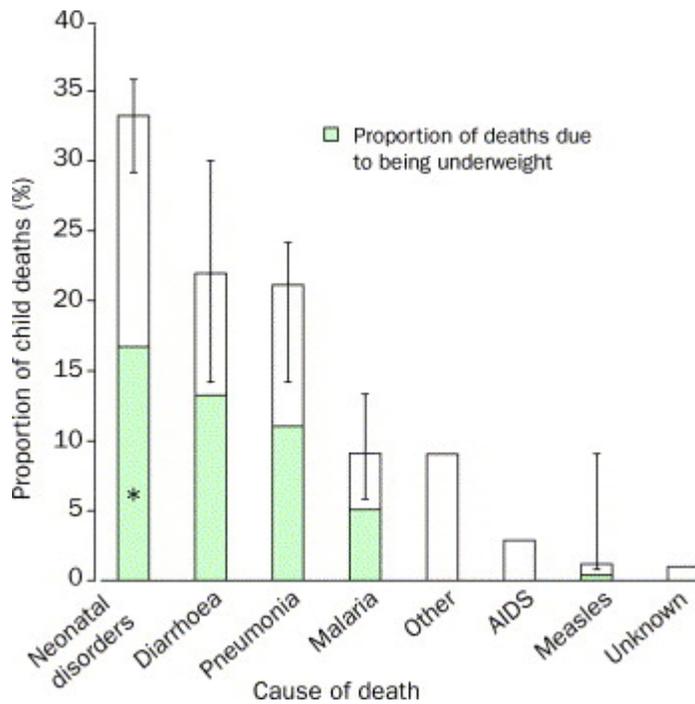


Figure 2.6 Distribution of global child deaths by cause, from (Black 2003)

While the medical profession is able to treat water-related disease, the water and sanitation sector is able to prevent them through a wide range of technical solutions. Table 2.7 on the following page describes technical interventions for each category of water-related diseases in order to break the transmission cycle.

Table 2.7 Technical options to control water-related disease, adopted from (Cairncross and Feachem 1993; WHO 2004)

Category of Disease	Control Options
Water-borne	<ul style="list-style-type: none"> Improve drinking water quality Prevent use of unimproved sources Provide sanitation facilities
Water-washed	<ul style="list-style-type: none"> Increase quantity of water for personal hygiene Improve quality of water supplies Improve personal hygiene practices Increase access to soap Improve sanitation
Water-based	<ul style="list-style-type: none"> Interrupt life cycle of worms Decrease contact with infected water via increased access to high quality services Control aquatic host populations Reduce fecal contamination of source water Increase footwear
Water-related insect vectors	<ul style="list-style-type: none"> Improve source water management Destroy insect breeding sites Decrease need to visit breeding sites Increase use of mosquito netting Eliminate host/disease reservoir Mass immunization Improved sanitation (closed systems)

Engineers have played a key role in the development of control technologies. Systems exist to collect, treat, and distribute clean drinking water and dispose sanitation residuals. The following section provides more in-depth information associated with each technical aspect of engineered systems employed to prevent water-related diseases. It focuses on control measures related to water-borne and water-washed diseases as an increase in services greatly reduces risks associated with water-based and water-related to insect vector diseases because people no longer have to access open source waters. This reduces the potential of contact with live vectors.

2.3.3 Technical aspects of water and sanitation services

Design criteria for water and sanitation services include quantity, quality, and level of service. These factors inform possible solutions for collection, treatment, and distribution or disposal.

International treaties and national, state, and local regulations provide quantitative requirements for each of these components. However, no uniform standard exists for design of services and defining criteria can be contentious and complex. Academics and assistance organizations have gone to great lengths to publish technical memos and guidelines related to water and sanitation technologies such as Water for the World and Water and Environmental Health at London and Loughborough (WELL). The following subsections provide an overview of some of the primary criteria and options for water and sanitation systems.

2.3.3.1 Quantity and sources

The quantity of water services delivered influences hygiene and public health. Engineers often perform a demand analysis as the first step in the design process of water and sanitation services. They multiply the amount of water for each person by the total population and typically account for a certain population growth rate over the intended life of the project. World Health Organization suggests that 2 liters (0.53 gallons) of water is the minimum daily demand required for survival (WHO 2005), while in Virginia municipalities must provide a minimum of 100 gallons (379 liters) of water per capita. Designers must decide what needs they meet based on drinking, cooking, bathing, washing, irrigation, sanitation systems, and fire protection. The actual quantity provided has major ramifications on cost and level of service and even obligations to fulfill human rights.³

For many years, designers of services in developing countries based criteria on drinking and cooking needs. A recent study suggests that a minimum of 7.5 liters per capita per day sufficiently meets the needs of most people (Howard 2003). MDG7c requires 20 liters per capita

³ Refer to (Smith and Green, 2005).

per day located within 1 kilometer of a person's dwelling (acknowledging the fact that many people must walk to access water) (UNICEF and WHO 2008). However, this amount does not account for other uses to include possible uses for small scale farming and industry that could enable economic development. Thus, there is a movement within the sector to provide services based on custom-fit demands that account for multiple uses of water (van Koppen 2006). Conversely, others suggest that curbing supplies (via increased tariffs) may help reduce water use as a reaction to reports that world water supplies are over-stressed (World Bank 2010). Interestingly, the World Bank supports multiple-use strategies while promoting supply-driven approaches. This contradiction illustrates the complexity of defining criteria for drinking water systems. Yet, regardless of quantity for which designers account, once determined, they seek sources to meet demand.

Many different sources of water exist across various geographic regions. Possible sources include rivers, lakes (natural and anthropogenic), groundwater (deep and shallow aquifers), rain (via harvesting), and oceans. Availability of water (geographically and seasonally) and terrain constrain possible design alternatives in certain locations. Engineers occasionally design systems drawing from a combination of sources to account for this. They also provide the means to collect water via pumps, rain water collectors, and dams. Available energies sources to run pumps influences collection methods employed. Additionally, raw water quality (the quality of source water prior to treatment) varies from source to source and steers required treatment processes to obtain desired quality of the delivered service. An inability to treat certain raw waters may prevent the use of that source. In regards to sanitation, collection methods depend upon water quantity. Toilets and pipes (gravity flow or pumped force mains) collect water—

based wastes conveying them to treatment systems. However, water is not required for sanitation. Dry options collect human waste on-site and treat them in-situ. Population density and available land constrain sanitation collection alternatives. Water-based collection is preferred in urban areas. The following subsection highlights issues associated with quality and treatment.

2.3.3.2 Quality and treatment

The quality of water has a profound influence on public health. WHO provides guidelines for drinking water quality using language such as “water needs to be of a quality that represents a tolerable level of risk (Howard 2003)” or improved technologies are “more likely to provide safe water than unimproved technologies.” Similar guidelines exist for sanitation: improved technologies “are more likely to be sanitary than unimproved technologies (UNICEF and WHO 2008).” Yet it is a country-level responsibility to legislate, regulate and enforce these standards. The United States Environmental Protection Agency provides quality standards for primary (both acute and chronic health-related contaminants) and secondary contaminants (aesthetic-related contaminants) and states regulate pathogens, nutrients, and other compounds in sanitary discharge limits. While many countries have quality standards and capabilities of monitoring, enormous challenges exist in developing countries to monitor and enforce these standards (Hunt 2001). However, engineers can still develop treatment options to supply high level services.

Drinking water and sanitation treatment technologies are expansive and ever evolving. Treatment systems rely on a series of processes that includes sedimentation, filtration, and disinfection. Systems range in complexity, resource requirements, and levels of operations and maintenance and include sari cloth for the reduction of cholera (Colwell 2003), biosand filters for in-home

point of use treatments (Baker 2006), pit latrines (Godfrey, et al. 2006) and full-scale municipal water works that rely on 24 hour electricity, chemicals, and a trained staff. The range of technologies in the latter category is often inappropriate for developing countries because of, as Ludwig (2006) argues:

a lack of understanding by the staff of the assistance agencies that the design criteria for the facilities must be modified to suit the socio-economic status [(i.e. context)] of developing countries. The developing countries are relatively very poor in terms of available finances, hence cannot afford to emulate Western environmental standards and design practices, especially as related to operation and maintenance, hence much simpler approaches must be used (p. 151).

The literature includes extensive research and reporting on simpler, more appropriate solutions for water and sanitation services in developing countries. Indeed, the Millennium Development Goals for water and sanitation account for this distinction in their definitions access. Refer back too Tables 2.2, 2.3, and 2.4. As the following subsection highlights, the health outcomes in developing countries are improving, however countries have yet met the full potential of these technologies.

2.3.4 Health-related outcomes

Clean drinking water and adequate sanitation has profound positive influence on public health. In the U.S., it was responsible for nearly half the total mortality reduction in major cities, $\frac{3}{4}$ of infant mortality reduction, and nearly $\frac{2}{3}$ of child mortality reduction during the 20th Century (Cutler 2005). However, in 2000, Joint Monitoring Programme changed its terminology describing water and sanitation services from “safe” and “adequate” to “improved” reflecting the challenges of monitoring health outcomes in developing countries (Hunt 2001). Experts disagree

about the influence of clean drinking alone on reducing diarrhea and other water-related diseases. One notion is that the quality of drinking has less influence than quantity and accessibility (Esrey 1985), while others suggest that quality greatly reduces the risk of cholera, but not other diarrhoeal diseases (Gundry 2004). There is also debate about technology and access. Piped, household connections provide far greater health impacts than water from public sources. Yet, the type of technology appears to be less important than how a service is used and by whom uses it (Hunt 2001). In other words, effectiveness is positively correlated with compliance (Clasen 2006).

Surrounding on-going debates over the health benefits of water and sanitation services (never mind that people have understood positive impacts for millennia, even if only implicitly), is the general consensus that preventing water-related diseases depends upon integrating water (quantity and quality), sanitation, and hygiene services and practices (Fewtrell 2005). The sector is placing an increasing emphasis on sanitation and hygiene as these two inventions block most routes of disease transmission (Hunt 2001). Moreover, studies show (not surprisingly) that hand washing with soap is more likely to reduce risk of diarrhoeal disease than hand washing without soap (Curtis 2003). As such, interventions increasingly address hygiene-related behavior teaching proper use of facilities and food preparation (Biran 2004). Despite success in decreasing water-related disease world-wide, a focus on access in place of effectiveness (and lack of monitoring capabilities and related lack of data and inability to enforce) and uneven access to water, sanitation, and hygiene within communities limits the potential to reduce prevalence of water-related diseases in developing countries as they are in developed one (Clasen 2006). The economics of service provision further complicates this issue. The sector has long debated who

should pay for services, how to finance services, and how to design services in the economic context of poverty. The following subsection highlights some of the major trends associated with the economics of water supply and sanitation.

2.3.5 Economics of water supply and sanitation

The economics of water and sanitation service delivery is perhaps the most heated topic within the sector. During the early 1990s, the World Bank performed a series of economic analyses on their water and sanitation investments reporting they had not realized the full benefits of past investments. They held national government receiving loans for failures that led to a serious waste of resources and lost economic opportunities (World Bank 1994). This acknowledgement resulted not only in a continued erosion of the public sector, but a renewed focus on cost-benefit analysis where anticipated benefits must be large enough to cover or exceed costs. Costs generally include investment (upfront capital) and recurrent (operations and maintenance) costs, whereas benefits include labor and time savings, lower health costs, improved fitness for greater agriculture and industrial productivity, and reduce child mortality. Typical benefit-to-cost ratios for project approval are 1 (i.e. $B/C > 1$). However, in developing countries where capital is scarce and opportunity costs are high, projects usually need to show a $B/C > 2$ (Feachem 1983).

Recent reports provide conflicting results of cost-benefit analysis. While one robust study on meeting the global MDG for water and sanitation suggests a range of US\$5 to US\$46 rate of return on US\$1 investment (Hutton 2007), a similarly rigorous study reports that projects rarely achieve even equal benefits to costs (i.e. $C/B < 1$) (Whittington 2006). These two studies highlight the main differences within the sector. The former study used a broad range of

economic and social benefits including: 1) time savings due to easier access, 2) gain in productive time, 3) reduced health care costs, and 4) prevented deaths. However, it revealed that time savings of higher access accounted for 80% of the economic benefits and assumes that people will work for pay with this new found time. The latter study focused on more tangible economic benefits concluding that those who pay costs may not necessarily be the beneficiaries and that incremental benefits may not be enough to cover project costs. Difficulties in assigning monetary values to rather complicated concepts provide room for interpretation and may account for wide ranging differences within the sector (Feachem 1983). However, the sector agrees on several key issues.

Cost-recovery models designed around a community's willingness and ability to pay for water and sanitation are dominant approaches. Willingness and ability to pay determines the level of service provided in order to obtain at least marginal opportunity costs (Warford 1997). Thus, the sector focuses much of its energy on community surveys to determine what levels of service potential users are willing and able to support in order to design tariffs for cost-recovery (Boland 2000)⁴. These findings suggest that network technologies (piped water systems) will fail and that poor households need alternative, non-network technologies (Whittington 2008). (As discussed in the previous section, note that network technologies enable a greater reduction in water-related illnesses.) While full cost-recovery dominates current practices, the World Bank now acknowledges that perhaps these practices are less effective, rarely collect marginal costs, and that services in developing countries should be formally subsidized as they are in developed countries (WSP 2009).

⁴ There is little consensus within the sector regarding tariff rates, refer to Whittington (1992 and 2003).

What seems apparent is that poverty (in this case, a lack of financial capital and low inability to pay for services) confines level of services in an attempt to sustainable (per cost recovery definitions) in resource-limited settings. In developed countries, quantity and quality standards (and social expectations) are set high and engineers create solutions to meet criteria. However, in developing countries, engineers limit quantity and quality to “an acceptable level of risk” creating solutions to meet constraints of a community’s inability to pay. In other words, criteria-driven approaches are more prevalent in developed countries, while constrain-driven approaches are more prevalent in developing countries. The literature-based response to this phenomenon includes considerable amounts of writings related to notions of sustainability, community-based practices, pro-poor practices, and appropriate technology in an attempt to understand and develop practices accounting for non-technical aspects of water and sanitation service delivery.

Both the technical and non-technical aspects of water and sanitation service delivery prove the sector and its practices to be extremely complicated and fraught with differences of opinion. However, while this overview covers an array of topics (if not in detail), the coverage thus far has been in a vacuum. It fails to mention how this work gets done and by whom. Thus, it is important to view this sector within its broader framework of international development. Only by considering this additional layer of issues can one understand how complex this practice truly is. The following section provides a very brief synopsis and critique of current development assistance with a primary focus on the role of non-governmental organizations.

2.3.6 Water and sanitation within the broader framework of development assistance

International development, its policies, practices, and discourse, is a mammoth subject. An attempt to provide an overview in several paragraphs is both naïve and disrespectful to all those

who have written on the topic. It is problematic to even begin a summary as it opens a potential ‘can of worms’ that has no bounds. Yet, to ignore it omits the larger context in which water and sanitation professionals work. Without defining the problem of service delivery more broadly, there is little hope that the sector can provide more effective solutions than currently exist. Thus, the following overview simply acknowledges the immensity of international development and situates water and sanitation interventions within it.

Success of the Marshall Plan to rebuild Europe following World War II ushered in a new age of international development and cooperation. The West was swept up in Rostow’s notions of take-off (Rostow 1960) as politicians and policy makers took the Marshall Plan global (Dichter 2003).

American President Harry S. Truman acknowledged this new policy initiative during his 1949 inaugural address:

We must embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas. The old imperialism - exploitation for foreign profit - has no place in our plans. What we envisage is a program of development based on the concept of democratic fair dealing.

Truman’s declaration sparked an age of formal development-assistance programs meant to liberate all nations from the human condition through industrialization and modern science.

Today’s international aid system includes central institutions and decentralized organizations in a mixture of development aid, emergency assistance, financial institutions, and foreign policy initiatives and includes trans-national organizations such as the World Bank, International Monetary Fund, and international nation-state aid agencies (Tvedt 2006). Shifts in development thought, policy, and practice across this mixture have occurred over time (Ebrahim 2001). Major trends in policy and practice included:

- 1950s and 60s: emphasis on large-scale infrastructure, industry, and agriculture projects.
- 1970s: emphasis on “basic needs” for individuals and families.
- 1980s: emphasis on community participation, sustainable development, and gender equity.
- 1990s: emphasis on economic liberalization and civil society
- 2000s: emphasis on Millennium Development Goals, time-bound, measurable targets to end poverty.

The water and sanitation sector mirrors these shifts and legacies of each one remain integrated across approaches within its policies and practices. These shifts have been in large part due to a lack of effectiveness (i.e. return on investment) in obtaining expected outcomes.

Development experts early on realized that poor nation states (developing countries), their institutions, and public policy were (and often still are) unable to address issues of underdevelopment and achieve the full potential of development initiatives. This brought on the rise of non-governmental organizations (NGOs)⁵ as a fundamental component of an alternative development paradigm (one in which shifted the focus away from state-to-state dealings) (Zaidi 1999). NGOs now receive a large portion of development expenditures and it is NGOs who carry-out the majority of water and sanitation projects in developing countries (Edwards 1995a; Edwards 1995b).

In an ideal world, the existence of NGOs indicate a vibrant civil society promoting good governance and effective policy implementation where state governance is weak (Rahman 2006).

⁵ This study considers an NGO to be any non-state and non-institutional actor. For the water and sanitation sector, this includes formal NGOs, religious- and academic affiliated groups, and foreign private companies who receive develop funds to deliver services in developing countries.

They are considered to be participatory, community-oriented, democratic, cost-effective, and better than weak government and large development institutions at targeting the poorest of the poor (Lewis 2001). In this way, NGOs are accountable to the communities in which they work. However, this is not necessarily the case in practice.

NGO-based approaches have two major flaws. Their existence, let alone survival, is often dependent upon donor funding. Thus, they are ultimately accountable to donors and their policies and not communities or countries in which they work. A consequence of this practice is a project-based approach in which NGOs depend on time bound, project specific contracts and leave when they have fulfilled the terms. This negatively influences NGO legitimacy and community relationships (Ebrahim 2001; Kamat 2003). A second issue is that NGOs struggle to achieve project goals and fulfill development expectations (Ebrahim 2001; Lewis 2001). In short, NGOs have shifted away from their initial focus on political mobilization and governmental accountability to apolitical, technocratic delivery of basic services eroding democratic institutions they ideal seek to support (Rahman 2006). This leads to a debate about the role and mandate of NGOs. One view holds that NGOs remain more effective than the public sector at service delivery and that localized constraints make their work extremely challenging. Another view surmises that NGOs are the spearhead of neoliberal policies aimed too weaken or sidestep the state in order for member countries of lending institutions to maintain competitive economic advantage.

Pillars of the international aid system (i.e. The World Bank and World Health Organization) promote policies for and provide funding to a vast majority of NGOs affiliated with the water

and sanitation sector. These NGOs implement these policies through practices and approaches informed by the broader international development discourse. While the sector has been responsible for increased access to water and sanitation services and improved health outcomes, an effectiveness gap persists between developed and developing countries. Clearly, the sector has identified and accounted for numerous barriers to effective service delivery. However, that this gap exists despite 60 years of interventions suggests significant shortcomings in the philosophies governing policies and practices employed by professionals within the sector.

This research posits that this gap is due in large part to an incomplete theoretical understanding of the context and related constraints in which these professionals practice. Through adapting and testing existing social science theories of international development, this effort attempts to improve current understandings of barriers to effective services, explain why they exist, and provide guidelines on how to overcome them. The following section introduces modernization and world system theories. Included at the end of this section is a table of barriers associated with each theory. Literature suggests that contemporary development policies and practices heavily favors modernization-based approaches (Ebrahim 2001). This report tests this phenomenon and explores an alternative approach whose elements consider barriers associated with both theories.

2.4 Theoretical Frameworks Underpinning this Research

This research posits that national differences in service delivery are due in large part to an inadequate theoretical understanding of approaches for infrastructure in resource-limited settings. Combining modernization and world system theories offers a perspective on both the local and

global assuming interconnectedness between the two. Another connection exists between theory and practice. Praxis is the implementation of theory as practices attempt to align with theory. One argument suggests that theory construction depends upon praxis (Kershaw 1992). In this way, theory explains previous phenomena, but does little to predict future events as well as relegating praxis to a static state. The hope is that as theory develops towards the ideal, so too to practices and policies. In this way, theory can inform praxis as it improves practice.

2.4.1 Linking Theory and Praxis

One purpose of this work is to demonstrate the explanative power of social theories (in this case explaining water and sanitation services as a segment of greater international development efforts). However, they also have great predictive potential. Theory provides the basis for sound policy explaining influences of policy decisions on society and explaining what motivates a society to implement certain policies (Hawdon 2008). A suitable theory of international development, for example, not only provides necessary direction for policies, but also explains why policymakers desire certain goals and how their decisions might affect local, national, and global relations. Such informed decisions reduce the potential for unintended consequences as they predict anticipated outcomes. “Moreover, solid theory, selected because it is in accordance with national ideology that sets the policy’s goals, does not only provide a detailed ‘road map’ for implementing policies, it also provides a well-defined strategy for evaluating the success of the implementation. Therefore, theory should guide [policy] (Hawdon 2008).”

However, in practice, policymakers are often unaware of or do not fully understand underlying theory. Thus, policymakers, more often than not, do not consider theory as the basis of sound

policy and so instead of theory, ideology more often motivates policy. Ideology as a basis for decision-making is subjective in that it emphasizes positive aspects of hoped-for outcomes as it deemphasizes predictable negative consequences. Furthermore, the use of ideology as opposed to theory is problematic because ideology “is often uncritical of its arguments, lacks nuance, and is empirically unverifiable (Hawdon 2008).”

Understanding ramifications of ideology-based policy are essential for three reasons. First, they may lead to “unanticipated” or “unintended” consequences that adversely affect society. In addition, policymakers may not understand larger societal implications and such “unattended” consequence may not even align with national interests or ideology. Last, ideology does not provide tools to evaluate where policy went wrong in the event of program failure making future improvements difficult. Understanding the association between policy motives and theory is paramount to successful implementation.

While Modernization and World System theories, together, provide some explanation of international development’s successes and failures, social scientists developed them to explain how policies were already shaping the world. How would the world look today had people been able to predict actions and consequences first through the lenses of international development theory? In reality, the world moves too fast; policy setters often cannot wait for a full theoretical assessment before taking action. At the same time, these theories derive from a long continuum of social theories developed by people such Herbert Spencer, Émile Durkheim, Sir Graffon Elliot Smith, Karl Marx, Friedrich Engels, and others who grappled with explanations of their world prior to international development. Perhaps armed with past and current knowledge regarding

social theories, political, military and corporate leaders can make informed decisions.

Regardless, with the theories now well tested and with hindsight and lessons learned from 60 years of practice, it is easy to judge where things went well and others went poorly.

Researchers use and develop theories to understand and explain observations and predict future events. Engineers utilize scientific theories to understand and predict scientific phenomena related to engineering. Likewise, they can employ social theories to understand and predict social phenomena associated with their sector. The provision of water and sanitation is a socio-technical problem. Viewing the problem through technical and sociological lenses provides a holistic perspective. While the sector debates technical aspects of service delivery, technical theories provide a limited framework to understand and explain such a broad problem. This study posits that an effectiveness gap in water and sanitation services exists between developed and developing countries because of an inadequate theoretical understanding of poverty, international development, and practicing engineering in such environments.

Social scientists use international development theories to describe development as a social, political, and economic phenomenon of and between nations. Sociologists modify, adapt, and create new theories as shifts occur in policy and practice over time. Thus, numerous and nuanced development theories exist and no single theoretical model explains development or understands underdevelopment (Gardner 1996). However, this study employs modernization and world system theories, two competing, yet similarly rooted theories that together allow for broad theoretical understanding of service provision within the context of poverty and international development. Key points are:

1. Proponents of modernization tend to confine poor project outcomes on constraints within the community or country, while ignoring the possibility of external or systemic influences on project success.
2. Proponents of world system theory tend to confine poor project outcomes on systemic constraints beyond the control of the community or country, while ignoring the possibility of localized influences on project success.

The following subsections provide overviews of these two theories and a brief description of theoretical limitations.

2.4.2 Modernization theory

Modernization theory is a dominant theory of international development. No one person is credited for its inception and it has deep sociological roots in Durkheim's model of an industrialized organic society, Simmel's money economy, and Weber's relationship between Protestantism and industrial capitalism (Gardner 1996). Modernization "visualizes development in terms of a progressive movement toward technologically more complex and integrated forms of 'modern' society (Long 1992). It gained prominence after World War II in part by Rostow's Take-off Model, five stages of economic growth countries move through as their path towards modernization (Rostow 1960). Alignment with Western Allies (ultimately termed the 'First World') or Russian Allies (the 'Second World') became a major emphasis of foreign policy associated with non-aligned states (the newly independent 'Third World'). Modernization was a strategic goal for these non-aligned states (Kiely 1995).

Modernization views nations as organisms that evolve along a linear path of development from a traditional state to a modern one. Industrialization, a transition from subsistence agriculture to cash-cropping, and urbanization indicate modernity (Gardner 1996). Kiely further defines modernization this way (p. 37):

The modern, Western world of social mobility, equal opportunity, the rule of law and individual freedom was contrasted with traditional societies, which were based on ascribed status, hierarchy and personalized social relations.

A country's ability to modernize depends on its ability to adapt and adopt specific social, political, and economic practices. These include secular social structures, democratic governance, and a market-based, capitalist economy. A country's inability to modernize accounts for underdevelopment within one or all of these sectors (Armer and Katsillis 2000). Thus, through the lens of modernization theory, the role of international development is to assist countries with a more rapid transformation via encouragement and diffusion of Western financial capital, ideas and technology (Moore 1965). Modernization theory establishes developmental barriers to localized contexts (i.e. the unit of analysis is internal to a specific country). While it explains well the developmental process of contemporary rich nations, it struggles to predict development of contemporary poor nations. World system theory grew out of critiques of modernization. It offers a different perspective of development with its emphasis on systemic barriers to development.

2.4.3 World System theory

World system theory provides an alternative explanation of underdevelopment and offers different predictions for development compared with modernization. While Immanuel Wallerstein gets credit for world system theory, it has sociological roots in Marxism and is

informed by dependency theories and a school of structural economic thought affiliated with scholars from the United Nations Economic Commission on Latin America (ECLA) (Gardner 1996). Raul Prebisch, a former ECLA economist argued that terms of trade between primary producers (concentrated in the Third World) was out of balance with and in favor of manufacturing producers (concentrated in the First World) with negative consequence on development (Prebisch 1959). World system theory defines development in terms of political and historical structures where, unlike modernization theory, underdevelopment is not natural, but created through political and historical processes and maintained as a requirement of global capitalism (Gardner 1996; Riain and Evans 2000).

World system theory, incorporating chaos and complexity theories, extends Marxist economic theory to the entire world and considers the historical significance of a global economic system on national development (Wallerstein 1974; Wallerstein 2003). It predicts that international development efforts often fail because these efforts overlook that in this world system “Third World” political economies evolve differently from ones in the “First World” (Riain and Evans 2000). The primary reason for this is that poor, developing nations face a world already dominated by powerful industrial countries. It predicts a country’s level of development in association with its structural position in the global market-based economy. As Armer and Katsillis suggest:

Rather than explaining development and underdevelopment by the presence or absence of certain internal institutions or personalities, these alternative theories argue that *both* result from unequal exchange relations and coalitions of interests associated with the structural position of societies in the global economy (p1886, emphasis added).

A world order structured of core, periphery, and semi-periphery defines a country’s structural position within a world system. These positions are:

1. The “core” which controls the global economy through political domination and marked by high levels of economic growth and industrialized production. It exports goods produced from raw materials exploited from the periphery, has a high capacity for innovations, and is more intensive in their use of capital and new technology. These “free countries” dominate others without other nations dominating them.
2. The “periphery” which relies on the production of labor and resource-intensive goods. It exports its raw material limiting self-sustained economic growth, thus the majority of its people live in poverty. The core and semi-periphery countries dominate these countries and their domestic institutions that maintain this imbalance.
3. The “semi-periphery” which includes countries that trade in both directions. They have a high level of autonomy and dominate periphery countries, while core countries dominate these countries (Wallerstein 1974).

World system theory posits that a country’s position in the world order determines its ability to modernize. It predicts obstacles to mobility within the core-periphery structure and emphasizes the ways in which economic elites and their allies in the periphery maintain their interest in preventing the full diffusion of economic capacities from the core to the periphery.

Thus, through the lens of world system theory, the role of international development is to build infrastructure within the periphery and semi-periphery geared to exploitation and export of raw materials by the core (Gardner 1996). Countries remain underdeveloped because it is in the core’s interest to maintain the system as is. As Gardner points out, “In this view, the improvement policies advocated by modernization theory can never work, for they do not tackle to root causes of the problem (p.17).” Thus, world system theory offers that developmental

barriers are systemic and beyond the control of developing countries. (i.e. the unit of analysis the world system). World system advocates cite a radical overthrow of the system is the only way change can occur (Dunaway 2003). This notion that periphery countries and, by extension, their populations are passive and stagnant to change is a major critique of this theory. The following section highlights limitations of both modernization and world system theories.

2.4.4 Limitations of modernization and world system theories

As competing theories of international development, modernization and world system theory offer complementary perspectives for a broader understanding of poverty and interventions within its contexts. Furthermore, while these two theories are rather dated for the study of a contemporary phenomenon, they are relevant because a majority of contemporary international assistance policies and practices prescribe to modernist-based approaches (Ebrahim 2001; Gardner 1996). World system remains relevant as it offers a means by which to explain root causes of problems that persist in the 21st Century (Lewis 2007; Nixson 2006). However, credible limitations of these theories exist.

While broad and macro in scope, modernization and world system theories do not encapsulate the vast world of development theories. As with any pairing, an inherent simplicity exists between dualities. Many critique modernization for being overly optimistic, while world system is pessimistic (Gardner 1996). Both modernization and world system theories tend to favor Western culture. Such normative thoughts have fallen out of favor among scholars (Kiely 1995). Theoretical advances offer differing paradigms through which to view and understand society and the age of globalism (Beck 2005; Sen 2000). Independent of each other, modernization does

not account for any barriers beyond a country's borders, while world system does not consider the influence of localized constraints and does not account for growth of countries such as Brazil, India, and China (Kiely 1995). Lastly, while factors related to modernization are fairly explicit, systemic factor are much more obtuse. Despite literature quantifying world systems (Chirot 1982; Delacroix 1978), it was difficult to identify systemic factors related too water and sanitation.

With a theoretical lens established, a comprehensive identification of barriers was possible in order to answer the second part of Question 1. The last section of this chapter provides barriers to effective service delivery according to social, political, economic, technical, and systemic categories grounded in theories of international development.

2.5 Barriers to effective service delivery

Table 2.8 on the following page presents barriers to effective service delivery grounded in international development theories and grouped by social, political, economic, technical and systemic categories. The following sources provided the basis for modernization/localized barriers:

1. *Water Source Selection* by the Water and Environmental Health at London and Loughborough (WELL 2003).
2. *Equity and Inclusion: Reaching the excluded* by WaterAid (WaterAid 2007).
3. *A Review of Decision-Making Support Tools in the Water, Sanitation, and Hygiene Sector* by Woodrow Wilson International Center for Scholars and Pacific Institute (ECSP 2008).
4. *Guidance Notes on Services for the Urban Poor: A Practical Guide for Improving Water Supply and Sanitation Services* by The World Bank's Water and Sanitation Program (WSP 2009).

Table 2.8 Barriers to effective water and sanitation services

Modernization-based Barriers (localized)	World system-based Barriers (systemic)
<p><u>Social</u> Gender equity Local traditions, customs, religion Education and awareness of water-related disease General level of education Trust between community and assistance organization</p> <p><u>Political</u> Local Corruption Community organization Local politics Strength of the public sector and relations with government ministries</p> <p><u>Economic</u> International financial support Material and equipment scarcity (local access) Willingness/ability to pay Availability of capital</p> <p><u>Technical</u> Physical constraints (terrain, water availability) Technical skills/capabilities of locals Local energy scarcities</p>	<p><u>Systemic</u> International trade barriers/restrictions International policies Structural adjustment policies Decentralization/lack of support for public institutions International financial blocks International travel restrictions/warnings International corruption Material and equipment scarcity (trans boundary access) International boycotts on exports Influence of border nations Trans boundary energy scarcities Water policies that favor private industrial/agro-business over public uses</p>

However, there is a lack of reports acknowledging systemic barriers to water and sanitation services in developing countries. Furthermore, arrangements of a world system are less tangible than arrangements of modernization. Thus, systemic barriers noted in Table 2.8 were derived from literature such as (Chirot 1982) and (Delacroix 1978), some of the few references that quantify world system theory. Note that while these are primarily economic in nature, they revolve around economics of an international basis describing the existence of a world system and are thus termed ‘systemic.’ With a theoretical understanding of potential barriers to service delivery in resource-poor settings, the study now transitions to understanding how the sector accounts for them.

Answers to Question 1 provide background information illustrating the complexity of the problem while also defining a set of variables grounded across to complimentary theories to test the a proposition. With these answers, the study can now progress to explain why the effectiveness gap persists despite a tremendous amount of energy, effort, and investment.

2.6 Explanation of the Research

An effectiveness gap exists between water and sanitation services in developing countries and those offered in developed countries. This divide is particularly stark in rural areas of very poor countries. The primary purpose of this work is to answer Question 4: How can the water and sanitation sector deliver services that are more effective in resource-limited settings? This is an extremely complex and difficult question that deserves and requires more attention than a dissertation can offer. Answers to Questions 2 and 3 provide a foundation in order to begin the conversation in response to the fourth question.

As described in Chapter 3, case study methods offer a robust means to answer Question 3. I initially sought out effective water and sanitation organizations as cases, but was unfamiliar with strong potential cases. While Water for People and WaterAid are examples of leaders within the sector, I lacked access to these organizations. I then turned outside of the sector and considered a multiple case study of Partners In Health (PIH), Coca-Cola, and Central Asian Institute; organizations with proven track records to whom I had access. After realizing the enormity of scope this posed, I narrowed my research to focus on PIH.

Partners In Health is a well-renowned, public health organization known for its effectiveness in very poor, rural communities (communities where the water and sanitation sector has limited effectiveness). PIH's effectiveness is tied to a unique approach. This is the first theoretical analysis of their practices. They have successfully met MDGs associated with their work. This success includes meeting MDG5b – achieving universal access to reproductive health for patients in their catchment areas. Furthermore, as a long-term volunteer with PIH, I had access to people located at all levels of the organization. Thus, PIH was an obvious choice as a proxy for water and sanitation-based cases. However, I had an issue with relating the findings from doctors to engineers. While I could justify generalization of a single case study back to the theories of international development, and then back to water and sanitation practices, I felt a more in depth theoretical study of these practices was not only necessary, but would address issues of reliability and provide a more rigorous analysis of the problem.

I developed a web-based survey as a tool to determine how professionals within the water and sanitation sector define context and to understand how this perspective influences their practice. This survey asked respondents to rate the influence of potential barriers on effectiveness and sought their opinion associated to several trends within the sector. This embedded research component enhanced my capability to generalize case study findings towards answering how the sector can deliver services that are more effective. The next chapter details the mixed methods approach implemented to answer Questions 2 and 3 and produced results as a foundation for Question 4.

3.0 Overview of Mixed Methods

This study used a mixed methods approach to answer Questions 2, 3, and 4:

1. How does the water and sanitation sector define context, and how does this perspective influence their practice?
2. How do organizations in other, related sectors deliver effective services in resource-limited settings?
3. How can the water and sanitation sector deliver services that are more effective in resource-limited settings?

Quantitative methods are best for answering narrowly defined research questions through deductive approaches, while qualitative methods are better for answering open-ended questions through inductive approaches. The strengths of one offset the weaknesses of the other. Thus, when combined, they offer a more complete way to obtain a breadth of data and explain them to a depth not possible with any single method (Borrego 2009). The qualitative methods employed to answer Question 3 are the dominant methods for this research. However, quantitative methods used to answer Question 2 provide important supporting data that enables a connection between PIH (a medical organization) to the water and sanitation sector.

Embedded mixed methods (specifically a dominant/less-dominant, sequential approach) are well-suited for this study (Creswell 2007). Ultimately, the purpose of this survey is to infer an answer to the broader question about how the sector can deliver services more effective in developing countries by first answering Questions 2 and 3. For Question 2, I interpreted quantified data from a web-survey to identify broad trends in the international water and

sanitation sector. These results were embedded into qualitative case findings in order to answer Question 4. This chapter details this mixed methodology. Part I summarizes quantitative methods, while Part II reviews qualitative methods.

Part I – Quantitative Methods

3.1 Overview of Quantitative Methods

This chapter reviews methods employed to answer Question 2: How does the water and sanitation sector define context, and how does this perspective influence their practice?

This portion of the study used quantitative methods to answer the question using a survey design to measure attitudes and opinions of water and sanitation professionals to draw general conclusion about the sector. Because the sector includes a great number of people, surveys are preferred methods of data collection in order to identify attributes of a large population from a small group of individuals (Creswell 2009). Using social theories of international development, Chapter 2 identified categories of barriers to effective service delivery in developing countries. Thus, the purpose of this survey was to rank these barriers according to their intensity, while it also sought to detect if a pervasive way of thinking exists among the sector. The sample included engineers, non-engineers, and professionals working on local, intermediate, and systemic levels. Data collection occurred over a 6 week period using a professional surveying service and email notifications requesting professionals to participate in the survey. It included a raffle of an iPod nano as an incentive for participation and Virginia Tech's Institutional Review Board approved this study (IRB # 09-062). Refer to Appendix B for a copy of the IRB approval letter supporting this research. I analyzed the data using descriptive and inferential statistics. The following sections provide additional details of these methods.

3.1.2 Survey Design

The purpose of this survey was twofold. The first purpose was to rank barriers to effective service delivery according to their intensity, while also determining the obligation and capacity of the sector to overcome these barriers. The second purpose of this survey was to detect the presence of a pervasive way of thinking among the water and sanitation sector. I designed a new survey instrument to collect cross-sectional data via a web-based, self-administered questionnaire managed over the internet. Surveys offer a preferential option for rapid and cost-effective collection of attitudinal data from large groups (Babbie 1990). However, an inherent weakness of survey data, especially relevant for this study, can be an uncertain relationship between survey sample size and the size of population it attempts to represent. The following section details the population and sample for this study.

3.1.3 Population and sample

The population of international water and sanitation professionals is massive and varied. This survey included people from many parts of the world, but only English speaking people with access to email and the internet. Moreover, it is impossible to know just how many people exist in this sector – certainly tens to hundreds of thousands (and if one includes technicians, laborers, and support staff, perhaps millions). Thus, it is impossible to state the size and characteristics of the study population, as well as calculate a sample size sufficient for validation to the general population. Because of this limitation, it is also impossible to compile a list of all elements within the population and perform random sampling. In such an instance, researchers use cluster sampling in which they identify representative groups within a population, obtain names of individuals, and then perform random sampling of this subgroup (Babbie 2007). However, I was

unable to do that as well. Therefore, this study relied on convenience sampling (a modified-cluster sampling). I had access to several large, representative international water and sanitation email ‘listservs’ and organizations and sent links to the survey through their networks. These sources included:

1. Water 21 Global News Digest: a weekly listserv managed by International Water Association (IWA) Publishing based in London
2. MENA-Water: a professional, World Bank-affiliated listserv related to Middle East/North Africa water and sanitation issues
3. Water for People: a national listserv maintained by a U.S.-based international NGO
4. Engineers Without Borders: 1) a national listserv maintained by a U.S.-based international NGO and 2) New York professional chapter listserv.
5. Adamski: a professional listserv maintained by a recognized leader within U.S.-based international water and sanitation sector.
6. Others: email contacts of three colleagues located at University of Western Australia, University of Oklahoma, and Virginia Tech

The survey sought demographic information from that enabled stratification of the data.

Categorical responses facilitated stratification of respondents and included primary roles of participants (engineers and non-engineers) and level where they spent most of their time (local, intermediate, and systemic). However, because of the unknown size of the population and existing data on characteristics of the water and sanitation sector, I was unable to validate if respondent stratification reflected actual proportions within the sector. Refer to Chapter 4 for

sampling results and the following section for details of the survey instrument developed for this study.

3.1.4 Instrumentation

I created a new survey instrument for this study, *Virginia Tech Wat/San Survey*, using SurveyMonkey (a commercial product supporting survey research). Refer to Appendix C for a copy of this instrument. Before initiating this survey, I performed a pilot study using Survey.vt.edu, a survey support tool offered to members of Virginia Tech. The following subsection provides details of this pilot and discusses improvements that led to the development of the final survey instrument.

3.1.4.1 Pilot survey

I performed a pilot survey in order to establish content validity of the final instrument and improve questions, format and measurements. The population was approximately 50 members of Engineers Without Borders Student Chapter at Virginia Tech with a sample size of 16 respondents. I also conducted four controlled sampling sessions with professors and colleagues for more in-depth critique and analysis of the instrument. Modifications and improvements to the final instrument based on the pilot survey included:

1. Changed the focus from engineers to the water and sanitation sector (feedback acknowledged that while engineers play a dominant role in service delivery, many non-engineers play a significant role in service delivery)
2. Changed the term ‘responsibility’ to ‘obligation’
3. Changed the term ‘empowerment’ to ‘capability’

4. Eliminated one independent variable (barrier) – ‘a community’s level of disease awareness’ under the assumption that ‘a community’s level of general education’ accounted for this variable.
5. Eliminated a demographic question related to years of experience, as this was not to be a factor of analysis.
6. Added a new set of questions related to ‘trends’ within the sector as I was not confident that questions related to barriers, obligation, and capability would provide sufficient data to answer the research question.
7. Changed survey tools to SurveyMonkey as Survey.vt.edu offered limited capabilities.

After completing the pilot, I developed a modified survey instrument. The following subsection provides specific content related to this instrument.

3.1.4.2 Content of the modified survey instrument

I used email communication to invite participants. The invitation was:

Researchers at Virginia Tech (USA) request your participation in the following research survey that gathers data on attitudes and opinions within the water and sanitation sector working in developing countries: <http://www.surveymonkey.com/s/VTWatSanSurvey>. The survey should take 10 minutes of your time. Thank you.

The opening page included additional information about the survey and an informed consent that required verification of legal age (18 years or older) before proceeding. The survey then guided respondents through a series of four groups of questions related to demographics, barriers, trends, and a short answer asking them to explain in their own words the persistence of the effectiveness gap.

3.1.4.2.1 Demographics

The survey instrument included three questions related to demographics:

1. Primary role within the sector: engineer, non-engineer, student, not in this sector, and other (for analysis, I counted student, not in this sector, and other responses as non-engineers).
2. Type of organization in which participants worked: international water and sanitation NGOs, other international NGOs, bi and multilateral organizations, public sector, academic institutions, private sector, and other.
3. Level at which participants spent most of their time: local (defined as “in the field in direct support of community-level activities”), intermediate (defined as “in-country office/capital city in support of both community and national activities”), and systemic (defined as “international home office in support of various in-country and/or international/policy related activities”), and other.

3.1.4.2.2 Barriers, Obligation, and Capability

The next section of questions used a matrix of drop-down menus allowing respondents to indicate their opinion on 18 individual factors influencing effective service delivery. They were asked to gauge how much of a barrier that factor was to service delivery, if the sector has an obligation to overcome those barriers, and then if the sector has the capability to overcome them.

Responses were scaled from ‘Don’t Know’ (6), ‘Absolute’ (5), ‘Major’ (4), ‘Moderate’ (3), ‘Minor’ (2), to ‘No’ (1) barrier/obligation/capability (values in parentheses were assigned to responses for data analysis). I asked respondents to base their responses on their most recent experiences, as intensity for each factor was likely dynamic across communities and

countries. Table 3.1 lists the 18 independent variables grouped by category and tested with the survey. For the actual survey, these factors were sorted randomly, not organized by category.

Table 3.1 Independent variables on effectiveness of service delivery

Category	Independent Variables
Social	Community's average level of education
	Community's power dynamics related to gender
	Level of trust between community and assistance organization
	Community's religious practices
Political	Community's internal politics
	Strength of the public sector
	Community's relationship with related government ministries
	Corruption
Economic	Community's ability to pay for services
	Community's ability to access resources for infrastructure (i.e. spare parts or chemicals)
	Availability of public funds
Technical	Availability of energy to power services
	Availability of water sources
	Terrain
	Community's ability to operate and maintain infrastructure
Systemic	Structural adjustments associated with conditional loans
	International trade policies that influence access to materials and/or equipment
	Policies that favor economic uses of water over domestic uses of water

Literature presented in Chapter 2, Section 9.0 provided the source material I used to develop and categorize the 18 independent variables. The goal was to identify several key and related variables in order to define the 5 larger categories (social, political, economic, technical, and systemic). More than 3 or 4 variables describe these categories, yet time and space prevented a more complete list. For example, education, gender, trust, and religion were used to define 'social' barriers. Factor analysis was used (as presented in Chapter 4) to show how well these individual barriers captured the theme of the five categories they represented.

While I left it to the individual to define barriers, obligation, and capability, I define them as:

- *Barrier*: a social, political, economic, technical, or systemic factor that block or impedes effective water and sanitation service delivery.
- *Obligation*: a requirement to take some course of action, whether legal or moral, to overcome a barrier.
- *Capability*: the ability to perform action to overcome a barrier.

This question afforded respondents to provide any comments to support or clarify their responses to the previous barrier-related questions.

3.1.4.2.3 Trends

The third section sought respondents’ opinions on trends within the literature. Table 3.2 presents the trends by category; note that the survey instrument sorted these trends randomly.

Table 3.2 Trends within the water and sanitation sector measure by this study

Trend	Item on Survey	Wording
Appropriateness versus effectiveness	3	First-world solutions are not appropriate in third-world settings
	4	It is better to design a more contextually appropriate wat/san system that a community can operate and maintain on its own versus a system whose functionality is dependent upon inputs from outside groups or NGOs, even if the independent system is less effective than the dependent system.
	10	It is better to design a more effective wat/san system whose functionality requires inputs from outside groups or NGOs versus a system a community can operate and maintain on its own, even if the dependent system is less contextually appropriate than the independent system.
Money and cost-recovery	1	Wat/san systems designed around a community's ability to pay are better than systems designed without a cost-recovery model.
	5	Lack of money is the greatest barrier to any wat/san project.
	8	With enough money, project teams can overcome all other barriers to effective water and sanitation services.
Public and Private	2	The private sector provides more effective wat/san systems than the public sector.
	6	The most effective wat/san systems involve the public sector.
Outcomes	7	In regards to water and sanitation services, first-world outcomes are not possible in third-world settings.
	9	The prevalence of water-related diseases can be reduced to undetectable levels in developing countries as they are in developed countries.

Respondents used a 5-point Likert rating scale (ranging from “strongly agree” to “strongly disagree”) to respond to these 10 questions, a common method by which respondents specify their level of agreement to a specific statement (Neuman 2006). The original final instrument placed barrier-related questions ahead of trend-related questions. At Week 3 of the survey being open and with a completion rate of approximately 47% (30 samples), I switched the order of this two on the basis that perhaps the barrier questionnaire format overwhelmed respondents. The final completion rate was 54% (67 samples).

3.1.4.2.4 Effectiveness Gap

This last question summarized the effectiveness gap and provided a figure similar to Figure 2.5. It then asked respondents, “Why might access to wat/san services not equate to the elimination of water-related diseases in developing countries as it does in developed countries?” Respondents were able to write in their response in short essay form.

After completing the survey, the survey took respondents to a thank you and exit page allowing them to enter an incentive raffle for an iPod Shuffle. The following section reviews methods employed to analyze and interpret the survey data.

3.1.5 Data Analysis and Interpretation

I employed descriptive and inferential statistics to analyze survey data. Means and standard deviations indicate relationships between overall finding related to categorical variables related barriers and trends. However, inferential statistics indicate differences between stratifications. Using Microsoft Excel’s data analysis toolpak, I used two-sided t-tests (assuming equal variance)

to detect differences in responses between engineers and non-engineers, while I used single-factor analysis of variance to detect differences in responses between local, intermediate, and systemic participants. I assumed a 95% confidence interval for all inferential analyses and verified reliability of the factors through the coefficient alpha. Concurrent and convergent validity of barrier-related categorical groupings was established through factor analysis using SPSS software (Hawdon 2009). I used qualitative coding methods and nVivo software using the five barrier-related categories as codes to analyze responses to the question related to the effectiveness gap.

These quantitative methods enabled the ability to answer Question 2. They were part of a mixed methods approach. The follow part of this chapter describes the second set of methods employed to answer Question 3 that included qualitative case-based methods. The same theories supported these embedded methods. These theoretical mixed methods provided multiple perspectives to meet the research objectives.

Part II – Qualitative Methods

3.2 Overview of Qualitative Methods

This chapter reviews methods employed to answer Question 3: How do organizations in other, related sectors deliver effective services in resource-limited settings? This portion of the study used qualitative methods to answer the question through rigorous, systematic case study methods, an emergent and distinct research paradigm within engineering (Taylor, et al. 2009). Case studies are particularly advantageous when drawing connections between numerous factors (Patton 2002), made more robust by the theoretical proposition guiding this research (Yin 2009). The study's purpose was to explain how Partners In Health (PIH) delivers effective services in resource-limited settings, with a particular focus on Haiti. While data collection relied on a triangulation of multiple data sources, semi-structured interviews of 28 participants provided a majority of data. Data collection occurred over a three year period in Haiti and Boston, included participant observation, and document analysis. Both PIH's Haiti-based Ethics Committee and Virginia Tech's Institutional Review Board approved this study. I analyzed data using coding methods with the assistance of nVivo software. The following sections include specific details of these methods.

3.2.1 Setting

Partners In Health is a U.S.-based international non-governmental organization (NGO) working in 10 countries across the Americas, Africa, and Asia. It works with sister organizations registered in each country. This work focused on PIH's work in Haiti where it has worked for more than 25 years with Zanmi Lasante (ZL), but remained open to experiences throughout the

organization. I gained access to PIH¹ in 2005 and began volunteering with them in Haiti in 2006, where I lived during the summer of 2009. I was involved with the design and construction of a vehicular bridge in the Central Plateau interacting with members of the community, United Nations, Government of Haiti, private companies, and donors, as well as the design of a referral hospital and as a first-responder supporting PIH medical teams in Port-au-Prince following the earthquake of January 12th. These opportunities afforded participant observation allowing me deep, long-term interaction with members across the organization including Haitian engineers, drivers, mechanics, doctors, nurse, administrative staff, board members, and directors, as well as Boston-based executive and administrative staff, co-founders, doctors, directors, and financial managers.

3.2.2 Data Sources

Multiple sources and data triangulation are the foundation of strong case study designs. The process of triangulation offers corroboration among different sources of evidence leading to *converging lines of inquiry* (Yin 2009). Data triangulation addresses potential problems of reliability because more than one source of evidence supports research findings. It also addresses construct validity because multiple sources of data provide multiple measures of the same findings. Data sources for this study included:

1. Interviews (to include multiple perspectives from different groups)
2. Documentation
3. Archival records
4. Direct observation
5. Participant-observation

Figure 3.1 illustrates how multiple data sources led to the triangulation of PIH's effectiveness.

¹ I often refer to Zanmi Lasante and Partners In Health as one in the same, unless significant cause exists to differentiate between the two.

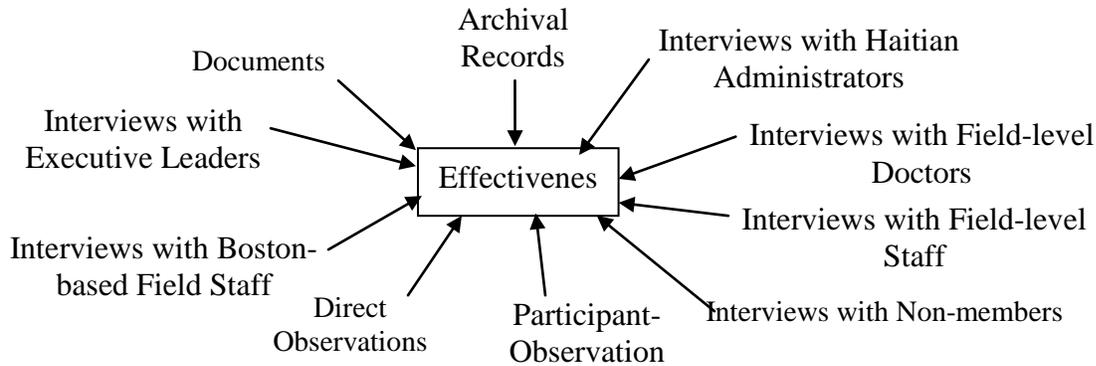


Figure 3.1 Convergence of Multiple Sources of Evidence (adopted from Yin 2009).

The following subsections describe sources with a particular emphasis placed on interviews.

3.2.3 Interviews

Interviews provided a majority of case study data for this research. Data collection complied with Institutional Review Board requirements. A pilot study informed the final semi-structured interview instrument applied to a wide array of participants. The following subsections detail specific aspects of the data collection phase associated with interviews.

3.2.3.1 Institutional review board approvals

This research complies with standards for human subjects' research. It meets the standards of Virginia Tech per the university's Institutional Review Board (IRB) review per IRB # 09-062. It also meets requirements of Zanmi Lasante's Ethics Committee per a letter dated 29 April 2009. Appendix B contains both approval letters.

3.2.3.2 Interview participants

Interview participants, who accounted for a majority of data analyzed, provided key information and multiple perspectives in order to corroborate PIH's approach or offer variant viewpoints.

Table 3.3 reflects that participants represented multiple levels within PIH and ZL, as well as non-PIH participants.

Table 3.3 Interview participants organized by where they work

Partners In Health/Boston		Zanmi Lasante/Haiti		Non-PIH Participants	
ID	Title	ID	Title	ID	Title
P1	Haiti Program Manager	Z1	Director of Facilities, Boucan Carré	N1	Mayor, Boucan Carré
P2	Chief Operating Officer	Z2	Medical Director, Boucan Carré	N2	Executive Director, Community Organization
P3	Haiti Research Assistant	Z3	Hospital Administrator, Boucan Carré	N3	Haiti PEPFAR Coordinator, US Government
P4	Chief Financial Officer	Z4	HIV/TB Project Manager, Hinche	N4	Regional Director, Haitian Ministry of Health
P5	Director of Procurement	Z5	Director of Training	N5	Director, Still Harbor/Former PIH Director of Development
P6	Executive Director	Z6	Civil Engineer	N6	Director, Cambridge Health Alliance/Medical Advisor, Government of Haiti
P7	Chief Medical Officer	Z7	Director of Programs		
P8	Director of Advocacy	Z8	Associate Director		
P9	Chief of Programs	Z9	Director of HIV/TB		
P10	Haiti Financial Manager	Z10	Director of Engineering		
P11	Haiti Doctor	Z11	Director of Women's Health		

Non-PIH participants work closely with PIH, but from a distance, while having experience with related organizations. Thus, they offered unique perspectives on PIH and were able to compare and contrast PIH's approach with others' approaches. Their insight improved validity of findings. A password protected master list contains names and associated identification numbers as an IRB requirement. The following section details the instrumentation used to interview these participants.

3.2.3.3 Interview Protocol

I created a semi-structured interview protocol for this study. Refer to Appendix D for a copy of this instrument. Before conducting interviews, I performed a pilot study on four participants not associated with the final study. The initial intent of the interviews was to have participants

identify barriers to effective service delivery with data based on a range of successful and unsuccessful projects identified by PIH. In this way, PIH was the unit of analysis and specific projects were subordinate units of analysis. The purpose was to develop a scaleable metric of success accounting for the influence of barriers to service delivery. An additional benefit of this design was that having participants talk about the same project would increase validity.

However, I modified my line of questions to be more open-ended with an emphasis on the organization as a whole after encountering a reluctance to talk about unsuccessful projects and an inability to obtain multiple perspectives on the same projects (i.e. participant experiences varied widely). In the end, this shift offered a much wider and richer range of data. The following subsections provide details about the pilot study and subsequent field interviews based on the final interview protocol.

3.2.3.3.1 Pilot interviews

Prior to conducting formal interviews, I performed one hour pilot interviews with four people not associated with the final study in March 2009. The purpose of this pilot was to validate relevant lines of questioning and clarify concepts of the research design. Participants represented the international development field and included a director of a U.S.-based international NGO, a former international NGO manager, a former Peace Corps volunteer, and a global health professional. I designed an interview protocol that mirrored the survey instrument used in the previous portion of this study. Refer to Appendix E for this protocol. It included 10 questions associated with categorical barriers faced in resource-limited settings with numerous follow-up questions and probes and a detailed check-list to track participant responses. Modifications and improvements to the final protocol based on pilot interviews included:

1. Shortening the final protocol to three questions that were more open-ended and developed a generic probe.
2. Omitting the use of a check-list as it prohibited active listening.
3. Initiating digital voice recording.

After completing the pilot, I developed a modified interview protocol. The following subsection provides specific content related to this protocol.

3.2.3.3.2 Modified interview protocol

The first interviews took place in Haiti during the summer of 2009. Figure 3.2 presents the modified protocol used for these initial interviews.

1. What is your job title and what are your roles and responsibilities within the organization?
2. Tell me about your most successful program or project? Probe for specific barriers and ask how they overcame them or how barriers influenced the outcome.
3. We can learn a great deal from programs and projects that did not succeed. Tell me about your least successful program or project. Probe for specific barriers and ask how they overcame them or how barriers influenced the outcome.
4. *Standard format to probe specific influences:* are you aware of any _____ that helps or hinders your work?
 - i. If so, please give me specific examples and explain how they influence your work.
 - ii. How does this help your work?
 - iii. How does this hinder your work? Are you able to overcome hindrances? If so, how? If not, why not?

Figure 3.2 Modified interview protocol

However, after encountering issues associated with, what at the time appeared to be, uninteresting data from the first five interviews and an inability to obtain data on the same projects, I modified the protocol further adding two additional items placed after the first item:

- Why do you like working for PIH? Please provide me with your top 3 reasons?

- In your own words, why do you think PIH is so successful?

Additionally, I rarely depended on the formal probe and took the liberty to ask more in-depth questions based on the flow of the conversation and participant responses. The next section discusses issues such as this as conducting interviews can be a rather dynamic experience, especially in a place such as rural Haiti.

3.2.3.4 Conducting the interviews

I conducted a series of 28 individual, one-hour interviews between June and October 2009. Eleven interviews with members of Zanmi Lasante and the majority of non-PIH participants took place in Haiti, while the others took place in Boston or over the phone. I documented Haiti-based interviews using extensive, verbatim hand written notes as most participants refused to be recorded and I wanted this group of interviews to follow a similar procedure. I then transcribed my notes into Microsoft Word within 24 hours of completing an interview. I worked with a Creole translator and researcher for many of these interviews: he translated back and forth and I recorded his English translations in real-time. This person was not affiliated with Partners In Health or Zanmi Lasante. We conducted pilot interviews before conducting actual data collection, traded notes, and reviewed transcriptions to ensure quality. Through his connections throughout the Central Plateau (where PIH works), he connected me with participants that I would otherwise have been unable to meet. Interviews with members of PIH and several non-PIH members took place in Boston (three of these were phone interviews). I recorded each of these interviews with digital recording equipment and hired a person to transcribe them into Microsoft Word. I converted all transcripts into rich text format and imported them into nVivo software for analysis. Section 4 provides additional information about data analysis.

As with all experimental data collection methods, the potential exists for bias and inaccuracies. Data from multiple sources provided the ability to corroborate interview data. The following subsections present additional sources of evidence: organizational documentation available publicly, PIH archival records, direct observation, and participant-observation.

3.2.4 Organizational documents as data sources

Organizational documents may include letters, memoranda, e-mail correspondence, written reports of events (to include meetings), administrative documents (to include progress reports and other internal records), formal studies or evaluations of the organization, and mass media documents such as books, interviews, documentaries and news articles (Yin 2009). PIH-related documents reviewed for this study included a mix of those available publicly and privately.

Table 3.4 provides a list of these documentary data sources.

Table 3.4 PIH-related organizational documents as data sources

Organizational Documents	Description
Regional Representative Workshop Documents, October 2 nd , 2009	Meeting agenda, list of attendees, financial status of organization, and materials for regional representatives.
<i>Mountains Beyond Mountains: The Quest of Dr. Paul Farmer, a Man Who Would Cure the World</i> by Tracy Kidder	A biographical book about PIH founder Dr. Paul Farmer that chronicles the founding of PIH.
“Wòch Nan Soley: The Denial of the Right to Water in Haiti”	A report, co-written by PIH members and others, relating Haiti’s lack of clean drinking water to systemic barriers.
Newspaper articles	Various newspaper articles from the Boston Globe, New York Times, and Washington Post
<i>Dr. Farmer’s Remedy for World Health</i>	<i>60 Minutes</i> on CBS – this documentary includes interviews of PIH staff and other global health experts.
<i>Africa: House Calls and Health Care</i>	<i>NOW</i> on PBS, – this documentary includes interviews of PIH staff and other global health experts.
Interview with Dr. Jim Yong Kim	<i>Bill Moyer’s Journal</i> on PBS interviewing PIH co-founder Dr. Jim Kim

3.2.5 Archival records as data sources

Archival records include public files made available by governments and governmental organizations, service records, organizational records, geographic maps and charts, and previously collected survey data (Yin 2009). PIH-related archival records reviewed for this study are available publicly on PIH's website (www.pih.org). Table 3.5 provides a list of these archival data sources.

Table 3.5 Archival Record Sources of Data

Archival Records	Description
PIH e-Bulletins (April 2007 – July 2009)	PIH publishes a monthly e-bulletin emailed to supporters. They relate progress on recent PIH projects, events, and general global health news. These records are available to subscribers.
PIH Newsletters (Summer 2003 – Autumn 2008)	PIH publishes a quarterly newsletter related to projects and personnel. These reports are publicly available at www.pih.org .
PIH Annual Reports (2003 – 2009)	PIH publishes an annual report, a requirement of their 501(3)(c) status. The primary focus of this record is financing and funding, but also highlights projects around the world. These records are publicly available at www.pih.org .

3.2.6 Direct observations as data sources

Casual direct observation of participants and their surroundings provides a deeper understanding of context in which events take place (Yin 2009). Sources of data from direct observations included field notes, pictures of PIH sites in Haiti, and personal reflections about conditions in Haiti's Central Plateau.

3.2.7 Participant-observation

Participant-observation occurs when an investigator assumes a variety of roles within the case study situation allowing rich and insightful observation into interpersonal behavior and motives. It also provides access to events and groups that are otherwise inaccessible. Thus, they offer a unique perspective to examine reality from the viewpoint of participants rather than from an

external position (Yin 2009). I volunteered with PIH in Haiti from August 2006 to April 2010. The majority of this time included working with PIH and ZL leaders to build a bridge in the community of Boucan Carré. While PIH relies on numerous partners, they have a very protective culture that I would not have otherwise been able to penetrate. Not only did this experience offer an insiders perspective on how the organization operates, but provided me with the trust and credibility to carry out this work.

The multiple sources of evidence offered here facilitated the triangulation of data towards convincing and accurate findings. The following section describes data collection and analysis techniques used to manage and develop converging lines of inquiry from these data sources.

3.2.8 Data Collection and Analysis

The strength of case study methods comes from their reliance on multiple sources of data that offer deep and rich understandings of phenomena. However, a perceived weakness of these methods is an inability to replicate findings. A case study data base allows accessibility of raw data and reporting rigorous, uniform data analysis techniques attends this shortcoming (Yin 2009).

3.2.8.1 Case study database

Case study databases enable other researchers to access raw data and perform their own replication of the procedures. This process addresses reliability of findings (Yin 2009). I used Virginia Tech's web-based *Scholar* interface as a database for all tangible evidence (obviously, evidence from direct and participant observations is limited). Anyone with Virginia Tech PID

may seek access to data via this site. Anyone without access may obtain data upon request.

Figure 3.3 offers a process for those wishing to follow the chain of evidence related to this case.

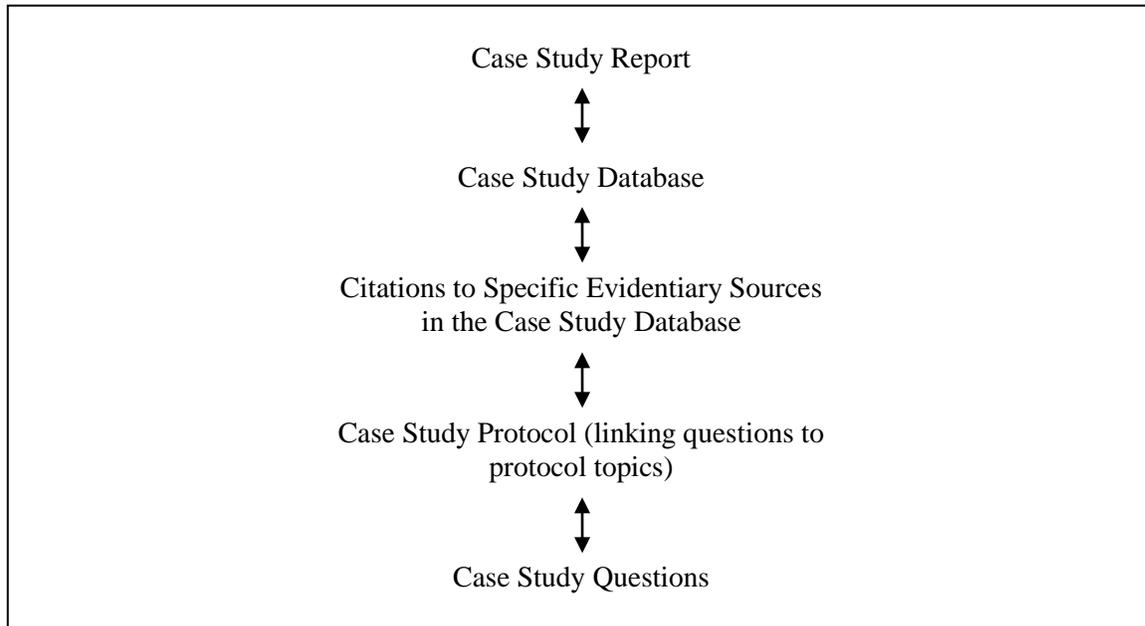


Figure 3.3 Process of case study replication (Yin 2009)

3.2.8.2 Data analysis

This study relied on a theory-based analytical strategy to explain how PIH delivers effective services in resource-limited settings and guided by a theoretical proposition: *assistance organizations that consider localized and systemic constraints are more effective than those that consider only localized constraints*. I employed single-case explanation building analytical techniques to test this proposition. The use of computer-assisted coding techniques, using nVivo software, supported categorization of large amounts of narrative text (i.e. qualitative data). An initial coding scheme developed from modernization and world system theories facilitated this process. Table 3.6 on the following page lists these codes (the same variables used to develop the survey).

Table 3.6 Coding scheme for analyzing case study data

Modernization-based Barriers (localized)	World system-based Barriers (systemic)
<u>Social</u> Gender equity Local traditions, customs, religion Education and awareness of water-related disease General level of education Trust between community and assistance organization	<u>Systemic</u> International trade barriers/restrictions International policies Structural adjustment policies Decentralization/lack of support for public institutions International financial blocks International travel restrictions/warnings International corruption Material and equipment scarcity (trans boundary access) International boycotts on exports Influence of border nations Trans boundary energy scarcities Water policies that favor private industrial/agro-business over public uses
<u>Political</u> Local Corruption Community organization Local politics Strength of the public sector and relations with government ministries	
<u>Economic</u> International financial support Material and equipment scarcity (local access) Willingness/ability to pay Availability of capital	
<u>Technical</u> Physical constraints (terrain, water availability) Technical skills/capabilities of locals Local energy scarcities	

As I coded interviews, I observed unanticipated patterns and relationships and developed new codes to account for these findings. I presented my findings to PIH in March 2010 asking them to critique and/or confirm them in an attempt to address validity and reliability.

This overview of case study database and analytical techniques attempts to explain how other researchers could replicate finding presented in the next chapter. However, there is simply no way for another researcher to perceive these findings in the exact way that I have. Thus, it is important to state my personal position, the lens through which I have conducted this work. The follow section is an effort towards this difficult task.

3.2.9 Investigator's position

I have worked in resource-limited settings since 2004, first with an organization in Nigeria and then in Haiti with another medical organization and Belize working on water projects. While these organizations do amazing and wonderful work, I cannot help comparing them to Partners In Health. Thus, I have an inherent measuring stick developed over time and across contexts that influences my analysis, just as it would anyone else. Moreover, these experiences have influenced me in a profound way as I seek to understand suffering in our modern world. I have a hard time accepting the geographic divide between rich and poor as natural. My most recent experience in Haiti only decreased my tolerance and patience for structural violence and the unnatural disaster of poverty.

A devastating earthquake struck Haiti on January 12th, 2010. As a longtime volunteer with Partners In Health, I was asked to join emergency medical teams responding to the initial aftermath and pursuant crisis. The data collection phase of this work was completed before the earthquake, but the analysis phase was after. I made every attempt to disassociate my experiences from the analysis. However, what I saw, smelled, and did forever changed my life and the lens through which I view this work and international assistance in general. I believe the data presented in Chapter 4 is as objective as possible. However, my experiences in Haiti following the earthquake did influence my discussions of Chapter 5 and brought a sense of urgency and clarity to my conclusions.

The next chapter presents the findings afforded by these methods. Chapter 5 synthesizes these results in order to answer Question 4.

Chapter 4 – RESULTS

4.0 Introduction of Results

Chapter 4 organizes results of this embedded, mixed methods study in two parts. Part I includes findings and analyses of a web-based survey of water and sanitation professionals, while Part II offers results from a case study of Partners In Health. Analysis throughout Part II begins to synthesize both sets of results. However, not until Chapter 5 do these results come full circle in answering the question, “How can the water and sanitation sector deliver services that are more effective in resource-limited settings?”

Part I – Barriers to Service and Trends within the Water and Sanitation Sector

4.1 Overview of Survey Results

Part I presents results from a web-based survey of water and sanitation professionals in an attempt to answer the third research question: How does the water and sanitation sector define context, and how does this perspective influence their practice? The survey included four sections. The first section sought to gather demographic information. The second asked participants to identify and rate barriers to effective water and sanitation services in developing countries and then asked them to rate the profession’s obligation and capability to overcome those barriers. The third section asked participants for their opinion of different trends within the sector, while the last asked for write-in responses regarding the existence of the effectiveness gap. Data analysis included descriptive and inferential statistics for all quantitative data and coding for qualitative data (e.g. write-in responses).

The following subsections include overall results and comparisons between engineers and non-engineers and levels of where people spend most of their time working (i.e. local, intermediate, and systemic levels). The null hypotheses for comparative analyses are that no difference exists between groups.

4.2 Demographics

The following sections provide demographic information associated with the sample.

4.2.1 Number of respondents

Table 4.1 presents the number of respondents who completed each survey question.

Table 4.1 Number of respondents who completed each survey question

Question	# of Responses
Type of organization	115
Role of participant	119
Level of working	110
Barriers, Obligation, and Capabilities	60
Trends within sector	75
Effectiveness gap	49

The following subsections provide demographic information related to types of organizations for which respondents work, their primary role within that organization, and the level at which they work (local, intermediate, or systemic).

4.2.2 Organizational type

Figure 4.1 illustrates the type of organizations in which survey participants work. Values presented in this figure represent the 115 respondents who answered this question. The majority of respondents work at academic institutions, while others work across public, private, and international organizations. 14 participants wrote-in “other.” Those identified as “other” included self-descriptions such as government companies, churches, research and development

foundations, professional associations, and think tanks. The subsample of respondents that provided write-in responses were representative of the overall sample population. However, since this demographic was not used in the analysis, no action was taken to redistribute them to one of the seven categories.

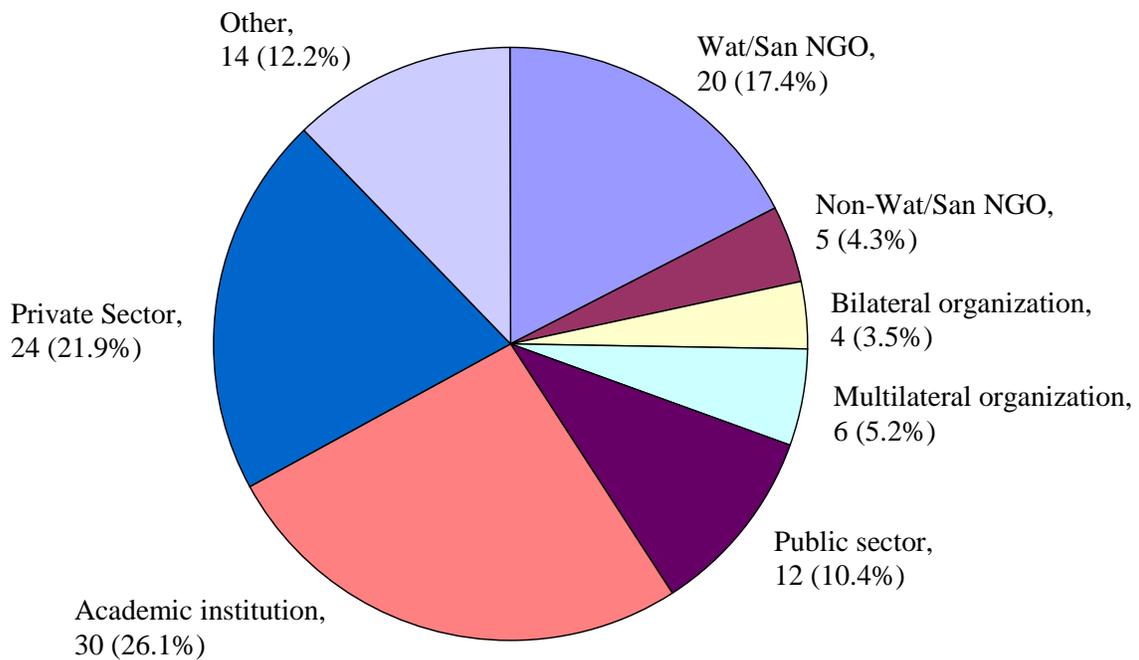


Figure 4.1 Sample of participants by organizational type

4.2.3 Primary roles

Figure 4.2 on the following page illustrates the primary roles of survey participants. Values presented in this figure represent the 119 respondents who answered this question. The majority of respondents (35.3%) said that they were engineers. Those identified as “other” included self-descriptions such as planners, researchers, environmental sociologists, donors, and water brokers. However, for analysis between engineers and non-engineers, all participants labeled as “other” were redistributed as “non-engineers.” Thus, this group was largest within the sample of 119 who completed this question (64.7%).

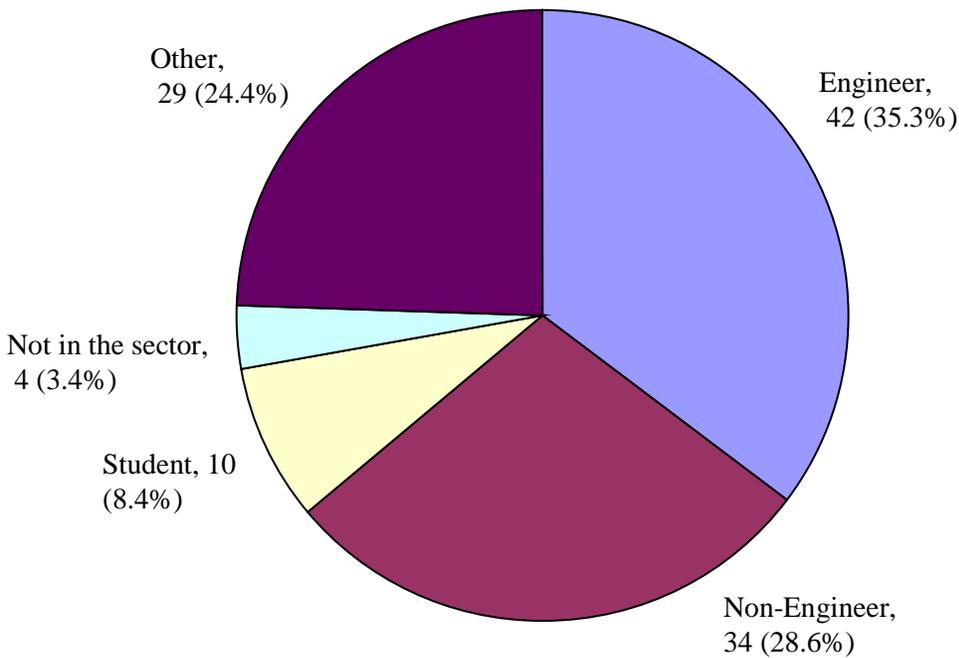


Figure 4.2 Sample of participants by professional activity

4.2.4 Level of operation

Figure 4.3 illustrates the level where participants spend most of their time working. Values presented in this figure represent the 110 respondents who answered this question. Levels were operationalized and described to participants as follows:

1. Local Level: In the field (in direct support of community-level activities)
2. Intermediate Level: In-country office/capital city (in support of both community and national activities)
3. Systemic Level: International home office (in support of various in-country and/or international/policy-related activities)

The majority of respondents (38.2%) said that they work primary at the intermediate level. Those working at local and systemic levels were evenly distributed at 23.6% and 24.5% respectively.

Those identified as “other” included self-descriptions such as office, in field and laboratory, previously worked for consultant in India, and teaching, R&D, consultancy work. However, for analysis between levels, all participants labeled as “other” were redistributed as spending most of their time at the “intermediate” level. This included an additional 8 respondents for level-analysis.

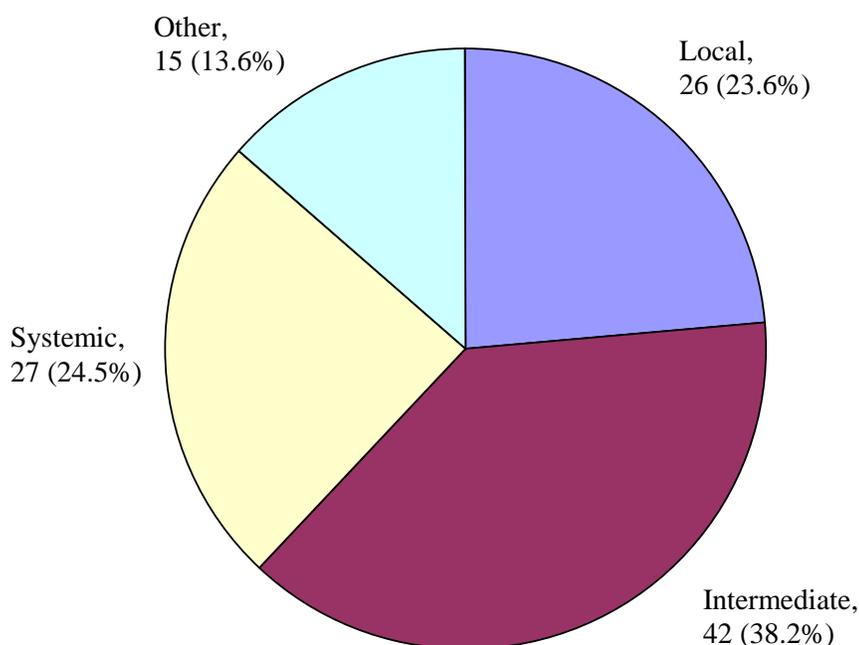


Figure 4.3 Sample of participants’ level of operation

4.2.5 Limitations and Wave Analysis

The population of English-speaking, international water and sanitation professionals is massive and varied. It is impossible to know just how many people exist in this sector – certainly tens to hundreds of thousands (and if one includes technicians, laborers, and support staff, perhaps millions). While the data set includes sufficient quantities of responses for statistical analysis, what is not clear is how well this data set represents all English-speaking, international water and

sanitation sector professionals. Thus, a limitation of this data is that no sample size, n , was calculated and thus it is difficult to generalize these results to the population they represent.

I conducted a wave analysis to address this shortcoming. When comparing results from the first half of all respondents with the second half of all respondents (those collected 27 February to 8 March compared to those collected 9 March to 9 April), no significant differences in responses existed between the two groups. This wave analysis demonstrates that responses from previously non-responsive people did not significantly influence the overall results. This indicates that had more people taken the survey, their responses would align with those used in this analysis.

Additionally, collection efforts included strong attempts to obtain the highest possible sample size for accessible respondents and multiple follow-up requests asking potential respondents to participate. One participant did say that the request came across all four watsan-related listserves to which she is a member. While statistical procedures guarantee the validity of the data presented here (that what respondents say was “true” among the sample population), the low sample size limits the reliability of the samples to the greater population to which they represent.

4.3 Barriers and the Obligation and Capability to Overcome Them

As discussed in Chapter 2, social, political, economic, and systemic barriers can limit effective water and sanitation service delivery. Some of these barriers are unique to developing countries and specific communities or settings, while others are more uniform across all contexts. The ‘barriers’ portion of the survey aimed to have water and sanitation professionals prioritize these categorical barriers. It also sought to obtain information relating to respondents’ obligation and

capability of overcoming these barriers. The survey asked participants to rate the level of barrier, obligation, and capability on a scale from 1 = No Barrier/Obligation/Capability to 5 = Absolute Barrier/Obligation/Capability for 18 independent variables. Each variable is associated with one of the five categories (social, political, economic, technical, and systemic) and together represent one of these concepts. Table 4.2 presents the categories and variables tested.

Table 4.2 Barriers to effective water and sanitation services in developing countries

Category	Variable
Social	Community's average level of education
	Community's power dynamics related to gender
	Level of trust between community and assistance organization
	Community's religious practices
Political	Community's internal politics
	Strength of the public sector
	Community's relationship with related government ministries
	Corruption
Economic	Community's ability to pay for services
	Community's ability to access resources for infrastructure (i.e. spare parts or chemicals)
	Availability of public funds
Technical	Availability of energy to power services
	Availability of water sources
	Terrain
	Community's ability to operate and maintain infrastructure
Systemic	Structural adjustments associated with conditional loans
	International trade policies that influence access to materials and/or equipment
	Policies that favor economic uses of water over domestic uses of water

As described in Chapter 2, the independent variables aimed to represent the larger category to which they belong. However, they are not inclusive of the category they describe. For example, the survey uses four socially related variables (education, gender, trust, and religion) to explain the category 'social barriers.' Other socially-related variables, when used with these, may capture more fully this category. However, testing all possible social, political, economic, technical, and systemic variables would have made the survey excessively long.

Factor analysis enables investigators to determine how well related variables explain a broader concept. Results for this analysis include:

1. The social variables used in this survey accounted for 65.6% of the total variance within the social category. Respondents associated religion and trust with each other, and gender and education together revealing a distinction among social barriers that one could describe as “social capital” social barriers (religion and trust) and “local power based on education and gender” social barriers.
2. The political barriers used in this survey accounted for 67.7 % of the total variance within the political category. Respondents associated internal politics, relationships between communities and government ministries, and corruption together, while identifying the strength of the public sector as a different type of political barrier. These groupings reveal a distinction among political barriers that one could describe as community-based politics and national-level politics (although corruption may be found at both levels).
3. The economic variables used in this survey accounted for 52.0% of the total variance within the economic category. Respondents associated all three related variables in a similar way (i.e. no sub-categories were needed to describe results).
4. The technical variables used in this survey accounted for 60.3% of the total variance within the technical category. Respondents associated available energy sources and ability to operate and maintain infrastructure together, and availability of water sources and terrain with each other. These pairings reveal a distinction among technical barriers that one could describe as socio-technical or variable barriers (energy and technical abilities) and as geographic or fixed barriers (water sources and terrain).

5. The systemic variables used in this survey accounted for 60.0% of the total variance within the systemic category. Respondents associated all three related variables in a similar way (i.e. no sub-categories were needed to describe results).

4.3.1 Modified Categorization of Barriers

A second factor analysis illustrated how respondents grouped individual barriers. Six newly defined factors explain 71% of the total variance among these 18 variables. The 6 factors include:

1. Major Barriers: Availability of energy sources (technical), gender (social), ability to operate and maintain infrastructure (technical), ability to access resources (economic), corruption (political).
2. Political Barriers: internal politics (political), strength of the public sector (political), and ability to access public funds (economic).
3. Social and Human Capital Barriers: ability to pay (economic), level of education (social), religion (social), trust (social).
4. Systemic Barriers: structural adjustment programs, international trade policies, and economic water-use policies (all systemic).
5. Technical Barriers: availability of water sources and terrain (both technical)
6. Organizational Barriers: relationships between communities and governmental ministries (political)

The following subsection includes a presentation of results related to barriers and the sector's obligation and capability to overcome them for effective service delivery.

4.3.2 Overall results on barriers, obligation, and capability

Figure 4.4 on the following page presents overall results of water and sanitation sector professionals who participated in the web-based survey based on original categories. Based on ANOVA, single-factor analysis, categorical means (values to right of bar) differ significantly.

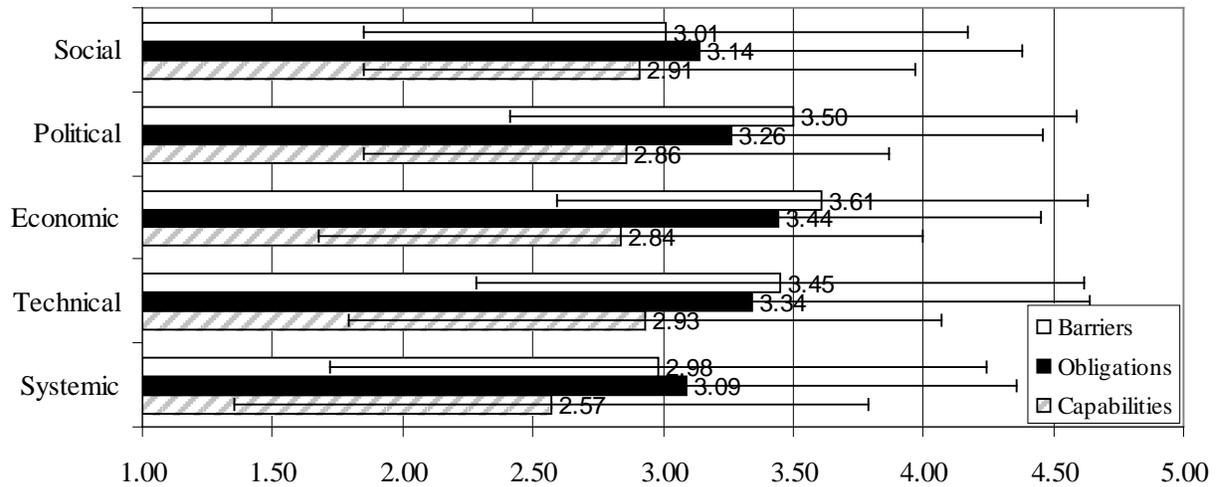


Figure 4.4 Overall categorical results of water and sanitation sector survey participants
Scale: 1 = No Barrier, Obligation, Capability; 2 = Minor Barrier, Obligation, Capability; 3 = Moderate Barrier, Obligation, Capability; 4 = Major Barrier, Obligation, Capability; 5 = Absolute Barrier, Obligation, Capability. Error bars represent standard deviation.

Survey participants identified economic-related factors as the most likely issues to bar effective water and sanitation services in resource-poor settings, while they associate systemic factors to be the least likely barriers. It is important to note that one-fifth (19.9%) of all respondents selected “Don’t Know” for systemic barriers (2.5% was the average “don’t know” response for all other variables). One interpretation for a “don’t know” response is that if professionals “don’t know” the influence of a barrier, then they do not experience it as a barrier to their work.

However, another explanation is that many professionals concentrate on localized barriers without a consideration of possible systemic barriers. For example, 30% of all respondents were not familiar with structural adjustment policies associated with condition loans. These policies often dictate national spending on infrastructure and are beyond the control of the country once

they agree to them. Without a more complete understanding of the full breadth of project constraints, the sector may fail to account for all possible influences on project alternatives and effectiveness. Table 4.3 on the following page presents overall results in rank order.

Table 4.3 Ranking of barriers, obligation and capacity per original categories

Rank (highest to lowest)	Barriers	Obligation	Capacity
1	Economic	Economic	Technical
2	Political	Technical	Social
3	Technical	Political	Political
4	Social	Social	Economic
5	Systemic	Systemic	Systemic

Note that respondents rate highest economic-related barriers and their obligation to overcome them, yet are more likely to be less capable of overcoming them than they are any other localized barrier. Not surprisingly, participants are most capable of overcoming technical barriers. They are least obliged and capable of overcoming systemic barriers. Again, their unfamiliarity with systemic factors may influence their obligation and capability to overcome them. Table 4.4 provides Top and Bottom 3 rated barriers. Refer to the Appendix F for complete variable-level findings and associated descriptive statistics.

Table 4.4 Top 3 and bottom 3 barriers to service delivery

Top 3 Barriers	Bottom 3 Barriers
Availability of water sources	Religious practices
Ability to access resources for O&M	International trade policies on materials and equipment
Corruption	Terrain

The Top 3 barriers to service delivery in developing countries seem to match those in developed countries (although no data exists to verify this empirically). Perhaps this reflects the background of many respondents who are from the U.S. However, it also highlights an interesting issue. Respondents agree that solutions should differ for the two locales as discussed in Section 4.4, while they face similar barriers to effective services. Table 4.5 on the presents overall results based on the modified categorization of barriers discussed in Section 4.3.1.

Table 4.5 Ranking of barriers, obligation and capacity per modified categories

Rank (highest to lowest)	Barriers	Obligation	Capacity
1	Major (3.53)	Major (3.47)	Major (2.95)
2	Political (3.48)	Political (3.22)	Social and Human Capital (2.94)
3	Technical (3.33)	Social and Human Capital (3.20)	Political (2.81)
4	Organizational (3.27)	Organizational (3.15)	Technical (2.80)
5	Social and Human Capital (3.16)	Technical (3.09)	Organizational (2.75)
6	Systemic (2.99)	Systemic (3.09)	Systemic (2.56)

One interesting difference in the way the variables are grouped is how respondents treat technical barriers. In both sets of categories, respondents rank technical barriers as having the third most influence on effectiveness. Yet, with the original categories, respondents have a greater obligation to overcome technical barriers and the most capability to overcome them, while respondents suggest a lower obligation and capability to overcome technical barriers among the respondent-identified categories. The respondent-identified technical category only includes terrains and water sources. Thus, this difference is because respondents perceive a difference between technical barriers that are fixed (terrain and available water sources) and those that they can change (available energy sources and a community’s ability to operate and maintain infrastructure). Another finding is that respondents identify and treat systemic barriers in a similar fashion – they remain the least barriers and the ones the sector feels they have the least obligation and capability to overcome.

The next two subsections present analysis of data stratified by demographics to identify differences between subgroups. Comparisons included those between engineers and non-engineers and levels of interactions (local, intermediate, or systemic level).

4.3.3 Comparing Engineers and Non-Engineers

The hypothesis for this analysis was that engineers would rate barriers, obligations, and capabilities differently than non-engineers. Two-sample t-tests assuming equal using two-tailed p-values were used to identify differences between engineers and non-engineers. The null hypothesis was that a difference exists between engineers and non-engineers (H_0 : Engineers = Non-Engineers; H_A : Engineers \neq Non-Engineers). Tables 4.5 – 4.7 present the results of these analyses where means presented reflect Likert scale responses. The scales used were:

- 1 = No Barrier, Obligation, Capability;
- 2 = Minor Barrier, Obligation, Capability;
- 3 = Moderate Barrier, Obligation, Capability;
- 4 = Major Barrier, Obligation, Capability;
- 5 = Absolute Barrier, Obligation, Capability.

Table 4.5 Comparing engineers to non-engineers and their opinion of **barriers** to water and sanitation service delivery

Role	Social	Political	Economic	Technical	Systemic
Engineers	2.84* (0.61)	3.66 (0.59)	3.68 (0.64)	3.56 (0.60)	3.25 (1.03)
Non-Engineers	3.09 (0.69)	3.47 (0.73)	3.61 (0.80)	3.47 (0.71)	2.81 (1.06)
P-value	0.238	0.352	0.729	0.665	0.254

* - mean with standard deviation in parentheses

Table 4.6 Comparing engineers to non-engineers and their **obligation** to overcome barriers to water and sanitation service delivery

Role	Social	Political	Economic	Technical	Systemic
Engineers	3.00* (0.96)	3.62 (0.83)	3.76 (0.71)	3.45 (0.74)	3.43 (0.97)
Non-Engineers	3.03 (0.72)	3.10 (0.71)	3.23 (0.92)	3.22 (0.81)	3.26 (0.96)
P-value	0.406	0.048	0.059	0.377	0.655

* - mean with standard deviation in parentheses

Table 4.7 Comparing engineers to non-engineers and their **capacity** to overcome barriers to water and sanitation service delivery

Role	Social	Political	Economic	Technical	Systemic
Engineers	2.94* (1.06)	3.04 (0.65)	2.80 (0.85)	3.04 (0.59)	2.70 (1.07)
Non-Engineers	2.70 (0.67)	3.27 (0.98)	2.82 (0.95)	2.96 (0.94)	2.57 (1.06)
P-value	0.413	0.407	0.956	0.738	0.749

* - mean with standard deviation in parentheses

Additional analysis accounted for a Bonferroni Correction using SPSS software. However, this analysis did not identify any additional differences between data sets.

Based on an independent sample T-tests, engineers did not differ significantly from non-engineers on their beliefs associated with barriers to effective water and sanitation services and their obligations and capabilities to overcome them except for two categories:

Political Obligation: Engineers (mean = 3.62) differ significantly from non-engineers (mean = 3.10) on their beliefs that they have a greater obligation to overcome political barriers ($T_{df=36} = 2.05$; $p = 0.048$).

Economic Obligation: Engineers (mean = 3.76) differ significantly from non-engineers (mean = 3.23) on their beliefs that they have a greater obligation to overcome economic barriers ($T_{df=43} = 1.94$; $p = 0.059$).

Examining variable-level results is helpful in understanding these differences. For differences between engineers and non-engineers on an obligation to overcome political barriers, the opinions of these two groups differed on one of four political variables. Based on an independent sample T-test, engineers (mean = 3.61) differ significantly from non-engineers (mean = 2.89) on their beliefs that the sector has a greater obligation to overcome barriers associated with internal community politics ($T_{df=44} = 2.41$; $p = 0.010$). This difference accounts for the categorical difference of political obligation between engineers and non-engineers.

For differences between engineers and non-engineers on an obligation to overcome economic barriers, the opinions of these two groups differed on two of three economic variables. Engineers (mean = 3.84) differ significantly from non-engineers (mean = 3.30) on their beliefs that the sector has a greater obligation to overcome barriers associated with a community's ability to pay for services ($T_{df=50} = 2.11$; $p = 0.020$). Similarly, engineers (mean = 4.06) differ significantly from non-engineers (mean = 3.52) on their beliefs that the sector has a greater obligation to overcome barriers associated with a community's ability to access resources for operation and maintenance of infrastructure ($T_{df=45} = 1.97$; $p = 0.028$). These differences account for the categorical difference of economic obligation between engineers and non-engineers.

For differences between engineers and non-engineers on a capability to overcome social barriers, the opinions of these two groups differed on one of four social variables. Engineers (mean = 3.53) differ significantly from non-engineers (mean = 2.74) on their beliefs that the sector has a greater capability to overcome barriers associated with a community's level of general education ($T_{df=46} = 2.66$; $p = 0.005$). This difference accounts for the categorical difference of social capabilities between engineers and non-engineers.

One interpretation of these differences is that engineers can account for constraints associated with internal politics, ability to pay, access to resources for O&M, and level of education in their designs of water and sanitation systems. An increasing emphasis over the past ten years on *point-of-use* (POUs) systems provide an example (Mintz 2001; Clasen 2006). POUs include a group of small-scale, batch-process water treatment technologies that people can place in their dwellings. Examples of point-of-use systems include bio-sand filters and water filter straws (enabling users

to obtain water directly from polluted sources through a small straw with an internal filter).

Unlike more traditional, community-wide systems, POUs do not require community organizing and management, are very cheap and require little to no resources for O&M, and no advanced knowledge is necessary for use and upkeep. Through technology, professionals are able to overcome what are often the most challenging barriers to effective water and sanitation services. Section 4.6 provides a more in-depth discussion about these results.

The second set of comparisons sought to determine differences in responses according to what level participants spent the majority of their time – at the local, intermediate, or systemic level. The following subsection presents these findings.

4.3.4 Comparing local, intermediate, and systemic levels

The hypothesis for this analysis was that respondents would rate barriers, obligations, and capabilities differently depending on what level they spend the majority of their time. Single factor analysis of variance (ANOVA) tests were used to identify differences between local, intermediate, and systemic levels. Unequal number of responses prevented the use of 2-way ANOVA analysis. On the following page, Tables 4.8 – 4.10 present findings of this analysis.

Table 4.8 Comparing respondents working at various levels and their opinion of **barriers** to water and sanitation service delivery

Level	Social	Political	Economic	Technical	Systemic
Local	3.04 (0.83)	3.57 (0.57)	3.71 (0.74)	3.45 (0.70)	3.00 (1.08)
Intermediate	2.96 (0.58)	3.61 (0.76)	3.61 (0.80)	3.65 (0.65)	2.90 (1.06)
Systemic	3.04 (0.69)	3.42 (0.70)	3.54 (0.67)	3.30 (0.62)	3.08 (1.14)
P-value	0.934	0.716	0.819	0.267	0.919

Table 4.9 Comparing respondents working at various levels and their **obligation** to overcome barriers to water and sanitation service delivery

Level	Social	Political	Economic	Technical	Systemic
Local	3.23 (0.55)	3.28 (0.53)	3.70 (0.90)	2.90 (0.63)	3.43 (1.05)
Intermediate	2.94 (0.70)	3.38 (0.85)	3.48 (0.63)	3.54 (0.76)	3.22 (0.83)
Systemic	3.28 (0.64)	3.34 (0.91)	3.31 (0.67)	3.30 (0.86)	3.43 (1.20)
P-value	0.364	0.953	0.425	0.144	0.852

Table 4.10 Comparing respondents working at various levels and their **capability** to overcome barriers to water and sanitation service delivery

Level	Social	Political	Economic	Technical	Systemic
Local	2.88 (0.58)	2.75 (0.40)	2.67 (1.12)	2.56 (0.72)	2.21 (0.91)
Intermediate	2.72 (0.64)	2.78 (0.74)	2.81 (0.90)	2.93 (0.79)	2.60 (1.04)
Systemic	3.11 (0.79)	3.13 (0.63)	2.94 (0.78)	2.98 (0.76)	3.10 (1.15)
P-value	0.374	0.338	0.774	0.339	0.270

Based on independent ANOVA tests, no significant differences in responses exist between participants who work on local, intermediate, and systemic levels. The expectation was that beliefs would differ across levels. For example, participants working at the local level would rate localized barriers higher than those working at the systemic level, while systemic-level respondents would rate world system barriers higher than those working at local levels. However, the prevalence of focus on local issues across the sector might explain why no significant differences were. Much of the literature and reports by the World Bank and World Health Organization (organizations at the systemic level) often cite local issues and barriers with a near absolute disregard for the possibility of constraints imposed by a world system. A recent World Bank report provides a rich example of this phenomenon.

The World Bank's Water and Sanitation Program (WSP) recently published *Guidance Notes on Services for the Urban Poor: A Practical Guide for Improving Water Supply and Sanitation*

Services (2010), a report that identifies barriers to service delivery for the urban poor and provides recommendations to overcome them. This extensive analysis identifies barriers associated with education, awareness, empowerment, resources, political systems and procedures, local capacity, alternative service providers, accountability and performance, finance, cost-recovery, subsidies, water resources and numerous other physical and technical barriers. The report situates all barriers within the country and recommendations align with developmental policies associated with modernization theory. These barriers exist and recommendations, if implemented well, may go far in improving services. However, systemic barriers are also real and an absolute failure to acknowledge their existence may be a missing component of policies and practices for water and sanitation service delivery in resource-limited settings. WSP's report highlights several trends within the sector. The next series of survey question sought to identify how participants representing water and sanitation professionals thought about these trends.

4.4 Trends within the Water and Sanitation Sector

This portion of the survey sought to seek the opinions of participants on several dominant themes within water and sanitation literature. These include:

1. Appropriateness versus effectiveness.
2. Money as the primary constraint and how cost-recovery models drive level-of-service.
3. Decentralization and the roles of the public and private sectors.
4. Differing outcomes between services offered in developed countries and those in developing countries.

Participants were asked ten Likert-scale questions related to these trends. Contrasting questions associated with similar themes were employed to increase validity and reliability of results.

Table 4.11 on the presents questions from the survey according to trends.

Table 4.11 Likert-scale questions to determine opinion on trends within water and sanitation

Trend	Question	Wording
Appropriateness versus effectiveness	3	First-world solutions are not appropriate in third-world settings
	4	It is better to design a more contextually appropriate wat/san system that a community can operate and maintain on its own versus a system whose functionality is dependent upon inputs from outside groups or NGOs, even if the independent system is less effective than the dependent system.
	10	It is better to design a more effective wat/san system whose functionality requires inputs from outside groups or NGOs versus a system a community can operate and maintain on its own, even if the dependent system is less contextually appropriate than the independent system.
Money and cost-recovery	1	Wat/san systems designed around a community's ability to pay are better than systems designed without a cost-recovery model.
	5	Lack of money is the greatest barrier to any wat/san project.
	8	With enough money, project teams can overcome all other barriers to effective water and sanitation services.
Public and Private	2	The private sector provides more effective wat/san systems than the public sector.
	6	The most effective wat/san systems involve the public sector.
Outcomes	7	In regards to water and sanitation services, first-world outcomes are not possible in third-world settings.
	9	The prevalence of water-related diseases can be reduced to undetectable levels in developing countries as they are in developed countries.

The following subsections present findings organized by overall responses and then analyzed for differences between engineers and non-engineers and across levels of location.

4.4.1 Overall trend results

On the following page, Figure 4.5 presents the overall results for queries related to trends within the water and sanitation sector. Based on these results, participants agree with the following sector-related trends:

1. Appropriateness trumps effectiveness for delivery of services in developing countries.

2. Services should be contextual – one set of solutions works in developed countries, while a separate set of is more appropriate for developing countries.
3. Services in developing countries should be based on a cost-recovery model.
4. Financial capital remains a significant barrier to effective services.

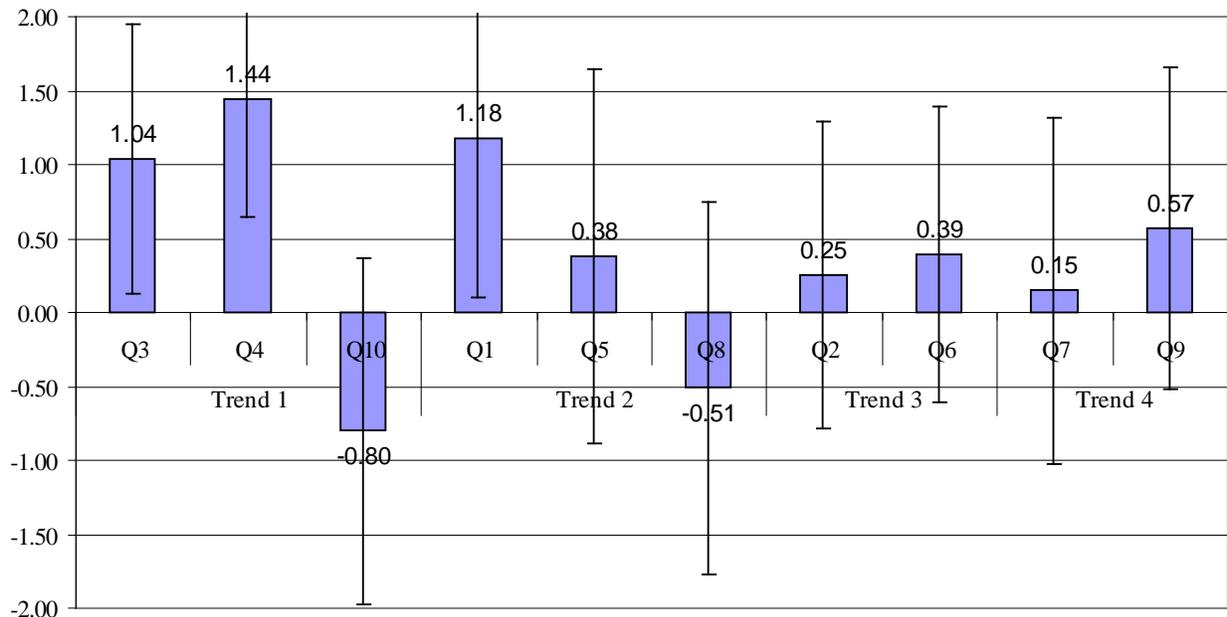


Figure 4.5 Overall results on trends within the water and sanitation sector (2 = Strongly Agree, 1 = Agree, 0 = Neutral; -1 = Disagree; -2 = Strongly Disagree)

However, there was conflicting agreement with other trends (what about “outcomes”?). While respondents agree that access to financial capital (on the part of both governments and municipalities to pay capital expenses through taxes collected or loans secured and users to pay associated recurring fees) is a significant barrier to service delivery, participants were neutral about the ability to overcome all other barriers if financial constraints did not exist. As reinforced by social capital literature (Putnam 1995; Poortinga 2006; Chiu 2007) and research related to empowerment of local communities for improved services (Parkinson 2003; Fewtrell 2005;

Pearce-Oroz 2006; Nelson 2008), perhaps respondents believe that overcoming social and political barriers require community ownership (i.e. responsibility) and improved personal hygiene practices. This relates to the “software” issue pointed out previously and is an essential key to understanding current approaches in service delivery. This analysis quickly turns to decentralization and the role of the public and private sectors. As survey results on Trend 4 demonstrate, perceptions surrounding the interplay between public and private are murky within the sector. Findings from the case study on Partners In Health provide some clarity to this notion and Chapter 5 includes a more in depth, synthesized discussion of implications for moving forward. Moving on within this section, the following subsections provide results from inferential analysis on the trends among various demographic groups.

4.4.2 Comparing trends among engineers and non-engineers

Tables 4.12 through 4.15 on the following page present comparisons of trends among engineers and non-engineers. Based upon these findings, no significant difference exists between engineers and non-engineers and their level of agreement to trends within the sector. The summary section of Part I includes a discussion related to the significance of this finding.

Table 4.12 Comparing engineers, non-engineers, and their opinion of trends related to appropriate technology

Role	Q3	Q4	Q10
Engineers	4.11 (0.74)	4.58 (0.58)	2.15 (1.13)
Non-Engineers	4.02 (1.01)	4.37 (0.88)	2.20 (1.20)
P-value	0.701	0.285	0.857

Table 4.13 Comparing engineers and non-engineers and their opinion of trends related to money and cost-recovery

Role	Q1	Q5	Q8
Engineers	4.14 (1.21)	3.43 (1.35)	2.62 (1.42)
Non-Engineers	4.22 (1.01)	3.30 (1.26)	2.38 (1.17)
P-value	0.776	0.690	0.449

Table 4.14 Comparing engineers, non-engineers, and their opinion of trends related to public and private sector involvement

Role	Q2	Q6
Engineers	3.33 (0.88)	3.52 (1.05)
Non-Engineers	3.21 (1.12)	3.30 (0.96)
P-value	0.633	0.381

Table 4.15 Comparing engineers and non-engineers and their opinion of trends related to outcomes

Role	Q7	Q9
Engineers	3.21 (1.20)	3.54 (1.04)
Non-Engineers	3.07 (1.20)	3.62 (1.13)
P-value	0.606	0.744

4.4.3 Comparing trends across local, intermediate, and systemic levels

Tables 4.16 through 4.19 on the following page present comparisons of trends across local, intermediate, and systemic level. Based upon these findings, no significant difference exists between participants working on different levels and their agreement to trends within the sector except on one trend. Those working at local levels agree more strongly than respondents working at intermediate and systemic levels that contextually appropriate systems that are independent from outside support than systems that may be more effective, but require outside support for their operations and maintenance. The summary section of Part I includes a discussion related to the significance of this finding.

Table 4.16 Comparing trends related to appropriate technology across levels

Level	Q3	Q4	Q10
Local	4.11 (0.99)	4.83 (0.38)	2.28 (1.18)
Intermediate	4.14 (0.86)	4.29 (0.89)	2.19 (1.17)
Systemic	3.82 (0.95)	4.39 (0.78)	2.06 (1.21)
P-value	0.493	0.051	0.849

Table 4.17 Comparing trends related to money and cost-recovery across levels

Level	Q1	Q5	Q8
Local	4.05 (1.27)	3.32 (1.29)	2.29 (1.16)
Intermediate	4.08 (1.09)	3.57 (1.26)	2.36 (1.25)
Systemic	4.56 (0.78)	2.94 (1.30)	2.83 (1.38)
P-value	0.257	0.242	0.358

Table 4.18 Comparing trends related to public and private involvement across levels

Level	Q2	Q6
Local	3.28 (0.96)	3.18 (1.07)
Intermediate	3.30 (1.18)	3.57 (0.95)
Systemic	3.22 (0.81)	3.22 (1.00)
P-value	0.969	0.298

Table 4.19 Comparing trends related to outcomes across levels

Level	Q7	Q9
Local	3.11 (1.24)	3.94 (0.94)
Intermediate	3.35 (1.16)	3.43 (1.19)
Systemic	2.67 (1.14)	3.56 (0.98)
P-value	0.136	0.264

The following section presents findings of the last survey question regarding the existence of a gap in effectiveness between rich and poor countries.

4.5 Results Explaining the Effectiveness Gap

The final survey question presented a figure similar to Figure 2.5 and asked “Why might access to wat/san services not equate to [similar reductions] of water-related diseases in developing countries as it does in developed countries?” Respondents provided typed answers in their own words. Refer to Appendix G for responses. This qualitative data was coded according to trends that emerged during analysis. Table 4.20 presents these results in rank order. Note that the number of responses does not match the number of people who answered the question. The response count was 49. I omitted 2 of these because they did not actually answer the question. Total number of answers was 57 because several respondents provided multiple answers in their response.

Table 4.20 Results explaining the effectiveness gap

Cause of effectiveness gap	% (total score out of 57)
Poor personal hygiene behavior	38.6% (22)
Inadequate standards (access does not guarantee positive benefits)	17.5% (10)
Lack of operations and maintenance	17.5% (10)
Lack of integrated health (i.e. other causes of disease)	8.8% (5)
Low environmental conditions/climate change	7.0% (4)
Cultural practices and corruption	7.0% (4)
Weak public sector	1.8% (1)
Lack of universal access	1.8% (1)

The top three reasons respondents gave for the effectiveness gap are:

1. Personal hygiene habits: lack of education and understanding of disease transmission and importance of hand washing, improper food preparation, improper handling and storage of water, and improper use of sanitation facilities.
2. Inadequate standards: the realization that UN definitions of access do not guarantee positive health benefits or account for economic and/or physical constraints on consumers, and access to water and sanitation does not address hygiene.

3. Lack of operations and maintenance: communities lack the skills, resources, and/or will to properly operate and maintain infrastructure; access does not address long-term functional sustainability of technology, only access to the hardware.

4.6 Discussion of Survey Results

The goal of the survey was to capture attitudes and opinions of sector professional regarding various trends in water and sanitation practice. In general, although given values of standard deviation by no means conclusive, the representative sample tends to display a propensity towards the modernist perspective. That is, they favor localized barriers over systemic barriers, as well as agreeing to trends associated with modernist practices and policies. That more than 20% of the sample did not know what systemic barriers even were (more than 30% for the variable related to structural adjustment programs) reveals a general lack of awareness pervasive among the sector about structural forces. Although, one could argue that those that did rate systemic barriers ranked them as the lowest overall barriers suggests that they do not influence engineering practices. Additionally, all responses to the effectiveness gap question related to localized barriers. Chapter 5 revisits this issue. For now, it is enough to interpret that if systemic forces exist and influence differential access to water and sanitation and related diseases, the sector is unaware of it.

Data analysis also included cross-sectional analysis of demographics to include engineers and non-engineers, and their level of engagement (field level, intermediate level, or systemic level). I expected to find difference between these two cross sections. Anticipated differences included engineers ranking non-technical barriers over technical barrier, with more capabilities to overcome technical barrier compared for the inverse for non-engineers. Likewise, anticipated differences among levels included localized respondents rating localized barriers higher than

systemic barriers, systemic respondents rating systemic barriers higher than localized barrier, and intermediate respondents in between.

Only four possible differences were found among demographics in the entire survey. This suggests that attitudes and opinions within the sector are rather uniform. Statistically significant differences existed between:

1. The obligation engineers have to overcome political barriers compared to non-engineers.
2. The obligation engineers have to overcome economic barriers compared to non-engineers.
3. The capability engineers have to overcome social barriers compared to non-engineers.
4. The opinion of field-level professionals that community's should operate and maintain their system independently (even if that means lower effectiveness) compared to those who work at intermediate and systemic levels.

4.6.1 Obligations and capabilities of engineers

Engineers are masters of technology. They employ technology to solve problems, even socio-technical ones. They often believe that technology is the key to all solutions and, through it, humans can defy natural laws of nature. The opinion of engineers within the sample that they have a higher obligation to overcome political and economic barriers, as well as a greater capacity to overcome social barriers than do non-engineers may stem from this faith in technology.

Scholarly literature abounds with innovative solutions for safe drinking water and human waste management. Many of these innovations are in response to previously failed ones. Specific political variables tested with the survey include community-level politics, strength of the public

sector, relationships with government ministries, and corruption. If these are indeed the responsibility of the engineer, then s/he might develop technologies that minimize the influence of these barriers. The notion is similar for economic barriers (ability to pay for services, ability to access resources for operations and maintenance, and availability of public funds) and for social barriers (level of education, gender, trust, religion). Perhaps the idea that the right technology can overcome these barriers explains the rise in point-of-use (POU) technology discussed previously.

POU solutions are individual or household level treatment options that overcome many, if not most, of the specific social, political, and economic barriers tested. The sector certainly categorizes them as appropriate technologies. While technological solutions exist to overcome these barriers, they may not always provide the most effective services in terms of quality and quantity. However, a more alarming notion is that these personal systems place the onus on the overburdened individual living in poverty. If they get sick, they are the one to blame – no one else is accountable for other local and systemic forces that may play a significant role in disease prevalence. If a filter straw, for example, eliminates the need for public funds, then we no longer have to ask why those funds are unavailable in the first place. Similarly, removing the responsibility from the community to the household and individual has the potential to erode social capital. In many poor communities in which I have worked and as a general trend among indigenous populations, social capital is everything. If poor people have nothing else, at least they have each other. For engineers to employ technical solutions to social, political, and economic problems threatens to unravel vital social fabrics among those living in poverty.

4.6.2 Field-level perspectives

Professionals at the field level face the day-to-day challenges of providing services in highly confined contexts. While this study demonstrates the existence of both local and systemic forces influencing differential levels of access and disease between rich and poor communities, local barriers are far more numerous than systemic ones. Often, people working at the field level become overwhelmed as they experience frequent frustration with slow progress despite vast amounts of energy they put into their work. This frustration has the potential to turn these people cynical, if not hopeless.

Self-sufficiency is certainly a product of Western culture that infuses development practice. However, it may also be an unexpected outcome of repeated disappointment with lack of functional sustainability of community-based water and sanitation systems. This may explain why those at the local level tend to agree more with the statement that: It is better to design a more contextually appropriate wat/san system that a community can operate and maintain on its own versus a system whose functionality is dependent upon inputs from outside groups or NGOs, even if the independent system is less effective than the dependent system.

The notion of functional sustainability dominates current practice. While no one wants to create a welfare state and dependent systems are thought to prevent a certain level of community responsibility, the sector must decide if it wants to effectively solve the problem of water-related disease or merely manage it. Perhaps field-level workers lack the energy and commitment to time and presence to stand in solidarity with a community – to work together for effective services. However, as the sector turns away from appropriate solutions towards effective ones,

they will begin seeing results. Perhaps these positive results will be enough to reinvigorate the sector.

To summarize these findings, representative water and sanitation professionals demonstrated a preference for modernist approaches while revealing a lack of awareness of systemic forces. The differences discovered between engineers and non-engineers, and the inferred inclination towards “technology as savior” mentality may cause more problems than it solves. In addition, while self-sufficiency is the end goal for development, it should not prematurely trump effectiveness. Lastly, respondents attribute a lack of personal hygiene, insufficient definitions of access, and poor operational and maintenance capabilities as the leading causes of differential access to water and sanitation and persistent diseases. Their analysis seems to stop short of getting to the root cause of these problems. Why don’t people practice proper hygiene? Why have the leading policy makers of world health forwarded such diluted standards that even when met make no guarantees for improved health? And why do communities lack resources to operate and maintain their infrastructure?

Partners In Health, a leading non-governmental organization with proven effectiveness in some of the most challenging regions in the world – very poor, rural communities where water and sanitation effectiveness is limited or even waning) tries to answer similar questions. Their approach considers the local *and* the systemic barriers to effective service delivery. Part II of this chapter presents findings from case-based research that explains how and why PIH is successful. By supporting this work with the same sociological theories used to analyze the water and

sanitation sector, the hope is to generalize findings as recommendations to improve the effectiveness of water and sanitation services delivered in resource-limited settings.

Part 2 – Case Study Results

4.7 Introduction of Case Study Results

This chapter details the results from the case study on Partners In Health. The research objective was to understand why and how PIH is an effective provider of health services in developing, or resource-limited, settings. Using the coding scheme presented in Figure 4.6, three dominant themes emerged from a systematic analysis of interview data. Emergent themes included: A) PIH has a unique organizational philosophy that perceives local problems related to poverty as rooted in a world system; B) they have created a flat and flexible organizational structure that is able to attend to both local and systemic constraints; and C) PIH’s philosophy and structure informs a set of key pragmatic principles. Supplemental data from books, documentaries, PIH’s website, and annual reports support these findings.

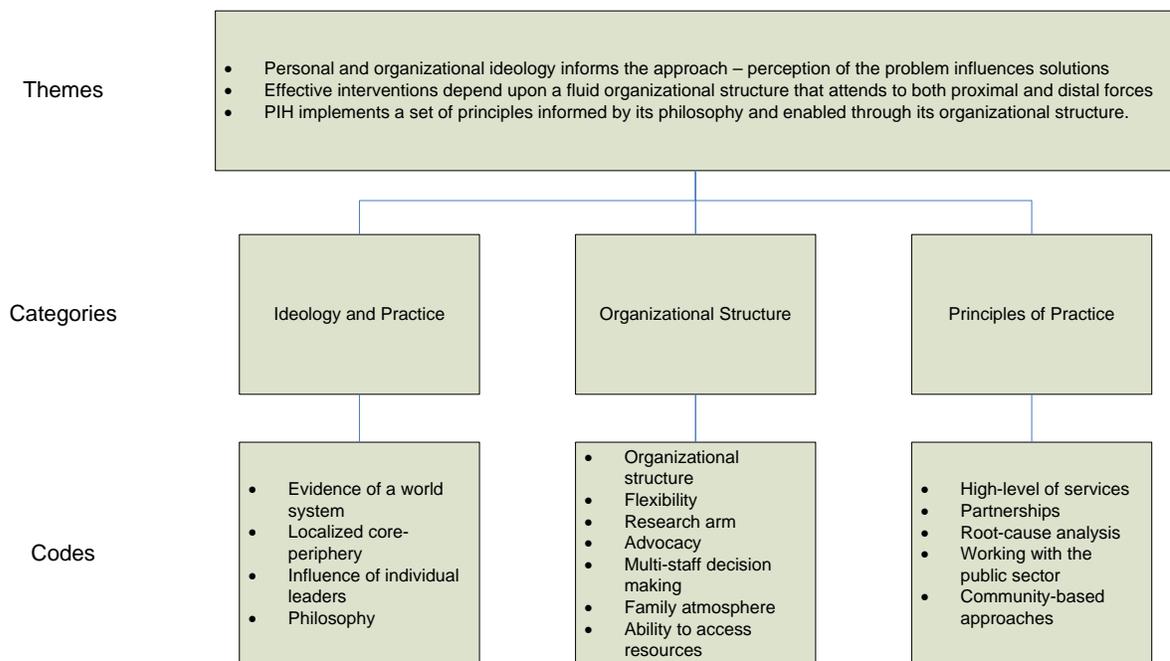


Figure 4.6 Major themes and code schemes explaining PIH’s approach

4.8 Organizational Philosophy

An organizational ideology exists at Partners In Health seeing poverty as a symptom of the system. The founder, Paul Farmer, brought this way of thinking to the organization. His vision and influence greatly influenced the organizational philosophy now adopted by its members. Through root-cause analysis, their practice seeks to break the cycle of poverty. The following sections detail each of these factors that make up PIH's organizational philosophy.

4.8.1 Systemic view of poverty

The way one defines a problem is often as important as the way one solves a problem. This study is about PIH's approach, that is, how they solve problems. Yet, an emergent theme suggests that the way they define problems strongly influences their approach to solving them.

Per PIH's website, their mission is to "provide a preferential option for the poor in healthcare." Drawn from interview participants, this mission has two parts. The first is providing health care to people living in poverty. Their daily tasks are like any other medical service provider – they diagnose the patient, prescribe medicine for the patient, and perform follow-up care with the patient. However, the data suggest a unique organizational ideology within Partners In Health associated with their outlook on poverty.

Recall theoretical explanations of poverty underpinning this study. Modernization theory explains poverty as a societal condition attributed to that society's location along an evolutionary path of development. As countries adopt secular cultures, democratic political systems, and capital-based economies, they can move from a condition of "developing" or "emerging" towards "developed" or "industrialized." The role of international development is to speed up

this “natural” process with input of capital, technology, and expert assistance. When countries fail to develop, analysts hold these countries accountable. They have yet to adopt modern social, political and/or economic ways of life.

In contrast, world system theory predicts conditions of poverty as an intended consequence of an international division of labor. Core countries and, to a lesser extent, semi-peripheral countries maintain a system of economic control over peripheral countries through trade barriers and political policies that prevent wage increases to match those in core nations. Social scientists view international development in part as a tool to increase this control through conditional loans that weaken peripheral governments (those of poor or developing countries) and to control the proliferation of technology ranging from medicine to water treatment processes. Examples of conditions include a loosening of import restrictions, deregulating environmental laws governing industries, and reductions in public sector spending (i.e. health care and education). As poor countries take on more debt, their political and economic power decreases, maintaining or increasing poverty levels and severely hindering these countries’ ability to “develop”.

Modernization and World System theories offer competing explanations of poverty – Modernization blames the poor for being poor, while World System blames the system for creating and perpetuating poverty. A relationship exists between these explanations and ideologies. Personal and group ideology determines how one defines a problem and the theories predict how people of one ideology will solve that problem. Thus, emerging from both sets of data is a theme that ideology (how one understands the problem) influences practice (how one solves the problem).

4.8.1.1 Localized constraints

While PIHers may believe that poverty is rooted in the world system, they are acutely aware of the localized constraints. Local constraints limit access to health care, education, and markets. This evidence suggests that they define the problem of poverty as rooted in a historical context, not one of social evolution. That is not to omit the profound influence local barriers have on project effectiveness. PIH faces many localized barriers in their work. Participants spoke of barriers such as an inability on the part of the patient to pay for services, uneducated communities, lack of high quality materials and equipment, corruption, traditional religious practices, and internal politics. However, an organizational analysis, as a Boston-based manager described, that “it is all of our faults that inequality exists” influences their approach. They do not allow local barriers to constrain alternative solutions, but use this world-view to overcome localized barriers. A member of PIH executive team noted:

We face local barriers every day, but it’s an approach, not an equation. Some people blame the local community for being poor and this influences how they solve problems. Whereas we see poverty as a consequence of the world system... In my view, local barriers are just absolutely due to the world systems and position of structures, like structural adjustment. The local barriers to people not having, it’s about how the [World] Bank is, it’s about how capitalism affects poor people, it doesn’t even count them.

This participant refers to Structural Adjustment Programs which are policies associated with conditions placed on loans from the World Bank and other development banks.

4.8.1.2 Systemic constraints

The goal of these adjustments is to stabilize a developing country’s financial status via a market-based economy. They prescribe internal modifications towards privatizing and deregulating governmental services and the reduction of external trade barriers. A focus on decentralization reduces government expenditures in education, health care, and other essential services.

Programs employ cost-benefit analysis to justify conditional loans. This process does actually count poor people, but one issue is the differential value of life, often based on a country's per capita gross domestic product. Decision-making using this metric lowers the amount of health care expenditures and thus the country's ability to provide health care to its population. One participant explained this philosophy, as "a function of the fact that you're not valuing the health of a child in Haiti the same way you're valuing the health of a child in America."

Another common theme among PIHers is their belief in a growing gap of social, political, and economic inequalities. A Boston-based staffer spoke quite clearly about this saying, "There is such glaring inequality. I think the gap is one of the most inhumane features of our time in history." Many Haitians may not be literate, but they have strong grasp on history. "Ask any peasant why they are poor," said a Haitian participant and they would answer, "Because we revolted and threw out the French in 1804. We scared the rest of the world by showing slaves could revolt and we've been paying for it ever since."

These perceptions of poverty and poor people may have a direct relationship to one's approach.

Many members of PIH see their role extending beyond proximal care towards a more distal

focus addressing large gaps in social equality. As a doctor in Haiti explains his role:

All of these people don't deserve [social inequality]. For the last 200 years since Haiti's independence, even before, we were the Pearl of the Antilles. We produced coffee, sugar. We had plantations. So it's almost a reparation, to address the large gap of inequality. We want to get at an understanding that every human has dignity. Rich or poor, we are the same.

PIH's diagnosis, their ideology, of poverty as a symptom of the system influences their approach. It is more than health care delivery in poor communities. Their prescription to local

barriers is a “preferential option for the poor.” On their website, they describe this second part of their mission “to be a powerful moral imperative.” PIH is a secular organization, but they borrow this language of a “preferential option” from Catholic social teachings based. These teachings are based on liberation theology that “signifies a special concern in distributive justice for poor and vulnerable persons.” PIH describes on their website how the concept of “a preferential option for the poor” challenges them to be:

...advocates for the voiceless and powerless among us. Those who are in any way and for any reason deprived, marginalized, or vulnerable have a special moral claim on the community. As a matter of both justice and charity, we must put in place structures and systems to address and meet their needs, so that they might participate more fully in the common good and thereby flourish more fully as human persons.

Participants describe a “clarity around [this] mission” that “makes decision making easy” and “help[s] the most disenfranchised and marginalized individuals.” However, it also forces the organization to move beyond “the problem of health to really look at poverty alleviation.” Their ideology on poverty’s roots seems to encourage a sense of solidarity with the poor when many organizations take on a more paternalistic role. Seeing poverty as being “not modern” encourages more of an assistance role as the benefactor helps the beneficiary along the upward path of development. Yet, members of PIH stand with their patients in what they see as an urgent struggle or fight for justice against structures of poverty. This nuanced notion plays a key role in their approach. It is why they have challenged traditional concepts of charity and international assistance and may well be a dominant factor in their effectiveness.

4.8.2 Ideology influences practice

As drawn from the survey of those in the water and sanitation sector, many people in international development tend to place more blame on the local population or country for failed assistance efforts. They predominantly cite localized barriers as the source of preventing

effective service delivery. Ultimately, they blame the community for being poor and unable to hold up their end of the bargain and maintain what the sector provided. The society from where one comes may influence their thinking about such things. As a PIH member suggests:

There's something about in [the United States] that we think [poor people] aren't working hard enough, they are taking advantage of the system. Some of that I think translates in over people's perspectives of people in Africa, Haiti, and whatnot, is that they think it is their own doing. And it's so not.

Such a “modern” view of poverty informs their approach to solving problems. This ideology of accepting poverty as a natural prescription of humanity and placing the blame of poverty in the individual informs solutions that focus on overcoming localized barriers. The practice of *appropriate technology* is a dominant approach rooted in this ideology.

Solutions stemming from Appropriate Technology consider social, political, and economic aspects of a community. It describes simple technologies suitable for use in developing countries. When compared to solutions employed in developed countries, many of these solutions require fewer resources, are easier to operate and maintain, and prefer labor-intensive means and methods to capital-intensive ones.

Based on the notion of praxis, the process of aligning theory and practice, a relationship exists between ideology and practice. Modernization theory can explain an ideology that sees poverty as a natural state of traditional societies. It also perceives local barriers as root causes of project failure. In this way, modernization theory can predict how the actions of those who have share an ideological understanding of poverty as a natural phenomenon. Thus, those who see the world this way place the blame of ineffective interventions, or even poverty, on a community or country. Following this logic, they have done all that they can, but ultimately a community is

responsible for effectiveness. This approach works towards managing poverty. However, an ideology that sees poverty as a symptom of a world system perceives political and economic structures as root causes of project failure. Thus, those who see the world this way place the blame of ineffective interventions on the system. Following this logic, they cannot overcome localized barriers without overcoming systemic barriers. This approach works to attack poverty.

A unique organizational ideology exists among members of Partners In Health. Their diagnosis of poverty aligns closely with a world system perspective. As a member of the Boston team relates:

So there is this concept that the poor are just always with us. I think the bigger critiques that are coming out is that there are structures that we put in place that not only allow poverty to exist but actually exacerbate the problem.

This notion of “structures” characterizes an organizational philosophy viewing poverty as a consequence of systemic arrangements, not as a predetermined element of society. The same person follows-up: “Now some people say that is Marxism,” that a class of economic elites rules the working class through capitalist exploitation of labor, “but large amounts of social teaching say that it is not Marxism, it is just the reality of it.” Thus, in their reality poverty is not a static state of the human condition. Another PIHer expresses this reality of poverty as the existence of social inequality stemming from “historical policies and colonialism, and so many of these things that cannot be separated from the situation that so many people are in today.”

It was PIH co-founder, Dr. Paul Farmer, who brought this ideology of poverty and the notion of a preferential option to the organization. He witnessed poverty as a young age while living in

rural Haiti with a community of people displaced, ironically, by an international development project in the Central Plateau.

4.8.3 Influence of individual leaders

Many people were instrumental in establishing Partners In Health in 1987. Founders and those influential in creating PIH include Ophelia Dahl, Paul Farmer, Jim Yong Kim, Fritz Lafontant, Todd McCormack, and Thomas J. White. Each person uniquely influenced the organization. Dahl brought a sense of imagination, humility, and can-do attitude. Kim has led research and policy-related initiatives to improve universal access to TB and HIV/AIDS pharmaceuticals and served as Director of the World Health Organization's HIV/AIDS department where he developed the "3x5" initiative designed to put three million people in developing countries on AIDS treatment by the end of 2005. White, a philanthropist, provided a financial base for PIH. However, Farmer shaped much of the organization's philosophy. Thus, he is the focus of this section. Tracy Kidder details the formation of PIH in his book, *Mountains Beyond Mountains: The Quest of Dr. Paul Farmer, A Man Who Would Cure the World*. A short summary, supported with interview data, follows.

Farmer first started working in Haiti in 1983 as a young man where he befriended Dahl and Father Fritz and Yolande Lafontant in Cange. This is where he observed abject poverty, death, and disease among a peasant population displaced by a reservoir – the result of an international development project damming the Artibonite River to generate and deliver electricity to Port au Prince. Cange became a squatter settlement established on the high, treeless hills above the Artibonite Valley where generations of farmers had sustained themselves. The Lafontants had been working to provide schooling to the children of displaced peasants there since 1962. As one

participant, a former student of Father Lafontant, recalled, “Paul didn’t come here with something in his head. He watched and saw reality with Father Lafontant.”

The observed reality of poverty had a profound impact on Farmer. Before starting medical school, he, Dahl, and the Lafontants started Zanmi Lasante (Partners in Health in Haitian Creole) from a commitment to provide medical care to the peasants of Cange. This initial outreach grew into a full-service medical center in Cange, now a bustling town full of healthy, well-educated people. Partners In Health, with Dahl still as its Executive Director, grew from this still-evolving partnership and now serves 2 million patients across the Central Plateau and millions of others in four continents and in more than 50 communities from Boston to Russia and across southern Africa. Farmer completed medical school and earned a PhD in anthropology while continuing his work in Haiti. In 1993, he was awarded a MacArthur “Genius” Award and now serves as Chairman of Harvard Medical School's Department of Global Health and Social Medicine and United Nations Deputy Special Envoy to Haiti. Farmer has authored or co-authored hundreds of peer-reviewed articles and conference papers and written several books related to health and human rights. This blend of pragmatism and scholarship shaped Farmer’s ideology, which he introduced into Partners In Health. One participant in this study said she owes to Farmer her motivation to work with PIH saying that she read his scholarly work in university and “was drawn to the fact [he] seemed to just get it.”

Farmer uses anthropology to understand and explain the pain and suffering of peasants in Cange and all over the world, as he details in numerous peer-reviewed publications and books.

Contemporary views of poverty and charity did not sit-well with him. He saw Cange’s poverty directly linked to the construction of the Peligre Dam. At the same time, liberation theology and

its notion of “structural violence” (how systematic and institutional social dominance, political oppression, and economic exploitation shortens lives) had a profound impact on his understanding of poverty and ideas of social justice (Farmer 2005). One of Farmer’s first tasks as a medical anthropologist was completing an anthropological study identifying people’s needs and seeing how people were living. As one participant noted:

Not too many organizations have physician anthropologists who took that upon themselves to not just come in and provide medical care but he imparted that in the people he hired or who came along to help, and I think that the understanding of social justice and social injustice and inequality really from the community perspective and the individual perspective from really an anthropological perspective has really helped us interact with governments, to try and come to terms with social forces that exist in a country.

This and similar analyses conducted by Farmer and his colleagues provided deep understandings about the interconnectedness between history and international policies and poverty and disease. As one member notes, “We see that we are working for justice in anything that we are doing. We are coming in and observing.” Farmer wrote about these connections in *Pathologies of Power* (Farmer 2005):

Their sickness is a result of structural violence: neither culture nor pure individual will is at fault; rather, historically given (and often economically driven) processes and forces conspire to constrain individual agency. Structural violence is visited upon all those whose social status denies them access to the fruits of scientific and social progress.

Through his experiences, scholarship, and theology, he saw these systems as the root cause of poverty and from this, Farmer adopted certain ideological approaches to solving problems of health care delivery in the confines of poverty.

Two dominant approaches come from social justice teachings. The first Farmer borrowed from liberation theologians revolving around a framework of *observe, judge, and act*. This framework

seeks “root causes of the problem...[and] elicit[s] the experiences and views of poor people and incorporate[s] these views into all observations, judgments, and actions. To “observe” is to analyze “structures of economic, political and cultural dependence on the great industrialized monopolies (PoP)” through the eyes of oppressed people. Analyses of social suffering reveal its social origins. Such observations call for “personal conversations and profound structural changes that will meet the legitimate aspirations of the poor for authentic social justice.” Following these analytical observations is an a priori judgment “that something is terribly wrong” and forces one away from apathy or indifference. Such observation-based judgment leads to “consciousness raising”; an understanding that social structures cause injustice developed by Brazilian educator and theorist Paolo Freire whose work adopted themes of liberation theology. Freire, who greatly influenced Farmer’s ideology, describes the importance of “consciousness raising” (quoted in Farmer 2005):

This involves discovering that evil is not only present in the hearts of powerful individuals who muck things up for the rest of us but is embedded in the very structures of society, so that those structures, and not just individuals who work within them, must be changed if the world is to change.

Actions, then, follow observations of causal relationships and a judgment that change is only possible by changing the system of social, political, and economic structures. It is not enough to provide charity – meaningful, but ultimately surface-level acts of service for the survival of the poor. Thus, Farmer also brought to PIH a second approach, the idea of “pragmatic solidarity.” Actions under a framework of pragmatic solidarity attend to the daily survival of the poor (for PIH, that is the delivery of health services), but also act to change systems and structures, most notably policies and pricing mechanisms through research and advocacy, in order to break the cycle of poverty.

By imparting his ideology and associated framework, many participants from within and outside of the organization view Farmer as PIH's foundation. He proved his approach through example and pressed Ministry of Health officials for collaboration. As one non-PIH member stated, "He just wouldn't go away, so the government said, okay, we need to sit down and listen to this guy. He started this, he was the visionary." However, the effectiveness of PIH is due not only to Farmer, but to the approach of the entire organization. The manager for the United States' President's Emergency Plan For AIDS Relief (PEPFAR) in Haiti observed:

I've only been working in Haiti for a few years, but I meet with Haitians. I mean who else from PIH actually works here? Louise is the only other person I see in PEPFAR meetings now. The government relies on the Haiti staff.

The influence of Farmer and other individuals at PIH cannot be overstated. Yet, Partners In Health is a global organization of more than 11,000 employees. The doctors, nurses, and community health workers, or *accompagnateurs*, are the ones who carry out the founders' vision, a vision based on an ideology that views poverty as a symptom of a world system. Their prescription for treatment and prevention is a unique organizational philosophy rooted in pragmatic solidarity and the provision of a preferential option for the poor. Philosophy influences how organizations define and solve problems. Thus, it informs how they organize. The second theme that emerged from this work is how PIH created an evolving organizational structure shaped by its philosophy.

4.8.4 Organizational philosophy

PIH's shared organizational philosophy begins with a deep belief in its stated mission. Nearly every interview cutting across the organization and even outside of it corroborated a central focus on mission. A member in Boston captured it this way:

I like working for PIH because I believe in the mission, and I can see it being carried out in a tangible way through my visits to Haiti. I know we're creating a preferential option for the poor, and keeping the poor in the center of all our planning work, we've been able to change health outcomes in the communities where we work.

However, data also suggest a larger, expressed mission that moves PIH's true organizational philosophy beyond its stated mission.

Members of PIH mentioned a "fight for social justice," which to them means addressing "glaring inequalities." Many also talk of the gap between rich and poor as "one of the most inhumane features of our time in history." Speaking of bridging this gap someone from Boston said, "PIH is doing something about that." She echoed many of her colleagues who see their mission as doing something to change conditions on the ground, "So everyday, my work contributes to this greater mission." Another important aspect of PIH's organizational philosophy is their "whatever it takes" culture.

"I love [this part of our] philosophy," says one participant, "whatever it takes to help people."

This motto reflects PIH's ideology that their mission of pragmatic solidarity is both "medical and moral" (PIH 2008):

When a person in Peru, or Siberia, or rural Haiti falls ill, PIH uses all of the means at our disposal to make them well—from pressuring drug manufacturers, to lobbying policy makers, to providing medical care and social services. Whatever it takes. Just as we would do if a member of our own family—or we ourselves—were ill.

Many credited the founders with this philosophy and the entire organization has "kept that whatever-it-takes value front and center for the entire time that the organization has been operating." *How* PIH attends to the inequality gap in a culture of "whatever it takes" differentiates them from many in the development sector.

Recall the survey results. The findings show that the water and sanitation sector faces many barriers in preventing water-related diseases in developing countries. While respondents have an obligation and capacity to overcome some of them, others are insurmountable, especially those related to money and access to capital. Thus, barriers constrain solutions. In contrast, nothing bars PIH from attempts to implement the most effective solutions. According to one of their executive leaders, the organization simply “doesn’t recognize constraints of any sort.”

“Paul Farmer believes,” says a member of the Executive Committee in Boston, “that budgets and plans are all excuses not to do things, all excuses not to take action.” Each year, PIH goes through a budget analysis. They collect information on total organizational cost and compare that to what they have in their projected annual budget. There is never enough money to pay for their communities’ needs. A non-PIH member close explained how PIH’s employs their philosophy to overcome this type of barrier.

PIH’s Executive Director has great influence on the final budget. “Her first and foremost concern is how [budget cuts are] fundamentally effecting” patients. She spends much of her time visiting with patients and staff across all countries in which PIH serves (as do many of the Boston-based staff). She recently returned from Rwanda where she observed that HIV positive patients needed more food, yet the Boston team was trying to strike a budget item providing this food. This created a conflict between budget and services. As the participant stated:

So because she is in this position of not only being a servant to the destitute sick but also being an Executive Director, she is in a position of privilege or power to be able to say, there’s a problem here, and we need to find out why this is going on.

They are willing to maintain salary freezes for Boston staff and forego computer upgrades, but PIH does not dilute their services to the poor. Instead, they “go figure out where to find the money.” One participant justified this risk-positive philosophy this way:

If the organization hadn’t pushed itself so many times and it hadn’t been on the edge like that, we never would have accomplished all that [we] have.

The data also reveal a sense of “creativity,” “bullish determination,” and “simple single-mindedness” around the removal of barriers. This organizational philosophy may underpin much of PIH’s effectiveness. This translates into personal convictions as noted by a Haitian doctor who said, “If we fail, our patients die.” Thus, PIH’s organizes itself to give autonomy to its members.

Not all PIH outcomes are initially favorable. The Haitian Director of HIV and TB told a story of patient drug adherence. This is a major barrier to effective health outcomes in all countries, but in particularly poor ones. Adherence is analogous to operations and maintenance of community-based infrastructure. PIH has access to all resources to combat TB in rural Haiti, from x-ray machines and laboratories for diagnostics to first and second line drug therapeutics and community health workers to observe directly their use by patients. A PIH-employed community health worker also assesses necessities of the patient’s home. If they lack food, water, and/or shelter, they report to their central hospital and arrange to provide these basics. They will also observe other members of the family for symptoms of tuberculosis. More often than not, other members will also show signs of the disease and the community health worker gives them money to travel to the hospital for diagnosis and eventual treatment. Even with all of this accompaniment, they were still having problems with adherence by many of adult males. Upon deeper investigation, the HIV/TB team discovered that many of these males would travel across the border to the Dominican Republic to find season migrant work in the rich fields of Haiti’s

neighbor. Ironically, many Dominicans travel to PIH hospitals in Haiti to receive HIV and TB care.

The Haiti team developed a two-part solution. They work to provide local jobs so that people stay in their communities. They have also developed cross-border programs with hospitals in the Dominican Republic where their patients can receive care. This example highlights the organizational philosophy to take a shared responsibility for effective project outcomes in lieu of blaming the community, a mainstream philosophy of modernization. While some in the organization say they see no barriers, there was an unanticipated barrier corroborated by several sources.

“I would say,” says a doctor who works in Haiti and Boston, “that the biggest problem we face is a failure of imagination.” The Executive Director echoed this idea about “human barriers,” “It’s almost all human.” She went on to say:

Don’t you think it’s created via imagination to some extent? So that there is no question that when we hit barriers, particularly their opposites, I think there are a couple of things that get in the way, really get in the way. They are all related to bureaucracy or imagination.

PIH sets a high bar for potential employees to ensure that they hire “committed, smart people, and people who are willing to learn our culture and our model”. In Haiti, all first-year medical school graduates perform a mandatory year of social service. In the early year, PIH struggled to recruit doctors to the rural, Central Plateau. Senior PIH leaders talked of their years of social service before joining Partners In Health. Many were posted in rural clinics with no resources. While they could not effectively diagnose patients, they witnesses thousands of cases of infectious diseases and could do doing about it. They had the skills to treat TB, HIV, typhoid,

and malnutrition, but had no tools. Thus, many of the best doctors did their best to stay away from these posts. Only those who mandated by the Ministry of Health to serve in rural areas or who originated from them and wanted to serve their home communities would go. Now, the top graduates compete for a position to work with Zanmi Lasante (ZL). As an outside official noted:

PIH is able to draw on really good professionals. They have backing from Harvard and the name recognition that brings. They have a wonderful ability to train their people, provide them with good benefits, and PIH/ZL carries its own name recognition.

Boston implements strict hiring practices even for staff positions. For example, when hiring someone for an accounting position, PIH firsts look for someone with the right technical skills. “However”, as a Boston-based participant noted, “we’ll never hire anybody who doesn’t show a dedicated commitment to the preferential option to the poor, and some willingness that they are a self-starter and willing to go above and beyond to make things happen.”

Another important aspect of this philosophy is language used among members of PIH. PIHers like to talk about “beginning or ending a conversation.” As one of the doctors who splits his time between Haiti and Boston said about people who “lack imagination:”

They end conversations, they don’t start conversations. They don’t have *this*, end of conversation. They don’t have *that*, end of conversation. They don’t have x, end of conversation.”

The power of language cannot be understated, for it comes from someone’s or an organization’s ideology and translates to practices. As a member of the Boston Executive Committee stressed:

It is fine to talk about barriers to a solution in PIH if that offering is meant to continue the conversation, but things like the language of sustainability, the language of accountability, all of these things to us are often pushed forward in the world as a way of stopping a conversation. Those are actually political attempts to stop something.

No better story expressed how vital this is to solving problems, than PIH's push for treating HIV-positive patients in Haiti with antiretroviral medicine.

PIH doctors in Haiti had been managing HIV-positive cases for 15 years only able to treat opportunistic infections such as TB or pneumonia and with education about safe sexual practices. However, in 1996 researchers developed antiretroviral (ARVs) medicines that curbed the transition of HIV to AIDS. Doctors in rich countries had immediate access to these medications and made huge strides in caring for HIV-positive patients. When PIH sought ARVs for their patients in Haiti, the global health community stood against them. Professionals cited three barriers to using ARVs in places such as rural Haiti. Cost was the first barrier. The individual price of treatment exceeded \$12,000 annually and PIH works in locations where health insurance is non-existent and patients pay no user-fees. The second claim was that "poor people can't tell time." Patients must take ARVs on a regimented schedule and cannot skip doses or it makes the drug ineffective. Lastly, ARVs require a logistical "cold-chain" in which medicines must be maintained at a cool temperature. Most rural Haitians lack access to electricity, let alone refrigerators. Thus, the global health community recommended that the "appropriate" treatment for HIV in places like Haiti was "The ABC of HIV Prevention." ABC includes three components: Abstinence, Be faithful, and Condoms.

Through its anthropological work PIH claimed that ABC was not appropriate in communities where women are victims of structural violence. Many women in rural Haiti depend on men for financial and personal security and this often results in unwanted sexual activity. Thus, PIH took on each perceived barrier. They lobbied drug manufactures to lower costs and eventually won

support of generic manufacturers who could supply ARVs for less than \$100 per person per year. They hired additional community health workers to dispense drugs daily to HIV-positive patients in their homes. Last, they reinforced their own logistics to ensure the cold-chain, even providing community health workers with small coolers to maintain drug temperature from the hospital to the home. Instead of ending the conversation with the global health community, they opened the conversation by proving their approach effective for their first 200 patients. Now, the World Health Organization endorses this approach for the treatment of HIV in poor communities.

PIHers justify their approach saying that, “We’ve focused not on what is appropriate in those circumstances, but what was appropriate for the needs of the people and to cure the disease.”

One member of PIH’s executive committee used an analogy of a business investor making investments guided by a philosophy of appropriate technology:

What kind of an investor would make an investment on that basis? You’re going in and do something, but only use appropriate technology? You don’t do that when you go and extract oil in Azerbaijan, you don’t do that when you equip or support the troops in Iraq... You just don’t do that! Give me your support and resources but I’m going to go in with substandard strategies or substandard raw materials, you just don’t do that.

To summarize the main points of this section, PIH sees poverty and its associated diseases as rooted in a broader international system. Because of this analysis, they see poverty as a disease whose diagnosis lies across the local and systemic levels. As one person reiterated:

If we accept the way that resources are allocated, and the status quo, and the constraints and challenges facing the community, and design projects to that, then we aren’t considering the fact that those things could change. Those things can be different. We don’t have to accept that.

Clearly, they do not. PIH has created an organization to fight poverty and disease wherever the barriers and constraints lie. As a member from Boston stated:

In order to address those issues you need to be able to tackle it at several different levels. So, you need to be able to tackle it at the local level to determine what the factors are that are causing this, so you can break that cycle. It would be at a local level and then at a national level and then at an international level, then a policy level.

How the organization's structure has evolved to take on this fight is the second main theme stemming from the research, one based on service, training, advocacy, and research that spans across communities and constraints.

4.9 Organizational Structure

PIH claims to have no formal organizational structure. As many participants confirmed, structure and bureaucracy become “excuses for inaction.” However, every group has some form of structure. One executive team member described to me the idea of a functional matrix, described in detail in Section 4.8.2. He sketched its concept on a white board during his interview. This was the only formal piece of organizational information received. Based on interviews and web content, I was able to develop several structures that explain how Partners In Health implements its approach. Figure 4.7 on the following page illustrates how PIH organizes itself globally.

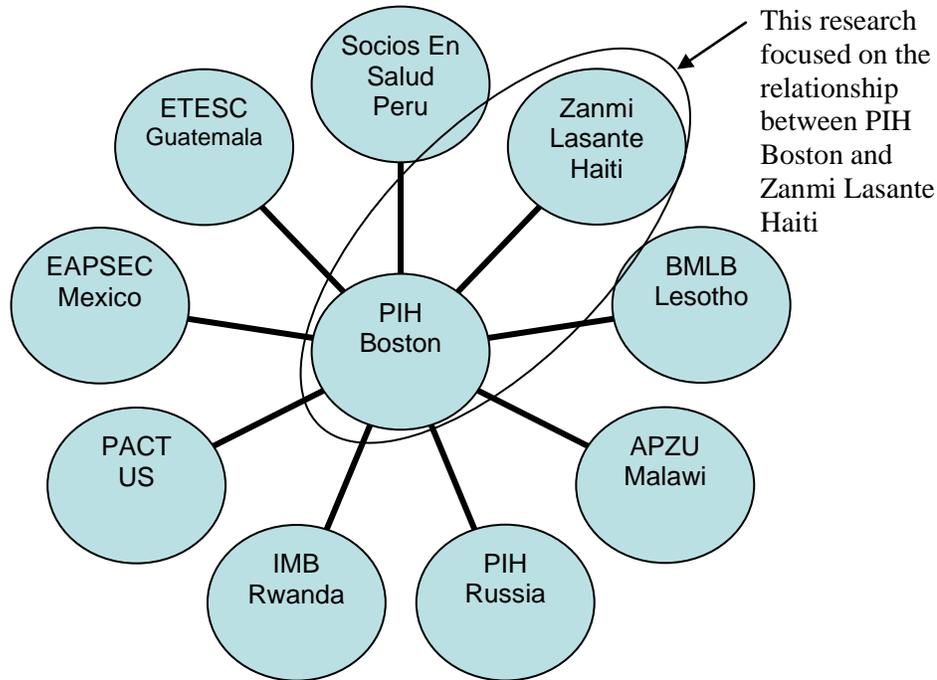


Figure 4.7 PIH’s Global Organizational Structure

Partners In Health is based in Boston and works in 9 countries. They help establish in-county, locally managed sister organizations through which they implement their work. On paper, these are independent organizations. Yet, in practice, the lines of division are invisible. This work focused on PIH’s work in Haiti with its sister organization Zanmi Lasante.

The first interviews of this study sought to understand barriers facing people in the field – the day to day difficulties confronting doctors, nurses, and community-based staff. They uncovered very little. Participants said they had the resources, the medicines, and tools to do their job. They did not admit to facing barriers. They reported that teams before them had already won-over the suspected errant witch doctor and community health workers had helped organize the installation of a water system so that patients had safe water to drink. What emerged was the existence of a

system capable of overcoming barriers seamlessly. Certainly, working in rural Haiti provides the field staff with plenty of challenges, but when in need of something, they “just call Cange.”

Cange is the headquarters of Zanmi Lasante where much of the Comité Exécutif (CEX) lives and works.

4.9.1 In-country organization

When asked about the existence of the same barriers, members of the CEX revealed many more of the anticipated challenges believed to exist in Haiti. They deal with logistical issues of transporting medicines from the United States and Europe, through customs in Port au Prince and in trucks over the mountains from the Capital. The system became clearer. A relationship similar to that of a family exists. For example, if one were to ask a child about the challenges of daily life, one would expect them to have very few challenges. When the child is hungry, a parent provides dinner. When the child is cold, a parent provides a coat. When a child is tired, s/he finds its bed. However, if one were to ask a parent of that same child about the challenges of daily life, they would tell of the struggles to obtain food and prepare dinner, to save money for the coat, and to work double time to pay the mortgage.

A similar relationship exists between the CEX and field staff in which resources to do their job is not a barrier. This relationship also plays out between the CEX and Boston in which people say they “just call Boston” for needed resources. The field staff is on the front lines of implementing PIH’s mission. However, they focus their energies on their patients, not on the acquisition of tools and resources to carryout their job. Their direct contact with communities and patients

informs them of localized issues. This information is fed back through to the CEX who very much deals with localized constraints. In Haiti, CEX members include:

- Founding Director of Zanmi Lasante
- Director of HIV/TB
- Director of Women's Health
- Director of Strategic Planning and Operations
- Director of Finance and Administration
- Associate Director of ZL
- Health Systems Manager
- Program Manager, Water and Education Projects
- Financial Officer
- Human Resources Manager
- Medical Director, Cange

Figure 4.8 on the following page illustrates the organizational framework of Zanmi Lasante showing the parent-child relationship between front-line staff and the CEX.

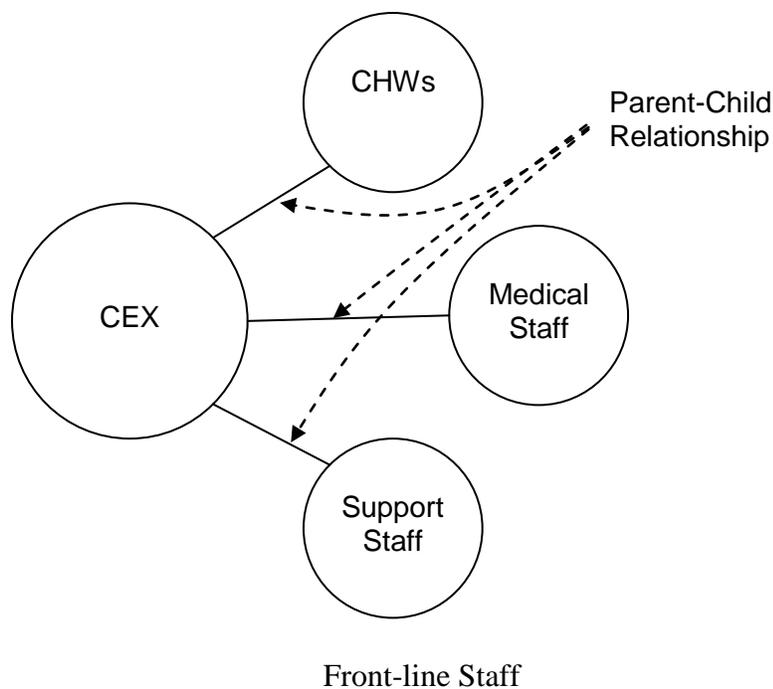


Figure 4.8 Parent-Child Relationship between Comité Exécutif (CEX) and Front-line Staff of Zanmi Lasante

It is necessary to make an important distinction between PIH and other organizations. In Haiti, the CEX and field staff comprises Zanmi Lasante (ZL). Zanmi Lasante translates from Creole to English as Partners In Health. However, it is more than a name. ZL is its own entity, with its own charter and leadership. Each country in which PIH works has a similar organization. In Peru, it is Socios En Salud and Inshuti Mu Buzima in Rwanda. In terms of philosophy and mission, everything is simply PIH. Yet, when it comes to organizational structure, the differences matter. The in-country organizations are actually doing the work. The role of PIH (i.e. Boston) is to *accompany* their sister organizations. As a Boston member stated:

The keys to success in Haiti is the growth and development and being able to retain incredible leadership on the Haitian side...It's really about building those partnerships and empowering them to be leaders and continue their professional development. I really think that's the key. And then kind of getting out of the way. We're here, we're seen as being supportive, we're seen as being providers of material and money or whatever, but there isn't a sense that we are running the show. The Haitians are running ZL.

Section C discusses the notion of accompaniment in detail, but similar to how accompagnateurs accompany their patients to well-being, PIH works along side ZL, SES, IMB, and the other organizations through a flexible approach Boston initiates, but shaped to local context in each country. The Functional Matrix is a key element to PIH's organizational structure that enables these relationships to perform more fully.

4.9.2 Functional matrix, where two organizations meet

Figure 4.9 on the following page illustrates PIH's Functional Matrix. This tool lies at the intersection of Boston and the in-country staff. These are the people who also stand, quite literally, across the line between localized and systemic barriers. They are connected to the local level and have daily interactions with the field staff. They are also connected with the international level and have daily interactions with the Executive Committee in Boston. Thus, they act as boundary spanner bridging the gap between localized and systemic constraints.

The Functional Matrix consists of horizontal rows of functions and vertical columns of people located in each country. Functions include various organizational tasks related to clinical and administrative tasks such as specific clinical and programs functions, procurement, finance, information technology, monitoring and evaluation, and emergency medical records. Each function has a "touchstone" in Boston who is in touch with each functional manager in specific countries.

Function	Boston	Haiti	Lesotho	Malawi	Russia	Rwanda	USA	Mexico	Guatemala
Clinical	C _B	C _H	C _L	C _M	C _{Ru}	C _{Rw}	C _U	C _{Mx}	C _G
HIV/AIDS	HIV _B	HIV _H	HIV _L	HIV _M	HIV _{Ru}	HIV _{Rw}	HIV _U	HIV _{Mx}	HIV _G
TB	TB _B	TB _H	TB _L	TB _M	TB _{Ru}	TB _{Rw}	TB _U	TB _{Mx}	TB _G
Women's Health	WH _B	WH _H	WH _L	WH _M	WH _{Ru}	WH _{Rw}	WH _U	WH _{Mx}	WH _G
Surgery	S _B	S _H	S _L	S _M	S _{Ru}	S _{Rw}	S _U	S _{Mx}	S _G
Mental Health	MH _B	MH _H	MH _L	MH _M	MH _{Ru}	MH _{Rw}	MH _U	MH _{Mx}	MH _G
Blood Bank	BB _B	BB _H	BB _L	BB _M	BB _{Ru}	BB _{Rw}	BB _U	BB _{Mx}	BB _G
Programs	Prog _B	Prog _H	Prog _L	Prog _M	Prog _{Ru}	Prog _{Rw}	Prog _U	Prog _{Mx}	Prog _G
Education	E _B	E _H	E _L	E _M	E _{Ru}	E _{Rw}	E _U	E _{Mx}	E _G
Agriculture	A _B	A _H	A _L	A _M	A _{Ru}	A _{Rw}	A _U	A _{Mx}	A _G
Infrastructure	I _B	I _H	I _L	I _M	I _{Ru}	I _{Rw}	I _U	I _{Mx}	I _G
Wat/San	W/S _B	W/S _H	W/S _L	W/S _M	W/S _{Ru}	W/S _{Rw}	W/S _U	W/S _{Mx}	W/S _G
Procurement	Proc _B	Proc _H	Proc _L	Proc _M	Proc _{Ru}	Proc _{Rw}	Proc _U	Proc _{Mx}	Proc _G
Finance	F _B	F _H	F _L	F _M	F _{Ru}	F _{Rw}	F _U	F _{Mx}	F _G
IT	IT _B	IT _H	IT _L	IT _M	IT _{Ru}	IT _{Rw}	IT _U	IT _{Mx}	IT _G
M&E	M&E _B	M&E _H	M&E _L	M&E _M	M&E _{Ru}	M&E _{Rw}	M&E _U	M&E _{Mx}	M&E _G
EMR	EMR _B	EMR _H	EMR _L	EMR _M	EMR _{Ru}	EMR _{Rw}	EMR _U	EMR _{Mx}	EMR _G

Figure 4.9 PIH's Functional Matrix (as conceptually described by P9)

This creates a functional team that shares information across sites, an idea that evolved as the organization grew. An organizational mantra says it is okay to make mistakes, but they do not want to make the same mistake twice. It infuriates people when the Rwanda team makes a mistake that Haiti solved five years ago. As a member of the Executive Committee explained the evolution of the Functional Matrix:

So we've got to be developing these cross-site functional teams that work together. And that understanding probably didn't exist at Partners In Health when we were Haiti, Peru, Russia, when each project was very focused on its own work and Boston was primarily a donor. Now there is a much greater sense of an integrated team.

Having PIH members from one country train their counterparts in another country is another method of crosscutting collaboration. This happens most often when new projects are started in a country. The Haiti-Rwanda collaboration is a robust example of these types of partnerships. As one Boston participant said:

One of the things I also think is lending to the success of the Africa projects is the involvement of the Haiti team...I think that's really cool that they are the ones who've done the work, they know the challenges, they have the experience, and I think it's fantastic to be able to have someone like [the Director of HIV/TB in Haiti] go to Rwanda. They speak the same language, they have the same backgrounds. To be able to do that training directly with his Rwandan colleagues, what cooler way? I think it's really great. So I think that kind of training and cross-site collaboration has been really key for us.

In this way, the touchstones are not the pivotal people maintaining control, but act more as facilitators between sites. Vertical teams, consisting of in-country members, further integrate teams across functions. Each geographical team communicates with each other. This is an organized expression of PIH's belief in fighting diseases holistically. This is such a vital aspect to *what* PIH does and deserves further attention as a Principle of Practice in the next section. The functional managers are at the heart of this structure and so it is important to go back to the functional matrix to understand better the interaction between culture and organizational form.

One of the unique findings is PIH's ability to address both localized and systemic constraints. No discrete line exists between these two sets of constraints. Yet it is the nucleus of activity, providing the bridge between information and resources. The boundary spanners working in this space have to understand multiple cultures and how to navigate between them.

Those who makeup the functional matrix are the interface between the front-line staff and the Boston-based leadership. They have to be able to work across both lines of state and constraints. The Haiti-based managers have their heads turned more towards the localized side, whereas the Boston-based managers have theirs turned towards systemic issues. Yet, both function in the space between the boundaries. For the most part, the Haitians do the actual work, while the Boston members facilitate or accompany their counterparts. As one Boston-based member explained:

My job is to accompany the process, to work with the teams to see what they need, and because I have that awareness [of localized issues], I become a better advocate on the global stage for what overall the constraints are and how we should change them.

In this way, functional managers exemplify the notion of accompaniment *accompagnateurs* established in the early days of the organization. Figure 4.10 on the following page illustrates how the functional matrix bridges geographical boundaries between Boston and in-country sister organizations.

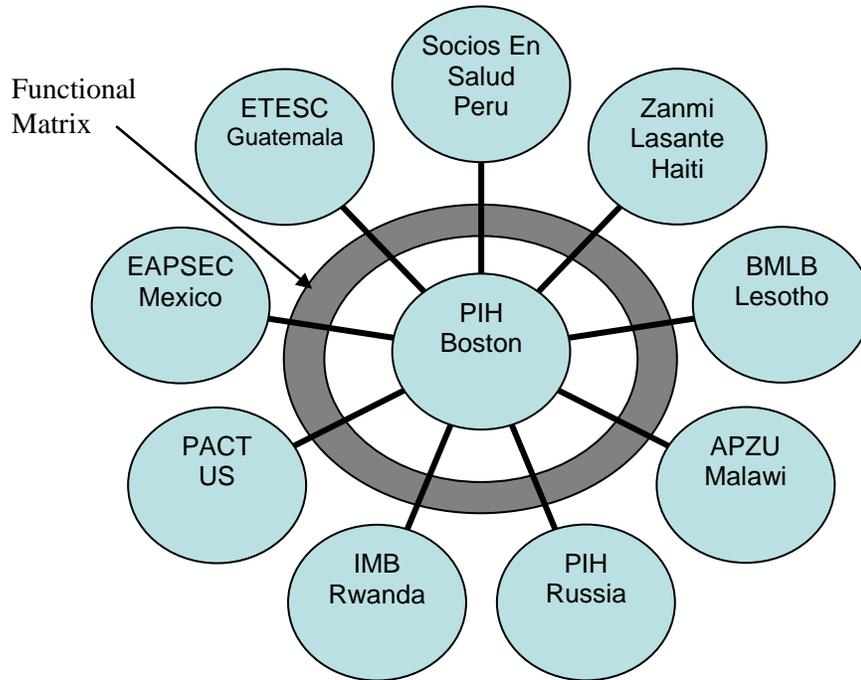


Figure 4.10 PIH’s Global Structure Enhanced by Its Functional Matrix as a Bridge between Sister Organizations

4.9.3 Boston-based executive team

The next organizational layer after functional touchstones and managers in the various countries (who are often members of the in-country executive committees) is the executive team, many of whom are also functional chiefs. These officers include:

- President and Executive Director
- Chief Operating Officer
- Chief Financial Officer
- Clerk
- Executive Vice President
- Chief Program Officer
- Chief Medical Officer

Other functions rest solely in Boston such as advocacy, communications, and development. The entire organization is ultimately responsible to a typical Board of Directors and an Advisory Board guides the organization as necessary.

There also exists the presence of hybrid individuals who hold no formal title and take on various roles and responsibilities to either fill in gaps or span boundaries as needed. One such person is a physician who splits his time between Haiti and Boston. He spends approximately 40 weeks in Haiti where he sees patients but also manages the design and construction of a new hospital in the town of Mirebalais and is writing ZL protocol for cardiac care. He spends 12 weeks broken up throughout the year as a general internist at the Brigham and Women's Hospital in Boston.

4.9.4 Organizational configurations

No formal organizational chart exists at PIH beyond the Functional Matrix and no one is “overly concerned process.” However, the organization matches flat, flexible structures found throughout corporate landscapes. Several participants talked of a “bottom-up approach” in lieu of a traditional hierarchical pyramid-based structure in which leaders at the top push information down to the lower levels. Yet, no one structure explains fully how PIH organizes itself. This subsection forwards three possible visualizations, starting with a concentric structure.

4.9.4.1 Placing the poor at the center

One Boston-based participant described PIH in a circular manner, where at:

...the center of that circle, or the nucleus of that cell is the destitute, is poor people. So everyone is actually turned and facing that nucleus. So, the most powerful people, who are on the outer part of the cell are clearly deeply connected into looking over a horizon

of lots of individuals, and in that, they start to see the relationships and they can also see the breakdowns of where things are not necessarily working.

Figure 4.11 illustrates how information comes “in from the people that are the most fragile” and how resources from the outer circles flow to them “so that is a two way street” between patients and the organization.

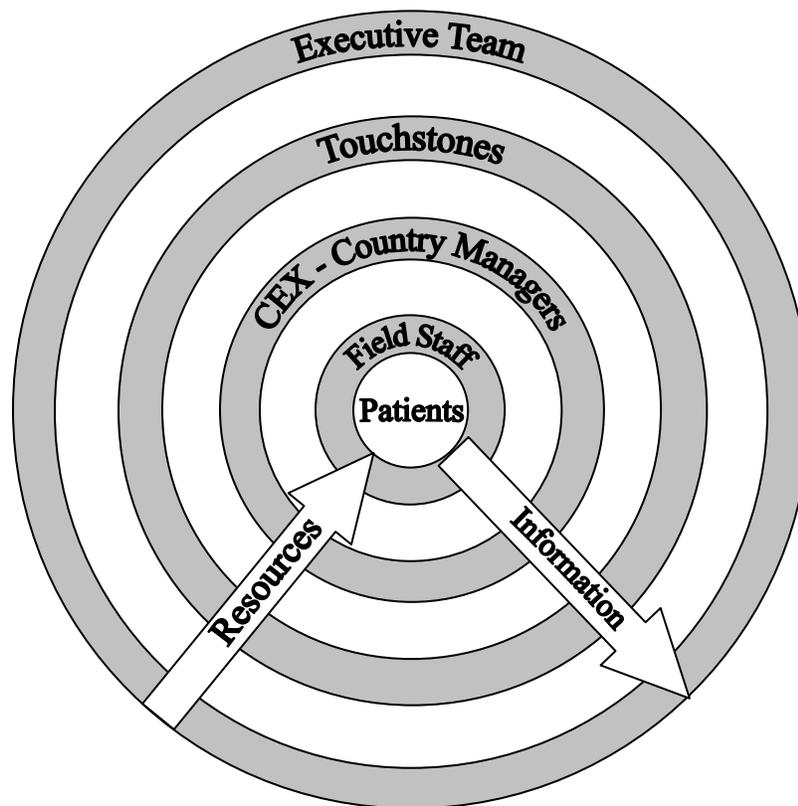


Figure 4.11 Circular illustration of PIH’s organizational structure where information flows from the center and resources flow towards the center.

As information flows from the center, the most-immediate ring of people attempt to address needs. Those in that ring reach out to the next ring when they cannot respond effectively. Each ring has a unique expertise in terms of barrier removal. While strict lines and distinctions are not clear within PIH, field staff best understand localized barriers, Zanmi Lasante’s Comité Exécutif

and functional managers span localized and systemic barriers (where the CEX and site directors their heads turned more towards localized constraints and functional managers have their heads turned more towards systemic constraints), and the executive team best understands systemic barriers. Figure 4.3 does not illustrate properly the make-up of the organization. PIH has more than 11,000 employees worldwide. Just over a hundred people are based in Boston (represented by the two outer rings). 80% of employees are *accompagneurs*, poor, rural people who work *and live* with patients. As one person noted, “When you have 80% of your staff as rural poor, it keeps you honest.” A Venn diagram provides a basis for the next visualization.

4.9.4.2 Two organizations for two-sets of constraints

Figure 4.12 on the following page represents how two separate, yet connected organizations work across two countries and span barriers at both the local and systemic levels and the space in between. As one doctor stated in the lexicon of medicine, “It’s the complete package that looks at both the proximal [localized] results of disease and distal [systemic] causes of disease.”

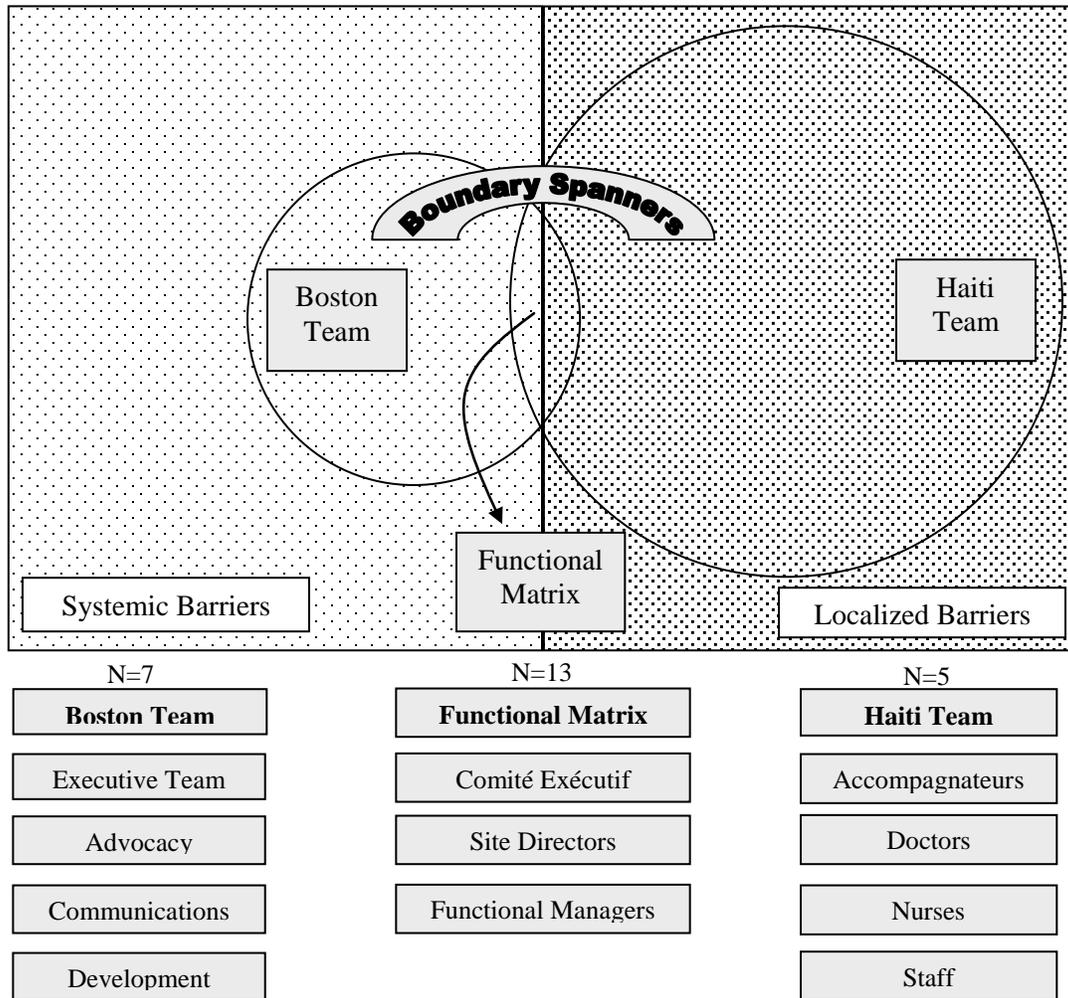


Figure 4.12 PIH's organizational structure that enables overcoming of localized and systemic barriers. N = sample of interviews from each group (does not show 6 non-PIH participants). The differently size circles represent the number of people working within each organization. The dots represent the relative number of barriers found locally and systemically.

However, Figure 4.12 does not illustrate the flow of information and resources between groups and through boundaries. Thus, a third scenario was developed to illustrate PIH's ability to create networks of information and resource flows that span geographic and theoretical boundaries.

4.9.4.3 Flow and boundaries

Figure 4.13 is an alternative representation of resource and information flow across boundaries and groups.

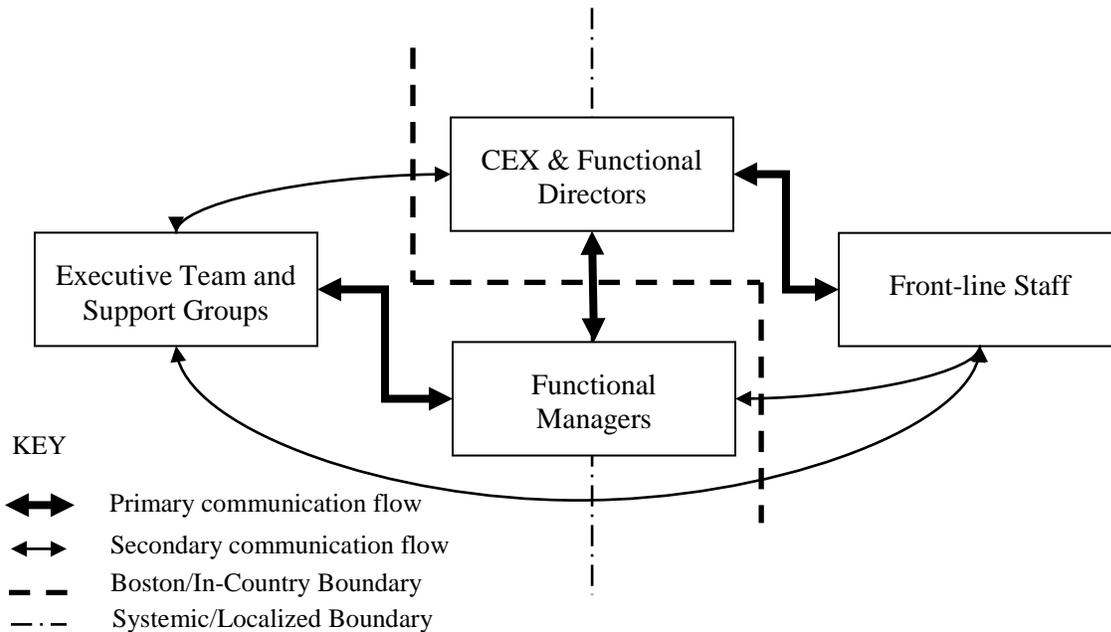


Figure 4.13 Organizational communication flow and boundary management

This representation reiterates how PIH’s organizational structure has evolved. While PIHers view bureaucracy as a barrier to action, all groups maintain some type of structure. At the same time, PIH wishes to remain “flexible and nimble,” noted a member of the Boston leadership team, in an effort “to change strategies to keep up with the challenges.” A member of the CEX likened the structure to that of an organism.

It grows like some cloud, always morphing and changing to keep growing, adding new parts to sustain itself like an organism, some kind of live system.

While Figures 4.11, 4.12, and 4.13 represent PIH’s organizational structure and how they implement their approach, in reality no model exists. PIH is a group of people who have set out to

solve problems under the guidance of their philosophy. While a loose organization is flexible and can respond quickly to challenges, it also has its drawbacks.

4.9.5 Chaos under control

As a member of the Boston staff expressed, “The flexibility is the reason why I think PIH has had success, because we don’t have a cookie-cutter model. We are able to be flexible while not compromising our convictions and beliefs.” However, this is also “a prescription for chaos.” A front-line doctor expressed his frustration with the lack of a hierarchical structure in which the person at the top has absolute authority and one in which he was comfortable working. “Here, the people don’t respect that kind of authority, they can go to other people in the organization.” From observations, the lack of respect is not personal, but from a broader disdain for structure. This presents quite a challenge especially for the Boston Executive team. As a member of the team observed, “The tradeoff between letting a thousand flowers bloom and chaos is not an insignificant one.” He goes on to say,

We, as managers and as an organizational mission, it’s our job to lay the lightest of touches of structure to keep people talking to each other, to keep things running smoothly, but to get the most out of everyone.

A flat, corporate structure best describes “the lightest touches of structure.” One participant also likened PIH’s organizational structure to that of an academic faculty. “We’re not looking for the Clinical Director to be in charge of everything,” this person explained, “and worse, we’re not looking for the Rwanda Clinical Director [from Boston] to wield a heavy hand.” This type of structure resonates with the earlier findings that bureaucracy leads to inaction. This person goes on:

What we’re looking for is much more akin to an academic faculty, where the faculty is broadly construed. [It is a structure] where everyone is being put in a position to find

themselves, to figure out how they can contribute to social justice...and any barriers that hierarchy puts into any person's pathway to find themselves in this world is a mistake on our part.

Thus, managers at PIH must be aware of the interplay of formality and informality in moving an organization forward. They take the chaos and occasional disrespect for authority as a tradeoff with an entrepreneurial culture focused on patient results, not personal efficacy. Structure only goes so far and yet one does exist. This structure enables the organization to overcome multiple barriers ranging from the local to the systemic. Several key components of their structure are service, training, advocacy, and research. These hallmarks enhance their ability to span boundaries and overcome barriers to effective care, while providing shape to the otherwise flat organization.

4.9.6 Service, Training, Advocacy, and Research

PIH's publications and website document its model of service, training, advocacy, and research (STAR) and nearly every Boston-based participant spoke about different aspects of STAR.

However, documentation does not exist that maps this model to organizational structure, nor how each component integrates with each other and into PIH's mission as enabled by social theories underpinning this research. Through this model, PIH is able to deliver first world health care in some of the most challenging areas of the world. Figure 4.14 represents the interplay between service, training, research, and advocacy.

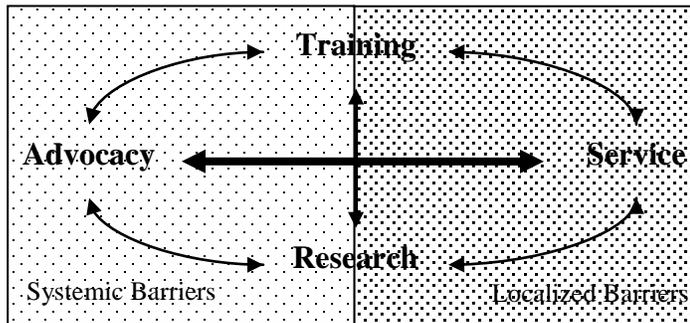


Figure 4.14 Interplay between Service, Training, Advocacy, and Research

Service, training, advocacy, and research are summarized as follows:

- Service: front-line interventions and services
- Training: educating patients, employees, and students
- Advocacy: influencing national and international policies, as well as public opinion
- Research: field trials to evaluate services and promote results

The following subsections detail these four components.

4.9.6.1 Service

In terms of overcoming constraints, service and advocacy are the primary arms. The service arm is the battle horse in the larger struggle for social justice. It contains the front line, triage response to poverty - diagnostic tools and treatment regimes against infectious diseases and support services including mental health, social support, education and agricultural assistance. PIH's sister organizations have developed effective systems to carryout this work as detailed in the following section, Principles of Practice. Yet, when organizations such as Zanmi Lasante hit systemic barriers beyond their control, they call upon PIH's advocacy arm.

4.9.6.2 Advocacy

While several participants echoed that everyone in the organization has a responsibility to advocate on behalf of the poor, an advocacy division in Boston facilitates many of the formal advocacy efforts. Efforts include lobbying in Washington, D.C. for pro-poor legislation and influencing language used in U.S. foreign policy and funding related to global health. PIH also negotiates with drug manufacturers for competitive pricing strategies and collaborates with other institutions in attempts to change U.S. and international policies, such as those offered by World Health Organization (WHO). *Wòch nan Soley: The Denial of the Right to Water in Haiti* is one such example (Provide Reference). PIH and ZL worked with the Robert F. Kennedy Center for Justice and Human Rights, NYU School of Law, and Harvard Medical School to highlight how the U.S. government influences policies of the Inter-American Development Bank to block access to clean water in Haiti. As a Boston participant noted:

PIH is an organization that works at all levels, attacking the problem collectively. The water report, *Wòch nan Soley*, is a great example of this. We're helping to get water on the ground while advocating the US Government and the International Development Bank.

She went on to describe how the Bank's director paid a visit to the town of St. Marc where PIH manages a public health center. When water failed to flow after he expected it to, he promised to follow through on changes in legislation to ensure access to funds for the people of St. Marc. A push for food security in Haiti emphasizes the interplay between service at the local level and advocacy at the policy level.

Many children in ZL's catchments have the disease kwashiorkor, a protein deficiency in patients suffering from malnutrition. Kwashiorkor presents with reddish-colored hair. The treatment, PIHers joke, is food. ZL collaborated with Zanmi Agrikol who makes *nuri-mamba*, a locally-

made peanut butter fortified with vitamins and provides families with these supplements. Within weeks, children become healthy. However, PIH and ZL take three additional steps towards food security. They identify the poorest patients and community members and accompany them with training in farming practices. ZL gives them tools and seeds and agricultural agents make weekly visits to follow-up with advice to increase crop yields. Yet, many Haitian fields lack high soil quality for productive growing. Much of Haiti's once rich topsoil has washed away due to deforestation.

Deforestation is a result of exorbitant cooking fuel costs causing people to cut trees to make charcoal. Thus, ZL also supports projects to plant new trees and the development of alternative cooking fuels made from agricultural by-products. They also educate people on the importance of saving trees. These practices go far towards improving crop yields and creating sustainable livelihoods. However, the root of Haiti's food insecurity is beyond Haiti's control. A flood of US grain and other food products have undercut Haitian farmers. The US government subsidizes its farmers who grow more food than needed. The US sends much of this surplus to developing countries as "food aid." The majority of rice sold in Haiti comes in this form of aid. As little as twenty years ago, Haiti produced enough food to feed its people and export their surplus for profit. Haitian farmers can no longer compete with the US donated rice. This policy is in part to conditional loans Haiti receives for other types of aid. Haiti remains food dependent, until this practice ends. Thus, PIH is advocating for changes in US policies affecting Haiti's food security. In this way, PIH implements a four-pronged approach to overcome a series of local and systemic barriers by enacting each arm of the service, training, advocacy, and research paradigm.

Participants talked about how advocacy can occur in Washington, but it also occurs within companies.

Corporations play a powerful role in global health. They are at the forefront of research and development of new pharmaceuticals and heavily influence the market. One participant likened working with drug manufacturers to accompaniment. PIH will freely criticize these companies when they feel it necessary. Yet, they also see them as partners to win over. One participant explained it this way:

So, a company is going to be propelled by its profits, but most people in this world, and certainly most people that I've dealt with, if you give them some sort of way to be part of the solution, they want to be. That's what we've found. That's why we work with Lilly in Russia to leverage \$100 million a year for TB alone as part of their foundation.

In this way, PIH advocates influential partners through relationships. As PIH effectively uses their products, as the level of trust increases, these companies are more likely to participate in solutions. These methods of advocacy are subtle, but no less effective towards creating change compared to top-down policy related changes. For this reason, PIH talks about being part of a movement. As their advocacy director stated:

There's no way that Partners In Health is going to do it all by ourselves. And we don't have to. The ONE Campaign [an effort to rally Americans to fight the emergency of global AIDS and extreme poverty] and all these other grassroots groups that we are working with, we're all working toward the same goal. I think we can coordinate our activities a lot better than we do, but we need massive social change, massive social understanding that this is wrong.

Events leading to the creation of the Global Fund to Fight, AIDS, TB, and Malaria illustrate this type of advocacy.

In 2000, grassroots advocates, many of whom were Africans with HIV/AIDS, protested the high cost of antiretroviral (ARVs) drugs at the International AIDS Conference in Durban, South Africa. ARVs were made available four years earlier. Yet, they were not available in most African countries, many of which had HIV prevalence rates of 25%. Kofi Annan held a special session to respond to this advocacy. The Global Fund resulted with the idea that poor African countries could not fight AIDS alone. However, activism alone is not enough. While service and advocacy are PIH's vanguard, training and research are vital support arms. The four work in concert towards a powerful change mechanism. One participant talked about the interconnectedness of service, training, advocacy, and research this way:

So part of why I think we're good advocates for global change is because we have real world experience [through service]. So you have people who are sitting as experts and making policy, and they have no real world experience. And then you have these activists who are trying to have change, but when the critics come they don't have a lot of depth.

Thus, through training and research, PIH strengthens its service and advocacy roles.

4.9.6.3 Training

Training is at the heart of sustaining an organization dependent upon thousands of accompagnateurs. "If we don't do it with training," says one Boston-based participant about service, "then you really have to either rely on ex-pats or you get poor quality care." Clearly, with a staff of nearly 11,000 people worldwide, PIH depends upon training their people. Yet, one functional manager explained that training within PIH extends beyond knowledge transfer from experts:

When we are training, we are also training [community health workers], and they are training us. It's a two way street, so I can train people on technical skills and they can train me about what the realities are. I think that has allowed us to develop an informed package.

PIH trains its staff at all levels and in all countries and collaborative training reinforces the organization's philosophy of observation. This training informs the advocacy and service arms in a cycle of continuous improvement. However, its training arm reaches outside of the organization.

ZL's director of training also directs the Caribbean HIV/AIDS Regional Training (CHART) Network in Haiti where ZL staff train thousands of Haitian medical professionals. Concurrently, PIH has direct ties with Harvard Medical School (HMS). Several PIH members serve as HMS faculty where they teach students courses related to global health. Some of these students go on to earn positions as research fellows that work at PIH sites around the world. Most recently, ZL's influence has extended into Haiti's medical education programs. Haiti's University and Educational Hospital (HUEH), also referred to as Haiti's General Hospital was destroyed during the January 2010 earthquake. It was the only public teaching medical facility in the country. PIH, from an invitation of the Ministry of Health is now constructing a 300-bed referral hospital in the Town of Mirebalais that will provide a temporary home for third and fourth year medical and nursing students. ZL staff will play an integral part as adjunct faculty at the new hospital and be able to share its approach to a new generation of Haitian health professionals.

PIH works on the basis, and some may say bias, that a "grassroots human-rights approach is better." They use training to spread this idea to its members. They also use research to validate their approach, while also informing advocacy and improving service. As one member noted, "We know when and how to use research to help advocate, to help evaluate, to help add to the knowledge of what's going on."

4.9.6.4 Research

Even with the backing of Harvard, powerhouse research institution, global health experts often criticize PIH's research agenda. The criticism comes from the notion that PIH's research does not start with a null hypothesis. One participant compared PIH's research with that of a drug company who does research, in part, to prove that their product is better than other products. The company then has its finding published in scientific literature so that people will be aware of the results. About pharmaceutical research and PIH's agenda, she goes on to say:

It's not really a null hypothesis, right? They think that their thing is better, and to me this is why we do research...Our research is to inform that whether it's providing treatment for drug-resistant TB or paying community health workers, or whether or not poor people respond to HIV drugs, our fundamental principle is that proving health in this context [of poverty] is better than not...We won't do research unless we think it is going to change the way people think and then use those findings to create advocacy on the global stage.

It is a bit Machiavellian, yet hard to deny that PIH's approach leads to outcomes that have changed the way the global health community thinks about delivering health care in resource-limited settings. They use research findings to modify their training and advocate for additional funding to improve and scale-up their services.

PIH tries to stay five years ahead of the global health community and use research internally to evaluate new initiatives. One such example is their push for mental health services in resource-limited settings targeted at orphans and children. This came from a series of concerns voiced by accompagnateurs who witnessed mental health issues during home visits. Before beginning these services, there were no psychiatrists in the Central Plateau. PIH initiated a training program to educate their staff on mental health services and recruited one of the few psychiatrists in the country to come work for them. They have been providing these services for several years assessing levels of depression in adolescents and their parents after treatment. A group from

UNICEF recently visited the ZL staff as this problem has gained the attention of the global health community. Staff members were able to discuss what works and what does not informed by several years' worth of data. As a person close to the study talked about integrating service, training, advocacy and research:

I think that's kind of how we tie it together and look at how we do make this real on a larger scale. So, yes, when we're delivering the services, and we're trying to make a good well-trained staff that stays for a long time, and we're trying to find these really defining things [through research] that if we can show we can do it, we'll change people's lives.

4.9.6.5 Structures supporting service, training, advocacy, and service

PIH utilizes its STAR organizational structure to identify root causes of constraints across local and systemic levels, develop solutions that fit the local context, and monitor and evaluate their outcomes in order to scale-up and disseminate their services. As the advocacy director suggests about the STAR structure:

It's all of our responsibilities to do this, because in the end, if we don't do it, who is? The people who it affects try to, but again, they are the so-called voiceless poor, it's a misnomer of course because they have a big voice, but no one is listening. So we, people who are in a position that can advocate for them, that can change policy, that can broker these conversations – it's incumbent upon us to do so because we are in that position. The person whose child dies of typhoid because they don't have fresh water, she has access to whom? We are that middle man that is called on, just by the fact that we are the ones who witness these atrocities. We are called on to act. Not just act to remediate the inequality of access at the local level, but also prevent that from happening again. Prevent even our investments from falling by the wayside.

The STAR paradigm channels resource and information in the fulfillment of PIH's mission as it enables the organization to span boundaries many see as insurmountable. PIH relies on many informal partners that include agricultural extension agents and drug manufacturers to remediate inequalities at the local level and make changes at the systemic level. Yet, it also depends upon a set of formal partners as it "is uniquely situated within "Four Pillars" of institutional support."

4.9.7 The Four Pillars

PIH has strong institutional support providing a deep organizational foundation and facilitating its service, training, advocacy, and research initiatives. “They have backing from Harvard,” noted a non-PIH participant, “and the name recognition that brings.” PIH is one of the four pillars from Boston focused on health and human rights. The others include the:

- Program in Infectious Disease and Social Change within the Department of Global Health and Social Medicine at Harvard Medical School;
- Division of Global Health Equity at Brigham and Women’s Hospital; and
- François-Xavier Bagnoud Center for Health and Human Rights at Harvard School of Public Health.

This collaboration aims to address pressing “health inequalities” with each organization meeting a certain set of responsibilities. PIH is an independent non-profit organization focusing on patient care, program administration, drug procurement, technical assistance, and fund raising. It is known as Harvard’s and the Brigham’s “effector arm.” Faculty and investigators from the Program in Infectious Disease and Social Change teach and conduct research related to medicine, public health, anthropology, and epidemiology. The Brigham and Women’s Hospital is Harvard Medical School’s teaching hospital and provides physician-scientists specializing in infectious diseases, pediatrics, cardiology, and informatics through its Division of Global Health Equity. Lastly, members of the François-Xavier Bagnoud Center for Health and Human Rights develop domestic and international policy focusing on the relationship between health and

human rights in a global perspective and mobilize scholars, practitioners, public officials, donors, and activists in the health and human rights movement.

As stated on PIH's website, "These alliances enable us to translate our lived experiences serving the destitute sick into clinical and operational research, education and training paradigms, and programs and policies that reduce health disparities and improve treatment outcomes." These partnerships provide unique PIH with unique ability and resource to identify systemic barriers and to develop and craft policy-level changes. Yet, from an organizational perspective, personnel provided through these partnership offer a unique ability for PIH to recruit highly skilled professionals and staff.

Many of Boston-based members of PIH draw their salary from one of the other three pillars. Many PIH doctors are residents at the Division of Global Health Equity from where they draw their salary. They spend 12 to 14 weeks throughout the year working as hospitalists at the Brigham and volunteer their remaining time at PIH sites. Some actually spend their full time at sites in Africa. Many of the other staff and professionals share responsibilities at one of the other institutional sites. Farmer, Executive Vice President of PIH, for example, is also a professor and Chair of the Department of Global Health and Social Medicine. Thus, PIH is able to retain experts in global health without having to pay for their services, a phenomenon atypical of most NGOs. The unique organizational structure of the "Four Pillars" makes this possible.

PIH's flat and flexible organizational structure, supported by its focus on service, training, advocacy, and research and strong institutional partners facilitates an organizational philosophy

that cuts through constraints and fosters its “whatever it takes” culture. These two themes explain *why* and *how* PIH fulfills its mission. The last theme details *what* PIH does in the fulfillment of its mission. Five principles of practice emerged from the research. They have connections to philosophy and structure, and even relate back to the guiding theories of this work. However, they explain pragmatic aspects of PIH’s approach.

4.10 Principles of Practice

PIH’s unique organizational philosophy and flexible organizational structure help explain why and how they deliver health services effectively in resource-limited settings. However, they effect change through a set of pragmatic principles. Participants corroborated five principles of practice that make up PIH’s approach. These include:

1. Root-cause analysis
2. High quality health care
3. Comprehensive interventions through partnerships
4. Working with the public sector
5. Community-based

4.10.1 Root cause analysis

Root cause analysis is PIH’s first principle of practice. It is the culmination of the organization’s philosophy and drives the evolution of the organization’s structure. PIH’s service arm addresses immediate needs through charity, but then, as a member of the Boston team explained, they ask, “Why did this happen in the first place and what can we do so that our patients don’t return to the same conditions and do it again?” An organizational philosophy that perceives poverty as a

systemic consequence determines an approach that not only responds to the consequences of poverty, but to the conditions causing poverty. As an executive leader explained:

We might have started off with the idea that we'll bring medical care to one small community in Cange, but it's really broadened because we've discovered quickly that it's not enough to just provide medical care unless you address the conditions that are causing them to be so ill.

Recall the example of Haiti's food insecurity problem and PIH's four-pronged solution. The program manager for this initiative described the driving force behind their multi-level solution:

We work to stop malnutrition, sure. But then we ask, "How did she get sick in the first place? How can we send her back into that environment? What do we need to do to prevent them from getting sick again?"

Seeing Haiti's lack of food security rooted in an unattended consequence of international policy undercutting Haiti's agricultural economy and high fuel costs driving deforestation for cheaper alternative energy, propels PIH to change the conditions causing the problem.

One of PIH's doctors talked about his responsibility of identifying and overcoming proximal and distal forces towards "farther reaching outcomes." He said that as a doctor, he is trained to sit in an examination room and treat people. However, if this is all he does, then the next generation of medical professionals will sit in the same room and diagnosis and treat the next generation of poor people. He went on to say:

In order to stem the time of poverty and disease...you have to get down to the forces that are behind this. Say for example, a water collection system. Well, why doesn't this area have a water collection system? Is it the local government? Is it the broader government? Is it the neo-liberal economic policy of the United States or other funding agencies that have blocked loans for political reasons, et cetera? These things will continue if they aren't examined and taken head on, taken to task, head on.

PIH believes that addressing root causes of problems, be they rooted locally, systemically, or somewhere in between, leads to sustainable practices. "One way to make sure your projects are

sustainable,” noted a doctor, “is to make sure that the forces that are in play that created that situation [such as] a vacuum of care, or classism, or racism, [are] tampered down to assure that your investment will remain in perpetuity.” Free health care for the poor is one of PIH’s core beliefs stemming from root cause analysis.

Often, user fees and transportation expenses prevent poor people from having access to health care. PIH holds paramount an ideological and moral conviction in health care as a human right.

A Haitian staff leader told this story about the early days of cash payments to patients:

When we first started [provided TB medicine], we had 25 patients on daily medications. But people wouldn’t come for their daily medications. Why? We asked. They said that they didn’t have the money to pay for travel, food on the road. So we gave them 15 Haitian dollars a month to visit the hospital. One patient would come to the hospital every month to get his money, but then he died. We didn’t understand why. We went to his house and found all of his medication. His family said that if he took the medicine he would get better and then we would stop paying him the monthly 15 dollars. So that’s when we introduced the first accompagnateurs. This guy preferred being sick in order to get money.

Thus, PIH simply removes this barrier by not charging user fees and providing cash stipends to people who may otherwise be unable to reach hospitals and clinics and they have modified their approach to increase the effectiveness of their services. In this way, their services are sustainable for their patients. Ironically, this is the practice most criticized by development experts. They view PIH’s refusal to charge fees and their provision of cash support as unsustainable. Through PIH’s concentric structure, with the organization focused on its patients, its focus is on the sustainability of their patients, not the financial viability of their organization.

One of the Boston-based doctors working in Haiti described that a number of hospitals exist in Haiti operating via a for-profit or at least a cost-recovery model. “They fail miserably,” he says,

because “they are attempting to undergo cost-recovery or make a profit in a setting of abject poverty.” People in such settings cannot afford to feed their children, and yet many hospitals and organizations expect them to pay for healthcare. This participant went on to say:

Time and time again we have anecdote after anecdote of people who are already at the bottom of the socio-economic ladder and are going to sell of their material possessions, a goat, a sheep, a piece of land to be able to afford healthcare. So even if they survive whatever ailment they have, they leave not unscathed. They leave much further impoverished than they were and are at much higher risk for poor outcomes in the future.

Thus, through root cause analysis, PIH works to remove barriers to health care provision. This leads to their second principle. PIH seeks not a level of care most appropriate for resource-limited settings, but the most effective care possible in the modern age.

4.10.2 High quality health care

A key principle of practice for PIH is delivering high quality health care regardless of setting and constraints. As a Zanmi Lasante doctor said, “We care for the poorest ones and provide them with the highest level of care.” PIH sees no distinction between services delivered in rich countries versus those delivered in poor countries. A member of the executive team in Boston put it this way:

PIH has always had its guiding principle of bringing first world health care into third world environments. That’s just always been a guiding principle. We don’t give any consideration to somebody in Haiti being able to have water that is less clean than we have here.

They believe that all people are equal and that if a treatment is available for someone in the United States or Europe, then that same treatment should be available to someone in Africa or Haiti. Furthermore, they provide the treatment in a dignified environment. Thus, features visitors notice when visiting PIH sites are landscaped facilities, outdoor waiting areas shaded by flowering bougainvillea, fishponds, white tile work, and beautiful art on clinic walls.

The Director of Ministère de la Santé Publique et de la Population (MSPP, the Ministry of Health in Haiti) in the Central Plateau credited PIH's success in there upon the services they provide. He reinforced this saying:

When it comes to caring for HIV patients, PIH is number one. They are the reference point for all others in Haiti and even for other countries. They are *the* example for HIV care. And even still, they provide excellent primary care.

A member of USAID in Haiti who works with many different non-governmental health organizations stated that PIH's high levels of care is "very expensive," an issue that many claim makes PIH's work unsustainable, especially when they charge no user fees. However, this same person admits to the effectiveness of PIH's approach of using highly active antiretroviral therapy (HAART) to combat mother-to-child-transmission (MTCT) of HIV:

In MTCT, PIH makes it mandatory to have all of its patients on HAART (the 3 drug cocktail). The other programs only require one, maybe two medications. PIH offers the Cadillac of services that aren't even available in most countries, let alone in Haiti. But researchers prove that the HAART treatment keeps patients alive.

PIH's results justify the cost of their approach. In Haiti, MTCT of HIV is 2.2%, the same as in the United States. By contrast, MCTC rates of another leading public health NGO in Haiti is 9.2%, while the national rate is 27% (Deschamps et al, 2009). A mantra relayed by several executive team members and reiterated by Farmer in recent PBS documentary is "It is expensive to do things badly." Empirical and anecdotal evidence suggests that the outcomes of many development organizations, while less expensive, do go badly – from numerous water systems sitting idle after gaskets in the hand pumping mechanism fail to newly constructed schools and clinics being empty because user fees prevent children and patients from attending. Besides criticism for its costs, another drawback of PIH's delivery of high-level services is its lack of breadth.

PIH would prefer that all people have access to high quality health care. However, they will not expand their service areas at the expense of diminishing service levels. A member of the executive team expressed this approach as pragmatic steps towards scaling-up while preserving its depth of services:

What I think is the more important thing...is the power of being able to say we can't provide health care to the entire island nation of Haiti, but we can do something significant and something meaningful and something very deep in this area. You see the creation of a hospital, then you see the creation of a social medical complex, you see that sort of jump out to five other clinics, then those five clinics become ten. You go from 176,000 patients to 2.1 million encounters. So that idea of pragmatic steps is a very important part of PIH.

As a Boston-based staff member related about PIH's work, "It might mean that we are treating fewer people since we are having to pay community health workers, but in the end we know that the treatments will be more effective." As stated previously, the use of *accompagnateurs* is a cornerstone of PIH's effectiveness. Other organizations also rely on these people. The difference is that PIH pays these workers, when many organizations rely on volunteers to provide these services. The global health community long condemned PIH for this practice suggesting that it was not financially sustainable. PIH does not operate on a cost-recovery basis. They raise the money to pay for all operating costs. If they are unable to raise necessary funds, then they will not be able to continue paying *accompagnateurs*. However, the World Bank recently completed a study, noted a participant, comparing paid community health workers to volunteers and found that paid workers were far more effective and reliable than volunteers. The Bank now recommends paying community health workers. Overcoming social barriers is another, intangible effect of high-quality services.

A Haitian doctor noted, “What we do benefits them. And then there is the trust because of that.” Another doctor noted, “When they get sick, the first thing many people do is take leaves, or have their baby at home. But gradually the word gets out that we provide a good service.” Providing continued quality care builds trust across communities. In a place such as Haiti, where many people seek medical care through traditional religious priests, this enables PIH to overcome potential social barriers to service provision. Local people are often skeptical of outside assistance. Such was the case when PIH began working in the Central Plateau. “But now its not fair to talk about Zombi causing diseases,” said a member of the CEX, “It’s HIV or TB. Even now people come to houngan [a Vodou priest], but they still come to the hospital.” He went on to explain how they first developed this relationship:

We would give reference papers to houngan so that they would send their patients to us. When one of their patients came, we would rush them through to give them importance (“See, my people get special attention at Zanmi Lasante”).

By bringing hougans into the conversation, and even healing several of these spiritual leaders with TB and other diseases, they were able to prove the effectiveness of their care. Now accompagnateurs work with hougans and continue to pay them respect when they refer their patients to PIH clinics. The first HIV program in Hinche, Haiti shows how the level of care makes a huge difference in outcomes.

A health organization received funding for HIV care in Hinche from 2002 to 2004. They were only able to perform voluntary testing on pregnant mothers. They tested 22 mothers in 2004, the highest rate of the three-year program. The numbers tested did not match previous epidemiology reports of high HIV burden in the region. A major issue leading to low testing was that the organization provided diagnoses only. People simply refused testing because they knew no

treatment resources existed. They had no ARVs to prescribe to HIV-positive patients. PIH began working there in June of 2004 and brought with them the resources and experiences of HIV treatment. In the first six months, they performed over 1,000 examinations and now have nearly 700 patients on ARVs. Thus, as many participants reiterated, “patients would not come to PIH’s facilities if care were poor.” Without effective treatment, there would be no patient trust. Without patient trust, there would be no patient participation and infectious diseases would continue unchecked in PIH’s catchments. And, yet, patients continue to come in droves. According to PIH’s *2009 Annual Report*, patient encounters, patients placed on ARVs and TB medications, and safe childbirths have doubled globally every year since 2002.

Providing high quality care, regardless of constraints, leads to effective outcomes and creating trust within communities. However, the quality and depth of care is not possible without dedicated partners accompanying PIH. Partners range from a wide range of in-house experts to numerous professional, private, and public partnerships that extend PIH’s service within a medical realm and even beyond it.

4.10.3 Comprehensive interventions through partnerships

Many Haitians use the phrase, *tet ansanm*, when describing the importance of working together to achieve a common goal. Literally translated from Creole as “heads together,” a member of Zanmi Lasante’s Comité Exécutif credited its spirit of *tet ansanm* for PIH’s success. Partners In Health relies heavily on what they term “the little p.” The little p is partners as opposed to their organization, “the Big P” in PIH.

These partnerships foster the organization's ability to integrate services that both deepen and broaden its influence to break the cycle of poverty. In the previous subsection, the Minister of Health noted PIH's reputation for high quality HIV care. While well known as an HIV relief organization, he also alluded to the organization's high level of primary care. Several participants noted that PIH is an organization that refuses to approach problems in a vertical, or stovepipe manner. "We really try to connect interventions," explained a member of the CEX. A former employee elucidated PIH's aims to integrate services:

It sees that intimately connected to those diseases are things like water and tuberculosis, and intimately connected to those things are things like poverty...So if you are really about the process of making sure that people don't die, you have to do more than just look at sickness, you have to look at poverty.

Thus, PIH's prescriptions for diseases extend beyond medical treatment. The Minister of Health differentiated PIH from other organizations based in this approach. "They not only provide health care, but social help," he said. One of ZL's medical directors reiterated this referring to the "Big 3:"

We address housing, school, and food – the Big 3 social needs for the poor. With drugs only, your program will fail.

In this way, PIH "sees patients as people and catchments as communities." As well as providing a full scope of medical services, PIH's comprehensive interventions include programs for children and adult literacy, food and nutrition, education (primary, secondary, vocational, and university levels), home construction, latrines, water systems, micro-credit loans, agriculture, alternative energies, handicrafts, and other community-initiated programs. As USAID employee said, "PIH goes beyond what a normal health organization would do. The integration of these different sectors, the whole person approach, is a real key to their success." Yet, as stated by

PIH's advocacy director, "We can't do it by ourselves." Hence, PIH relies on numerous partners for its comprehensive interventions.

The first pairing exists between PIH-Boston and its sister organizations facilitated by the functional matrix. For example, Boston and Haitian counterparts share the functional role of nutrition, education, and agriculture. They both work with Zanmi Agrikol, an independent, sister organization of Zanmi Lasante. Other partners include:

- Institutional support of the "four pillars" such as the Brigham and Women's Hospital that not only provides physicians, but lends its diagnostic and surgical capacities when necessary.
- Other NGOs such as Charity: water who provide water and sanitation support, the Solar Electric Light Fund that provides solar panels at PIH sites, and Operation Smile who provides plastic surgery during its annual visits to Haiti coordinated by ZL.
- Universities that offer unique expertise and student volunteers.
- Private industries such as those who donate medical supplies and equipment.
- Professional volunteers such as architects who provide design services for hospitals.
- Multi- and bilateral organizations such as the United Nations and United States Agency for International Development who provide policy and funding support.

Financial supporters are another vital partner as they provide all of PIH's budgetary resources. According to its *2009 Annual Report*, individuals and family foundations supply half of PIH's budget, while foundations and corporations, and governments, multilateral and research institutions each donate roughly the remaining two quarters. Many similar organizations rely on

limited sources of funding, making them reliant on the wishes of their sources often leading to a more rigid and unimaginative approach. A non-PIH member who works with multiple NGOs suggested that part of PIH's effectiveness is due to the fact that they are not reliant on a single source of funding. She went on to say that:

PIH has a better chance at sustainability because of their varied funding sources...They have the "whole person" attitude which brings even more diverse funds.

Communities of concern provide another important aspect of PIH's support. Communities of concern are regional networking groups, primarily in the United States, but in other countries as well, organized by volunteers. They often include wealthy friends and passionate supporters of all ages who organize activities, speakers, and fund raisers. PIH's diversity in scope draws a mixture of people with varied interests. This not only better serves its patients in allowing more comprehensive interventions, but also continues to attract new partners with whom they may otherwise not engage.

As a Boston-based participant noted, "The secret to our success, in part, is our ability to appeal to many different people. We made sure that we're not just a group of people that only appeals to activists, or only appeals to one kind of donor. I think we have broad appeal." An example of this would be PIH's relationship with Digicel, an Irish-based company that delivers mobile phone services in Haiti. Digicel gives back to communities through the Digicel Foundation. As the ZL director of training related, "Digicel likes education and things like that. If we only did health, they wouldn't be interested in ZL." Now Digicel is ZL's largest private supporter in Haiti. Other partnerships escalate PIH's visibility, growing their platform for advocacy, which often leads to even more and varied partnerships. PIH believes this process improves its chances for longevity, as described by again by the director of training:

We work with the RFK Center for Human Rights at NYU. So by scaling up in areas and sectors, we build new partnerships and relations. This allows people to see us in more places...By increasing sectors, these new partnerships allow us to be more sustainable.

PIH's work in the Haitian community of Boucan Carré exemplifies 'partnerships and comprehensive interventions' in practice.

More than 50,000 people live in the remote area of Boucan Carré. In 2004, Zanmi Lasante began working in earnest there after building a hospital in partnership with MSPP (the Haitian health ministry). Prior to that, the people there had limited access to even primary treatment having to walk one to two days to hospitals in Cange or Mirebalais (another town in the Central Plateau). In 2000, the community started a dispensary through a twinning partnership (formal relationships between Catholic parishes) between St. Michel in Boucan Carré and Sacred Heart in Knoxville, Tennessee. "It was staffed by two nurses," said Boucan Carré's mayor about the dispensary, "that often lacked the medicine to provide health care." The community was introduced to Zanmi Lasante when they sought MSPP authorization for the clinic. The following year, ZL started a mobile clinic in Boucan Carré where they diagnosed diseases such as TB, HIV/AIDS, malaria, typhoid, and snails and other skin parasites. Previously, community members lacked an understanding of sources of these diseases. The three groups solidified their partnership when PIH and Sacred Heart each pledged \$100,000 towards the construction of a full-service hospital built on land donated by the community. As a former mayor and now leader of SOPABO, a community-based organization that acts as a proxy town council, related:

We lack financial resources within SAPABO, but we have land and human resources all over Boucan Carré. It's the reason why we want to make partnership. For example, with Zanmi Lasante, we provided the land, they provide the health care.

This partnership now incorporates multiple organizations participating in comprehensive interventions. Examples include:

- Fonkonze (a micro-lending bank) manages a bank at the hospital.
- Sacred Heart remains involved in education, water, and public health.
- Solar Electric Light Fund recently installed solar panels providing auxiliary power for the hospital.
- The hospital belongs to MSPP who works with ZL to meet community health needs.

Lastly, a bridge over the Fonlanfe River stands as a strong example of comprehensive services through partnership. Last year, ZL facilitated the construction of a bridge over a river that previously stood as a major physical barrier to health care, education, and markets for community members. PIH is not in the bridge building business. Yet, they and the community understood the significance of the problem after several women died in ZL ambulances waiting for floodwaters to recede enough to cross. ZL formed a team that included: community leaders who negotiated a deal for donated land and allayed concerns of community members who benefit financially by helping people cross the river; United Nations Civil Affairs unit that orchestrated legal issues; a battalion of Brazilian military engineers with MINUSTAH who contributed and installed a modular bridge; volunteers from an American university who raised funds, performed a site investigation and developed a design with several of the partners; Digicel who provided financial capital and construction management services; the Haitian Ministère des Travaux Publics, Transports et Communications who performed geotechnical testing and design approval. Despite its effectiveness, some criticize PIH for “mission creep” and the potential to erode sustainability.

Yet, for PIH, comprehensive interventions mean an absolute removal of barriers to care.

Participants explained how a “vertical approach,” one that does see the whole person or community is one of the greatest failures of public health interventions around the world. PIH’s executive director described it this way:

If you don’t have a bridge over that bloody piece of water [speaking of the Fonlanfe], the side effects of that are enormous. If it’s meant that we’ve had to use our connections, our clout, our money, our partners in different places, rallying the UN...that’s what we have to do...But I don’t believe it’s a mission creep. I don’t believe it’s the wrong kind of mission creep, I think it’s the right kind. I think we need to find partners to do it...I think to some extent the sustainability piece has been used as a stick. Sustainability is an important goal, no question. But it can’t be used as we can’t yet envision sustainability, therefore we won’t do it...That’s giving up on 9 or 10 million people. I think it’s the patience and the ability to say we can invest this much. Venture capitalists understand this. And the business community in many ways have been more supportive of what we do or more unconditionally support what we do. And far less suspicious because they understand risk, creativity, imagination.

PIH takes into account everything needed to lead a healthy life, from education, water, hygiene practices, giving out microloans, and, of course, access to high quality medical care when people get sick. “It’s the complete package,” noted one physician, “that looks at both the proximal results of disease and the distal causes of disease.”

Their approach depends upon myriad partners across multiple sectors. “What makes success in our minds are partnerships,” recapped one participant, “The founders knew this, that they would need many partners to accomplish the mission.” However, one partner left out of the initial formation of PIH was the public sector. The organization formed during the last years of the Duvalier regime in Haiti, during a time in which government collaboration was difficult, if not deadly, and popular opinion suggested that the public sector ignored the rural poor. Thus, PIH saw their work as separate, if not a proxy to, the public sector. Yet, as their philosophy matured

and the political climate in Haiti changed, PIH realized the importance of governmental partners. Driving this shift was a recognition that without the public sector, sustainability would not be possible. Neoliberal policies succeed in weakening the public sector in many developing countries, a consequence that perpetuates poverty and dependence. PIH came to understand that until the cycle of international dependence was broken, the gap of inequality between core and peripheral countries it was working so hard to breach would remain open. Now, the partnership between PIH and the public sector in all countries where they work is a hallmark of their practice.

4.10.4 Working with the public sector

Especially since the 1980's, neoliberal policies have dominated international development. These policies minimize the role of the state, while maximizing the role of the private business sector. Yet, PIH's clinical director expressed an opinion against these policies echoed by other participants across the organization when she said:

I believe that a strong public sector is the best way to serve the poor. It's why it's such an important part of what we do. We've gone 30 years with neo-liberal policies in which the public sector has been intentionally attacked, everything has been privatized. When privatization exists, it benefits a private few.

Neoliberal policies descend directly from modernization theorists who, in the 1950's and 60's, influenced international development philosophies and policies still in effect today. These strategies aim to assist developing countries adopt modern social, political, and economic systems as they move from being traditional countries to developed ones. World system theorists view neoliberal policies as tools used by core countries to maintain the world system. Structural adjustment policies (SAPs) are tangible examples in which developed countries mandate budget expenditures of developing countries minimizing public sector investment and dictating national

regulations in favor of private sector investment often based internationally. In terms of world system theory, neoliberal policies weaken peripheral governments enabling core country corporations and elite in-country partners to control an international division of labor.

4.10.4.1 Unstable or ineffective government

Such policies, coupled with Haiti's long, violent history of political instability, due in large part to 200 years of international interference after Haiti's earned independence, have crippled Haiti's governance structures. So profound have these influences been, that many Haitians, as voiced by several Haitian participants, have little trust in their government. "We don't have a system here," said one ZL doctor, "Not even a political system." A ZL medical director said of public sector involvement in some of the remote, rural areas, "The only time you see the government is during elections and then they disappear again." Haitian participants understand the roots and associated difficulties of this challenge as expressed a long-time member of the CEX:

Our country is a place of huge problems. Not only the past 20 years, 30 years before that we had a dictatorship, and then this [current] instability. But look at our history, its been hard since independence. So it's hard to work in this environment: protests, fires, riots, road blockages. It's a sacrifice to do this work.

Haiti's problems are hard to deny. Even Boston-based staff expressed the challenges of working there. One participant talked about PIH's goal to one-day "hand over the keys" of its facilities to the Haitian people. When asked what prevents that from happening now, he responded by saying that it is "the fragility of the government, the lack of resources that flow into the government, the lack of the will of the development community." The acknowledgement that constraints exist locally and systemically highlights an important difference in PIH from other aid organizations. Many are unwilling or unaware to place blame on themselves, the "development community." Additionally, citing "a lack of will" relays back to a lack of imagination, a major barrier

espoused by many PIHers. When comparing Haiti to Rwanda (a country that appears to be breaking free of international dependence), a Boston-based leader said,

Haiti's sustainability is going to take longer than things in Rwanda because of the political situation and because of the investment and because of the stability of that country...So, I think it's really important to look at the long view with a country like Haiti...you can't build democracy on a foundation of poverty, and you can't really build anything on a foundation of poverty.

The lack of a tax base perpetuates Haiti's public sector inabilities. The majority of its operating funds are international development bank loans and development agency grants implemented through NGOs. Thus, as the same person above said, "there isn't a direct line between what a community needs and where the funding comes from." Compare this to the United States where citizens can call their representatives to complain about poor services and seek change because the public sector is accountable to its constituents. This person went on to say:

When the government of Haiti is accountable to USAID and not accountable to its communities, if you follow where the money goes, the system of incentives and communication and feedback is broken.

In addition to limited governmental accountability, NGOs acting as public sector proxies further complicates matters. On one hand, NGOs provide basic services when governments cannot. Conversely, NGOs work to decentralize public sector authority, further weakening poor country governments. A Haitian staff member emphasized this notion:

Health care, water, education, and the like should be the responsibility of the government. NGOs should come to support...But we can't depend on the government.

Many PIHers acknowledge this conclusion. However, they also agree with the stated ideal.

Governments should be able to provide basic services to its people, and when they need help and NGOs should play a *supporting* role. Instead of seeing a weak public sector as a barrier to effective care, they saw it as an opportunity to fulfill its mission. Thus, PIH made an organizational commitment to strengthen the public sector.

4.10.4.2 Coordination between nongovernmental organizations and governments

The regional director for Haiti's Ministry of Health (MSPP) who helped form the partnership between the ministry and PIH explained the relationship this way:

They formed a partnership with MSPP based on solidarity, it's a strong partnership. It allows the work to go well. MSPP puts forward what we have and PIH puts forward what they have. This allows us to work together. It's a shared success.

Many participants across the interview cohort cited a critical component of PIH's success is working with MSPP and other governmental ministries in Haiti and other countries as. A Haitian medical director said, "From my perspective of the last 20 years, the NGOs need, if they're afraid of sustainability, they need to work closely with the government, not replace the government." This partnership aims to bolster and reinforce what the public sector in a given country is trying to do. "I think that most NGOs are guilty of just the opposite," said a Boston-based doctor who works closely with MSPP, "Coming in with a preconceived notion of what they think is right, ignoring the government, ignoring the elected officials, and then moving in with their prescription to success."

Ten of the eleven sites where PIH works in Haiti are actually MSPP facilities. "Zanmi Lasante doesn't have ownership," resonated a member of the CEX, "If we leave, MSPP will still have the facilities." ZL manages construction of new hospitals and clinics and restoration of existing ones. ZL's Director of Infrastructure talked about the MSPP approval process for all facilities.

Through this process, he is able to ensure all proposed facilities meet MSPP requirements and expectations, while also helping them change their "very old procedures" at variance with modern health care facilities. PIH supplies public facilities with all necessary equipment from

CD4 count to x-ray machines, stocks in-house pharmacies with a full range of medicines, and bolsters MSPP staff with PIH and sister organization doctors, nurses, and administrators. In Haiti, they supplement MSPP employee salaries so that there is no division between ZL and MSPP workers. In Malawi, the government provides housing to its medical staff, so PIH there built houses for every employee to align with in-country guidelines. While they work to reinforce the public sector and specific policies, PIH preserves its organizational philosophy where it works. “Being flexible and really listening to the system that’s in place,” noted a PIH research coordinator, “but also challenging the system that’s in place, not compromising our values or our mission, but just finding the best way to work” is key.

For PIH, *accompaniment* seems to be “the best way to work.” The organization sees the role of NGOs, development institutions, and charities as supporting, not replacing, the public sector. This concept may not appear on the surface to be a stunning finding. Yet, very few organizations have the determination, patience, and capability to do it. This relates to the notion that ideology influences practice, a major theme emerging from this work. People and organizations with philosophies aligning more closely with modernization as opposed to world systems are more likely to view government as a barrier to their work. Or, as drawn from the survey, simply unfamiliar with neoliberal policies and the role of NGOs as government proxies

Therefore, when asked if every aid organization could do what PIH does, the clinical director answered:

No, but every government can if they are enabled to do it. I think what we’re saying is that even we can’t do what we’re doing without governments. What we are trying to do is build strong systems. The systems should be in the public sector...and I don’t think that any NGO can do it. I think NGOs should not be the strategy, NGOs should be

accompagnateurs, real accompagnateurs, mud between the toes accompagnateurs, not just like sitting in an office and making policy and this and that. Just really get in there and doing it.

Getting in there and doing it is the final principle of practice. PIH is an organization whose mission is “to provide a preferential option for the poor in health care.” They have a unique organizational philosophy that encapsulates modernization and world system theory and have created an organization to eliminate constraints in order to provide high quality care to some of the poorest people in world. Their advocacy and imagination enables their ability to overcome systemic barriers. However, this is only out of necessity. They began as, and ultimately still are, a community-based organization. Through accompagnateurs, community health workers who are often neighbors of their patients, they care for people and communities and stay attuned their needs. Accompagnateurs are the lifeblood of PIH. Everything PIH does comes through them – all of the resources to break poverty’s grip and the information how to best provide a preferential option. At the same time, accompagnateurs have taught the organization about accompaniment, not only one-on-one with a patient, but Boston-to-Haiti accompaniment, Haiti-to-Rwanda accompaniment, and PIH-to-public sector accompaniment. While PIH’s effectiveness depends on all five principles of practice, its community-based approach is where it all comes together.

4.10.5 Community-based

PIH is “an organization that has taken historically tremendous risks but in the taking of those risks it has also set up procedures by which the bottom-up approach starts to inform,” said a former director of development. The founders established this bottom-up approach early on when they first came to Cange and were willing to sit and listen to community members. It has evolved over time such that PIH adapts its approach to better align with local context, be that in

Haiti or Russia. This led to the development of a presence-based approach in lieu of a project-based approach, in which communities participate fully and the work continues after the grant period is over. Its community approach has shaped the organization's structure. Everyone is turned to and facing the community as they respond to its needs. In this way, they not only give voice to the "voiceless poor," but they observe, judge, and act with them. To put it another way they listen when so few others do.

4.10.5.1 A willingness to sit and listen

When talking about PIH's effectiveness in relation to other NGOs she works with, a USAID official said it "comes from longevity and a willingness to sit and negotiate." The founders came to Cange because they wanted to help, but without preconceived notions of how. As the training coordinator in Haiti said, "Paul Farmer didn't come here with something in his head. He watched and saw reality with Father Lafontant." He goes on to compare this approach with experiences he has witnessed in his city:

Some come from the US and say "I want to do a water project." They set-up an office in Hinche, hire some local people. But they don't sit with the mayor and his civil engineer.

Being in and with communities is still an important aspect of PIH's work today. In Haiti, a divide exists between Port-au-Prince and the rest of the country. Being in Haiti is not enough for members of PIH. "In Port-au-Prince, people talk about social justice in [medical] school," noted a Haitian staff member, "But they don't live with people dealing with daily difficulties, they don't understand the challenges poor people face." Program managers talked about the significance of their Boston colleagues understanding community needs and the value of sitting with and listening to people directly:

You have to hear the people, be with them to understand their needs. You could be in Boston and email me. OK, I'll tell you what's happening. But you need to see it, witness it, be there with them to understand their needs. From their you have the motivation. You'll ask, "How can people live like this?" You decide to do something positive.

Development experts often talk about the value of engaging with communities. However, especially at higher-level development institutions, decision makers base decisions not so much on community needs, but on economics. One Boston-based participant explained typical public health planning based on national Gross Domestic Product (GDP):

[For example,] Haiti has GDP of this and Lesotho has a GDP of that and this is what we can do... "I am an expert, I am a Harvard faculty person, this is what you should be doing," instead of saying "What do you need and how do we bring it to you."

Often, organizations develop their model and attempt scale-up and dissemination by forcing communities to adapt to their approach. When these attempts fail, their tendency is to blame the community for a lack of participation and move on to the next one. A leading international charity provides a striking example of this.

Rotary International has taken on the charge of providing potable water to poor communities. Their intentions are good and reflect protectionist policies to prevent past frustrations. Yet, their "4-way test" requires that communities follow a specific set of guidelines before North American clubs commit to projects. Furthermore, they are explicit about being accountable to "funding agencies" and "potential major partners," not to communities. This differs from PIH's approach as ZL's Director of Women's Health explained:

What we do in the field, we listen. You have to hear the community. What did they mean when they said a certain thing? And put yourself in the situation of this community. We don't have a big office in Port-au-Prince. We're based in the middle of the rural area to see it, to feel it, to be part of it, to challenge the issues.

Unlike most aid agencies who maintain home offices in capital cities and perform periodic “drive bys” in rural areas, PIH’s bases itself in remote, rural regions. Thus, they are constantly listening to their patients and continually adapting their approach to better align with local context.

4.10.5.2 Local context

PIH has been working with Zanmi Lasante in Haiti for more than 25 years. During this time, they have molded a system that works well there. Yet, in the last ten year, the organization has undergone several major expansions. Its largest was a move into Rwanda, the epicenter of the African HIV epidemic. after being asked to partner with the Rwandan government. PIH asked the ZL team to play an integral role in transporting the PIH approach to Africa. As the Director of Procurement said about the Haitian team,

They are the ones who’ve done the work, they know the challenges, they have the experience, and I just think it’s fantastic to be able to have someone like [Dr. F] go to Rwanda. They speak the same language, they have the same backgrounds. To be able to do that training directly with his Rwandan colleagues...that kind of training and cross-site collaboration has been really, really key for us.

However, PIH recognized the importance of recognizing context, engaging with communities without presuming to know what the answers are for a different location. Instead of talking down to their new Rwandan colleagues, the ZL team respected their “local wisdom.” A former employee who helped facilitate the move to Rwanda explained PIH’s approach:

While we understand the similarities present in those poor settings - that Haiti has something to offer Rwanda, that Rwanda has something to offer Haiti – we refuse to create strict models. I think what we look at is to really see through solidarity. So that the model is not this very strict approach, it’s simply saying ‘Look, there’s much we can learn from one another but we also have elements that have to be shifted.’ So there’s a nimbleness or flexibility and the ability to move very, very quickly to do whatever it takes to make a situation well.

PIH understands that there are ways of doing things in different countries and communities based on their geography and cultural paradigms that work for there. They see no reason not to change if its not exactly their model.

One such example is accompagnateurs in Haiti compared with those in Rwanda. In Haiti, accompaniment is patient-based and ZL assigns four to five patients to each accompagnateur. Rwanda had an existing community-based system in place where communities select a woman and a man to act as their community health agents. This system culturally works for Rwandans, so PIH saw no reason not to adapt their model to fit the local context. A member of the executive team in Boston talked about his preference for being an organization that does not allow itself to fit a rigid model, “We’re going to look at the situation as we find it and try to solve problems.”

“I think that sort of humility and being aware of the cultural contexts and being willing to adapt [is key], expressed a Boston-based person, “If the outcome is the same, then maybe the methodology doesn’t need to be quite so hard and fast.” Recall the concept of appropriate technology in which solutions consider social, political, and economic aspects of a community. At first glance, PIH’s respect for local context appears to align more closely with appropriate technology versus a more systemic approach.

In many respects, PIH does incorporate practices influenced by appropriate technology philosophies. It will bend and adapt its approaches to fit local conditions. The subtle, yet significant difference is PIH’s insistence on positive outcomes. Appropriate technology is primarily concerned about fitting solutions to constraints, in this way solutions are appropriate

for local context. Solutions are acceptable even if they do not yield results that solve a problem completely. The excuse is that a particular solution fits a particular context and is the best possible solution given the barriers and constraints. Thus, by contrast, PIH aims for *effective* solutions. They will bend and adapt their model enough to work within a specific context, but they will do everything in their power to overcome barriers to effectiveness.

Maintaining a local presence is a major element to PIH community-based principle and its overall approach. As a Zanmi Lasante staff member explained, “PIH is from Boston. ZL is its sister organization here. It’s local. We can advocate with the government, when World Vision can’t. They can just leave anytime. We can’t just leave Haiti.” Not only do in-country sister organizations automatically create a permanent local presence, but PIH works through a presence-based approach. Many aid organizations seek short-term contracts from bi- and multi-lateral development organizations. When these projects are complete, regardless of community needs, these organizations move on to the next community or country in search of new project grants.

4.10.5.3 Local presence

A Haitian staff member talked about his experiences working with another NGO before joining ZL. The group was awarded a ten-year contract to reduce maternal mortality. At the end of the grant period, the success rate improved to 80%, but funding ended and the organization left. It took with them institutional and local knowledge, equipment, and staff and closed facilities. This participant used a Haitian cultural analogy to explain this practice:

In Haiti, it happens a lot when parents die, or they are too poor to care for their children. So they send them to live with a relative, an aunt or uncle. The uncle can say, “Go away,

I can not longer afford you.” But he can’t do that with his own son or daughter. The local Zanmi Lasante organization is like that. An international organization could just leave.

Many see PIH as an American organization. However, its sister organizations employ nearly 11,000 community members, whereas approximately 100 people work for PIH-Boston. This is an expression of solidarity in which PIH is “equipping core of individuals to change” their communities. These people are poor, rural people, just like PIH’s patients and act as the eyes and ears of the organization. “I think that it’s just a different philosophy,” says a former doctor in Haiti who now sits on the leadership team in Boston, “because we can say look you expert in public health and you engineer, you might say that but I’m listening to my people, my friends, my colleagues.” PIH even requires their professional staff to live in the communities where they work. As a Boston-based functional manager reinforced, “What this means is that we are closely attuned to what the needs of the community are and are able to respond in a real way, in real time. One participant provided an example of how a local presence informs PIH’s practice.

People frequently contact PIH to learn more about their work and many want to give a donation. However, they are often concerned about knowing that it will go to something that is working or effective. When fielding such calls, she tells a story about ZL’s water interventions. They complete three or four water projects in outlying communities each year. Water projects are notorious for breaking down and remaining unrepaired. When asked how PIH knows when this happens and how they could ensure a person’s donation does not go wasted, she replies, “Well, since we’re working daily in these communities, we’re going to know if it’s broken, and we’re going to be able to fix it if it needs to be fixed.”

Additionally, working daily in these communities, PIH knows where the bad water sources are. They begin to recognize patterns in areas where there are diarrhea diseases. Such recognition enables them to prioritize their interventions. “So they’re targeted interventions based on an ongoing presence and solidarity with the community,” concluded the manager. An additional benefit to having a local presence is an ability to overcome one of the more challenging barriers working in poor countries, that of corruption.

A long-term, local presence leads to strong personal relationships and name recognition. PIH’s director of procurement stated that corruption in Haiti, which Transparency International claims is the 4th most corrupt country in the world, has not been an issue:

...because we have the benefit of long-term staff who have really good relationships with the ministers, with people at the airport, with customs folks...People know who we are and what we are doing, and the goods we’re importing. We aren’t selling them, we aren’t profiting from them, they are helping an enormous portion of the population.

She credited the ZL staff for this, but one person in particular, ZL’s director of operations. She spends her life traveling between the different sites everyday and “ropes people in to feel like even if they are a baggage handler at the Port-au-Prince airport, they are somehow part of Zanmi Lasante, and they can take pride in that work.”

PIH’s community-based approach epitomizes its core. It illustrates its philosophy in action, defines its organizational structure, and informs the other principles of practice. As one participant summarized, “We are influencing policies in many circles, but I think that the long standing commitments are what really, truly [make the difference].”

4.11 Additional validation of findings

I relied on multiple sources of data in order to understand PIH's approach, with interviews providing the main source of data. I created codes and allowed themes to emerge independently that ultimately became what I termed PIH's principles of practice. I then compared them to PIH's five fundamental principles as additional validation of the results.

PIH's fundamental principles include:

1. Access to primary health care
2. Free health care and education for the poor
3. Community partnerships
4. Addressing basic social and economic needs
5. Serving the poor through the public sector

The principles of practice align with each of these fundamental principles. 'Root-cause analysis' includes removal of user fees relating to *free health care and education for the poor* as "the imposition of user fees has resulted in empty clinics and schools, especially in settings where the burden of poverty and disease are greatest." 'High quality health care' is associated with *access to primary health care* as it "integrates infectious disease interventions within a wide range of basic health and social services." 'Comprehensive interventions through partnerships' touches on *community partnerships* and *addressing basic social and economic needs* as "PIH works to improve access to food, shelter, clean water, sanitation, education, and economic opportunities." 'Working with the public sector' associates directly with *-serving the poor through the public sector* as "PIH works to strengthen and complement existing public health infrastructure. Lastly, 'community-based' illustrates part of *community partnerships* as "community health

workers...are a vital interface between the clinic and the community. These similarities provide additional validation of the findings.

4.12 Synopsis

We know through long-term data and its role in influencing public health policies that PIH is effective. However, this research reveals why, how, and what PIH does in order to achieve positive outcomes. They have a unique organizational philosophy that defines the problem of poverty as rooted in the world system with symptoms presenting at local levels. Thus, prescriptions are both short and long term. Local treatments attend to acute and immediate needs. Yet, without systemic treatments, chronic symptoms remain.

PIH's philosophy helped to shape a still evolving organizational structure that enable the organization to address local and systemic barriers. It takes its cues from its patients and acts as a logistical resource chain to bridge the inequality gap. Its philosophy and structure play out in a set of principles that guide PIH's day-to-day practices. From using root-cause analysis to identify constraints to relying on accompaniment to strengthen the public sector, PIH is able to bring the benefits of modern medicine to those most in need and works to break the cycle of poverty that perpetuates disease.

A PIHer summarized these findings well when she said:

I think there are many other NGOs that provide healthcare, some better than others, and some very good, but I don't think anyone does what we do in the same way we do it for the reasons we do it. I think that our mission statement and our motivation and intention is what is really appealing to me. That it is a sort of moral driver. That it's okay and acceptable to talk about things like morality and justice and preferential option and pragmatic solidarity and liberation theology...It's not just about healthcare delivery or

drug delivery or logistics or research. It's all kind of tied up in this shared ethos and sense of service.

4.13 Summary of Results

This, and the two previous chapters, sought to answer the first three research questions. The first question asked, How effective are water and sanitation practices in developing countries, and how do contextual barriers influence sector effectiveness? Analysis of World Health Organization data and literature review helped define a gap in effectiveness between water and sanitation services delivered in developing countries and those delivered in developed countries. Social theories of international development supported the identification of potential barriers to effectiveness, while also offering two complimentary perspectives on poverty and international development. Question 2 was, How does the water and sanitation sector define context, and how does this perspective influence their practice? Quantified results from a survey demonstrated that professionals within the water and sanitation sector tend to follow a modernist approach in the delivery of service in contexts of poverty. Their focus is on localized constraints, while failing to consider the influence of systemic barriers as root-causes to local problems. By providing a theoretical understanding of these findings, the third question sought to demonstrate how PIH delivers effective care in the very places most hindering water and sanitation sector performance. By asking, How do organizations in other, related sectors deliver effective services in resource-limited settings?, this research identified *why* PIH does what it does, *how* they do it, and *what* pragmatic steps they take to implement their vision. Data from a case study illustrated the significance of a philosophy that views poverty as a consequence of a world system. This view, coupled with a comprehension that structural forces reveal themselves at the local level, allows PIH to break the cycle of poverty by attending to local and systemic barriers. PIH has developed an informal organizational structure, supported by institutional partners, that enables them to span geographic and theoretical boundaries through a global network. Case study findings also discovered a set of critical success factors informed by PIH's philosophy and structure.

The final question asked, How could the water and sanitation sector deliver services that are more effective in resource-limited settings? The last chapter considers findings from the first three questions to answer this. The first element of what will be an evolving answer provides a

discussion on praxis. Having a theoretical understanding of differential access and disease is essential to understanding the problem. A redefined view of the problem allows redefined solutions. Technology alone cannot provide solutions to social problems. Solutions need not focus on what technology will work in a given context, but should consider social, political, and economic conditions necessary to support technology. If a community lacks the ability to address one or more of these conditions, then the service provider has an obligation to support them, in solidarity, as opposed to charity. The answer also demonstrates how organizations in the water and sanitation sector can adopt a flexible organizational structure that facilitates an ability to identify and overcome local and systemic barriers. The chapter concludes with a set of pragmatic recommendations built upon current water and sanitation practices, as well as lessons from PIH, and ideas for future research and dissemination of these findings.

Chapter 5 – DISCUSSION AND CONCLUSION

5.0 Overview

The estimated annual cost of achieving the Millennium Development Goals for water and sanitation are US\$11.3b. Providing universal access would cost US\$22.6b annually, while universal access to regulated, piped water supply and sewer connections would cost US\$136b each year. Total estimated economic benefits per annum for meeting MDG7c and universal access are US\$219b and US\$400b respectively (Hutton 2007). This is not an overwhelming amount of money if one considers that total US Congressional appropriations alone for the current war in Iraq have been \$653.3b (FY 2003-2009 bridge) (O'Hanlon 2010) and that the benefits far exceed cost. One can reasonably assume that the rate of return would not only improve health and well-being across the world, but also enable countries to develop their economies such that they would no longer require outside investment. However, if all countries obtained universal water and sanitation access, no insurance exists to guarantee the projected return on investment. The World Bank stated recently, “Even those who have access to improved water supply infrastructure do not necessarily get adequate services” (WSP 2009). Using available data presented in Chapter 2, we can predict a “below expectation” return on any water or sanitation investment. It is no surprise that, when surveyed, professionals representing the sector agreed that a lack of money is *not* the greatest barrier to implementing their projects.

The previous three chapters used mixed methods and data from multiple sources (secondary data from the UN and WHO and results from a web-based survey of water and sanitation professionals) to answer the first two research questions related to the effectiveness of water and

sanitation services in developing countries. The reasons for lower-than-expected performance are complex and varied. They include social, political, economic, and technical constraints particularly stark in resource-limited settings, as well as the sheer scale of the problem. Answers to the third research question show how Partners In Health has been able to deliver effective services in large part because their approach addresses and overcomes both local and systemic forces. This chapter aims to answer Question 4 (How can the water and sanitation sector deliver services that are more effective in resource-limited settings?) building upon comprehensive findings of this study.

Synthesizing and reflecting upon results enabled the development of a foundation that begins to address this final question and stimulated ideas of future research. By no means is the answer offered here complete. This pursuit deserves more attention than the dissertation of a fledgling researcher and will require multiple contributions from people across (and well beyond) the sector. Ultimately, improving upon the return on investment will require long-term, tactical actions. However, the shape and direction of those tactics depends upon a theoretical understanding of the problem. Comprehending praxis, theory informed practice, is essential for implementing effective services regardless of setting, but especially for resource-limited communities. Using this relationship, the answers begin taking shape in the subsequent sections as supported by theory, findings from the research, and experiences. Results center around three main themes: 1) the influence of philosophy on practice; 2) organizational structure for high performance of non-profit organizations in resource-limited settings; and 3) principles of practice for implementing effective services. The cornerstone to these results is relating theory and

practice to demonstrate how organizations can be more effective when they consider local *and* global constraints.

5.1 Discussion

The notion of praxis lies at the heart of answering how the water and sanitation sector can deliver services that are more effective in resource-limited settings than are those supported by current paradigms. Praxis is the act (or art) of linking theory and practice (what should be done with what is done). As this study postulated, a limited theoretical understanding of practices and policies plays a significant role in the persistence of water-related diseases and deaths among certain populations in the modern age. This study used modernization and world system theories to enable the examination of local and global forces attributing to disparate levels of service and effectiveness of water and sanitation programs in developing countries.

Results from the survey and those inferred from reports of leading international institutions indicate that the sector has minimal understanding of systemic forces in the role of water-related diseases perpetuated in settings of poverty. Instead, the sector tends to perceive the problem merely as technical in nature. This by no means ignores the fact that solutions consider social, political, and economic forces. They do. However, these forces are thought of as ‘local context’ and not stemming from externalities. As such, the sector considers these forces as constraints in which solutions must work within, as opposed to barriers the sector must overcome.

I base this assertion on the fact that more than 20% of respondents did not know what systemic forces are and those who indicated that they did rated them as the lowest barriers to effective services. Admittedly, there is room for debate on this issue. If, for example, people do not

encounter global forces in their work, then they might believe that those forces do not exist or influence their work. Yet, the dearth of discussion in water and sanitation literature related to systemic barriers further reinforces my interpretation of the survey results.

Historians and social scientists identify complex forces and explain how and why they influence various phenomena and cultures. They develop sociological theories as tools to help explain and predict outcomes of actions. An understanding of these theories can inform and improve the effectiveness of practitioners. Yet, rarely do practitioners have time for such analysis. Often, policies stem from scholarly literature and institutional reports that then inform practice. However, these writings seldom include theoretical reflection, certainly not on any theory other than modernization. This work relies upon modernization and world system theories to understand complexities of international development. While both are established theories, they each have limitations. Social scientists lost interest in modernization decades ago because while it explains well how current world powers progressed, it does little to explain contemporary poverty in developing countries. Yet, it still remains the theory of choice among developmental policy makers and professionals (Ebrahim 2001). World system provides an alternative perspective on development (or at least explains why certain countries are not progressing), but fails to account for real barriers facing practitioners on the ground. Additionally, theorists critique both theories for ignoring the power and possibility of individual and community agency to change structural forces. Yet, these two theories, when combined, offer numerous internal and external variables explaining social, political, and economic forces that continue to shape development and propagate modern poverty.

The failure to account for the full range of forces that perpetuate poverty and associated water-related epidemics stunts the profession's ability to prevent diseases in resource-poor settings. Fixing policies and practices on local context limits the effectiveness of solutions. This by no means dethrones the significance of the local – that of culture (the intertwined combination of certain social, political, and economic institutions within a specific setting). Context *does* matter. However, social problems such as poverty are not only results of culture. Structures and power play a significant role in causality (Kershaw 2003). Our world is one in which these three forces play out dynamically in all areas of life. Any solution cannot divorce culture from structure and power, just as solutions cannot leave structural forces out of consideration – the local and the global are intrinsically connected.

Any analysis failing to account for all three facets (culture, structure, and power) does not see the complete picture of the social, political, and economic forces that shape current social relations (Katz 2010). Poverty is an unnatural disaster (a consequence of a global economic structure), as are extent patterns of differential access to water resources and persistence of diseases found in the modern world. Solutions to social problems such as poverty must consider culture, structure, and power. Members of PIH spoke explicitly to this notion of poverty and created an appropriate approach. World system theory helps identify structural forces and powers, while modernization aids an understanding of culture. In concert, they provide a lens to understand the problem of poverty.

Through a modernization lens, people are poor because they are traditional. Solutions using this logic seek to improve and adopt modern social, political, and economic systems and technology.

Once in place, a country will overcome poverty as it becomes ‘developed.’ The ‘blame game’ is a consequence of this logic. Ultimately, the sector blames the local (the country, the community, the individual) when progress lags. The World Bank’s Water and Sanitation Program, for example, recently published findings on barriers to service delivery for the urban poor. In *Guidance Notes on Services for the Urban Poor: A Practical Guide for Improving Water Supply and Sanitation Services*, all barriers and solutions were rooted locally and appropriate for the poor with no mention of structural forces and recommendations to change international political or economic policies (WSP 2009). Policy makers and practitioners view poverty in a vacuum whose bounds are strictly national (that is, they view it as a problem of culture). Admittedly, the notion of playing the victim can be just as toxic. Blaming the system and taking all accountability away from individuals and governments fails to recognize that any solution must consider the local *and* global.

If the motivation is to change extant patterns of differential access and disease, then only a full understanding of the problem enables that change. The United States must reexamine its policies with Haiti, for example, to understand why Haiti is in the position it is in. We are partially at fault (i.e. U.S. policies attributing to food insecurity in Haiti as discussed in Chapter 4). Local diseases in settings of poverty will persist as long as current external forces remain unchallenged, regardless of how well crafted solutions are to fit local culture, criteria, and constraints. Only those solutions that overcome local barriers, while also advocating for global change will equate to sustainable partnerships and effective outcomes. This is what Partners In Health has learned and organized to do well and explains significantly their success. The goal of this research is to

show that PIH's approach is generalizable to other sectors demonstrating how others can adopt their philosophy, organizational structure, and principles of practice.

After 60 years of experience, one important lesson for sustainable public infrastructure is that design, construction, operations, and maintenance of technical systems requires certain social, political, and economic conditions. Indeed, the more complex these systems become, the more complex supporting conditions must be (Winner 1980). The practice of 'appropriate technology' derived from this important lesson. In the face of tough, localized barriers, engineers working in resource-limited settings began developing solutions that local populations might sustain in the absence of certain supporting conditions. With its focus on proximal forces, the philosophical basis for this logic resides in modernist thought and theory. Appropriate technology is not bad. However, at times its products fail to meet the needs of users. The UN Millennium Development Goals' definition of access relies heavily upon appropriate solutions (refer to Tables 2.2, 2.3, and 2.4). From what little health-based evidence is available, one may conclude that 'appropriate solutions' do not adequately ensure a pronounced or sufficient reduction of risks associated with water-related diseases. In light of this gap in effectiveness, an examination is needed of the decision making process, and the theories and philosophies underpinning them. The following section demonstrates positive and negative aspects of modernist-based praxis and attempts to explain how a holistic view of poverty can improve services delivered in a context of confined conditions.

5.2 Redefining the Problem

The idea that water and sanitation practices in developing countries require solutions that differ from those in developed countries is pervasive throughout the sector. Recall from the survey how respondents believed strongly that:

It is better to design a more contextually appropriate wat/san system that a community can operate and maintain on its own versus a system whose functionality is dependent upon inputs from outside groups or NGOs, even if the independent system is less effective than the dependent one.

The end-goal for assistance is for the beneficiary to reach a point where they no longer require help from the benefactor. That is, we want communities to support themselves. Agreement with this statement hinges on the notion of ‘self-sufficiency.’ This way of ‘pull-yourself-up-by-your-bootstraps’ thinking originates in modernist philosophy and relates back to Truman’s Inaugural Address highlighted in Chapter 2 (one could argue that it is part of the U.S.’s culture of the individual, but not appropriate for more communal cultures). Some of the greatest barriers to service provision are ability to pay and to operate and maintain infrastructure. Solutions must incorporate provisions to overcome these cultural barriers. However, by overemphasizing culture, the sector has found itself in an ideological position that places a greater emphasis on what is appropriate in lieu of what is effective. Thus, many current solutions tend to work within constraints of culture even if that equates to inferior solutions. Regardless of intent, this devolves to an ‘at least it is better than nothing’ mentality that does not adequately address the effectiveness gap.

A redefinition of the problem is paramount to challenging the current path of engineering practices and policies associated with international development. An understanding of social theory informs this paradigm shift towards closing the glaring gap of inequality and relative

ineffectiveness within the water and sanitation sector. It begins with shifting the focus away from barriers and constraint driven practices, to solutions that incorporate creative social, political, economic, and technical components they necessitate. If, for example, a community's ability to pay is a barrier to effective service, then instead of recommending solutions they can afford, the sector could include financial subsidies. Surprisingly, the World Bank recently started recommending subsidies in lieu of full-cost recovery, a policy that goes against trends dominating the industry (World Bank 2010). Examining the engineering design process provides an understanding about how these solutions come about. As this examination illustrates, how we solve a problem has as much to do with how we define a problem.

5.2.1 Reexamining engineering design processes

Engineers across disciplines go through some type of decision making process to develop engineered solutions to problems. Figure 5.1 on the following page illustrates an iterative process taught to first year engineering students across the United States and one generally used throughout practice. Problem solvers use this iterative process to identify the need, define the problem, complete necessary research and data collection, categorize criteria, and classify constraints before developing alternative solutions. Ultimately, engineers develop a final design that meets the stated needs, align with local criteria and within project constraints.

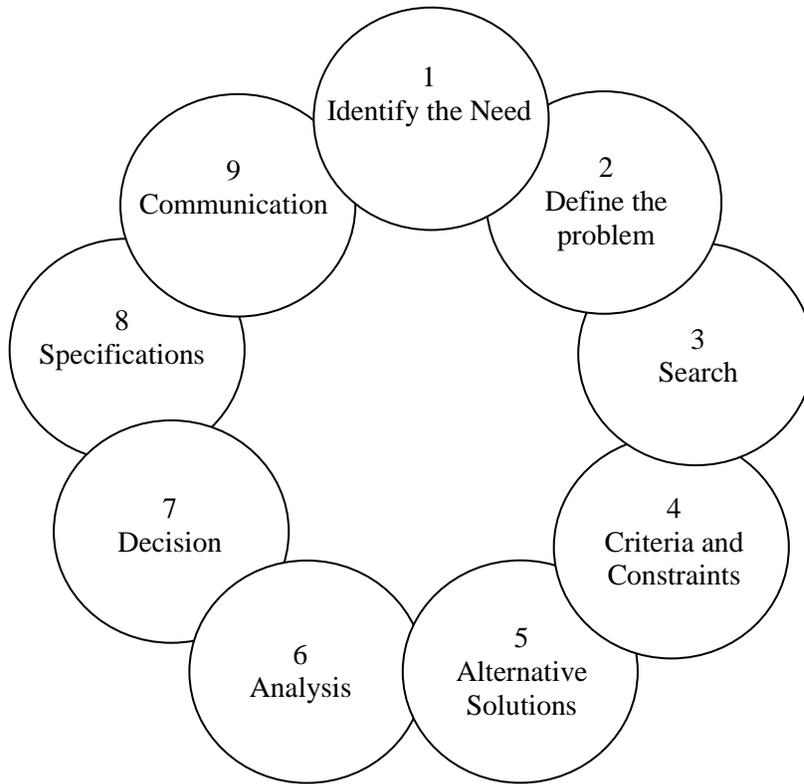


Figure 5.1 Engineering design process (Eide 1993)

Barriers to water and sanitation services in any context, be they in a developed or developing country, include social, political, economic, and technical constraints, even if these constraints differ in magnitude and type across context. However, experience, literature, and survey results reveal a distinct difference in how many engineers employ the decision making process in developed countries compared to developing countries. Figure 5.2 on the following page illustrates this difference.

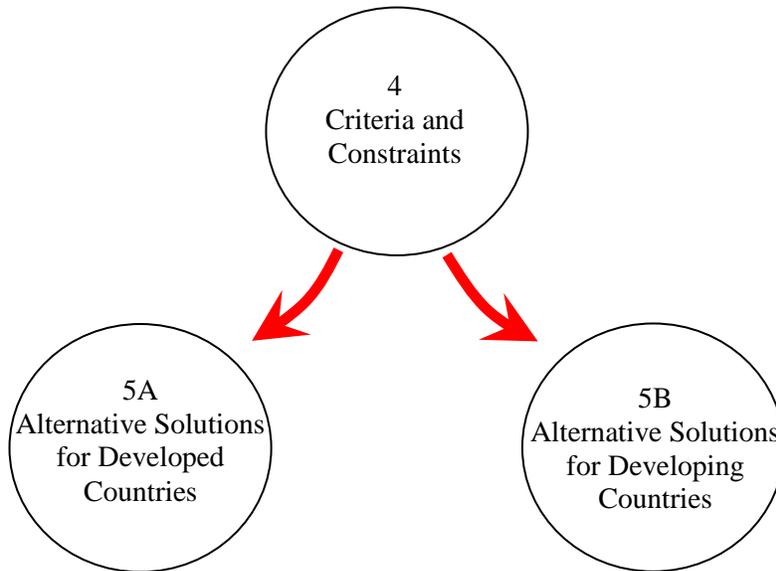


Figure 5.2 Conceptual difference in possible solutions between developed and developing countries

This figure illustrates how, in general, a lack of social, political, economic, and technical support systems in developing countries has led to differences in what services those countries can realistically consider. In other words, the solution sets that work in rich countries are not suitable for poor countries. For the most part, meeting the need drives the process in developed countries. Designs there most certainly address constraints for they have a significant influence on which solutions the design team recommends. However, constraints tend not to dominate the development of alternative solutions, whereas constraints in developing countries are often high in intensity and/or number and tend to limit significantly possible alternatives to solve problems. Appropriate technology is the dominant term explaining this phenomenon. It describes simple technologies that are more appropriate in resource-limited settings in lieu of more complex, resource-dependent alternatives. ‘Appropriate’ solutions require fewer resources, rely on labor-intensive means and methods, and are easier to operate and maintain than capital intensive, resource-dependent solutions. However, in practice, appropriate solutions more often than not

equate to substandard options and outcomes. Context and culture matter, but not at the expense of effectiveness.

To be clear, solutions in resource-limited settings do not have to mimic those in rich countries. Practices in rich communities relying on potable water to flush toilets, fight fires, irrigate lawns, and fill swimming pools have no place in any community or country pursuing sustainable resource management. The developing world offers the developed world an opportunity to disseminate certain lessons learned and promote sustainable water-use practices. Clearly, the problem is not technical. Many rural communities receive highly effective services from the very technologies recommended by the United Nations. The key is to understand that technology is only as good as its supporting cast of social, political, and economic conditions.

Current policies and practices are at an impasse. Either the sector continues designing and building systems appropriate for social, political, and economic cultures of poverty with limited effectiveness or stop international assistance until conditions have progressed to the point where they are able to support effective solutions. PIH offers a way through this stalemate. It begins by redefining the problem of service delivery in resource-limited settings. The problem is poverty. As explained previously, solutions to social problems such as poverty must consider cultural, structural, and power-related dynamics. Again, the local and global are intrinsically connected. Water and sanitation professionals must let go of perceptions of poverty that suggest it is only a local problem. Admitting that poverty in the modern age derives from a world system is the first step to enable effective solutions that span cultural and structural forces. Power is not yet part of the equation.

One might believe that only the powerful who command structures have the influence to change them. Modernization and world system theories would support this view. However, the power to change is not only in the hands of the so-called powerful. Individuals, communities, and governments have power to influence change. Furthermore, if we believe in the adage that knowledge is power, then people who understand culture and structure, also have power. With that power, comes an obligation. Engineers working in developing countries often exceed their obligation to serve others and improve their local conditions. However, by understanding that local conditions are rooted in structural forces, engineers, and the sector at large, have an even greater obligation to address global barriers to effective services in order to prevent diseases. Technical solutions exist that would make water-related diseases the exception in developing countries as they are in developed countries. The proprietors of that information hold an obligation to see that these solutions are implemented regardless of setting and status. This is not to suggest naively that engineers can overturn structural adjustment policies or unfair labor agreements. However, they can make others aware when conditions prevent effective solutions and advocate for the support of practice and policies that enable effectiveness.

It is interesting too note that during the pilot survey, I tested only for the opinions of engineers. Many respondents suggested that they were not obligated and/or capable of overcoming many of the barriers the survey tested. They said that others, however, were – economists, sociologists, and the like. The final survey reflected this perspective and instead asked opinions related to the sector at large. By understanding the division of labor within engineering alone, this comes at no surprise. Searching on any corporate job search engine one will find very distinct levels of responsibility. While such divisions aid in production and efficiency, they can also lead to a lack

of obligation to fix a problem outside a person's direct sphere of assumed influence. No such distinction was observed among members of Partners In Health. Their flat organizational structure, mixed with a culture that imbues the notion of "if-you-see-it, you-fix-it" relies upon people who feel highly obligated to confront barriers regardless of position or title. As the following section illustrates, their structure not only facilitates a sense of major responsibility at the lowest levels, but also an ability to identify and overcome local and global constraints. Other sectors could adapt their organizational model that enables effective service delivery in resource-poor settings.

5.3 Organizational Structure Enabling Effective Service Delivery

Based on the findings of this research, effective organizations deliver services meeting user needs because their philosophy informs an approach that considers local and systemic barriers.

Recall what a member of PIH said about their holistic approach to address issues of poverty,

In order to address those issues you need to be able to tackle it at several different levels. So, you need to be able to tackle it at the local level to determine what the factors are that are causing this, so you can break that cycle. It would be at a local level and then at a national level and then an international level, then a policy level.

Their organizational structure enables this ability to tackle issues at different levels and span boundaries. Partners In Health has no formal organizational structure. In fact, structure is one of those concepts members frown upon because the founders believed that fixed roles and bureaucracy become, as one participant noted, "excuses for inaction." However, like all groups, they do organize. Despite a formal organizational chart, PIH exhibits a unique organization structure that mirrors and facilitates their approach. Based on case study research, I developed a series of illustrations that explain several ways of understanding their structure (refer to Figures

4.3, 4.4, and 4.5). Figure 4.5 best represents how their structure fosters a network that conveys information and resources across geographic and theoretical lines. Figure 5.3 is a modified version of this illustration depicting how a water and sanitation organization might structure itself to enable effective delivery of services in resource-limited settings.

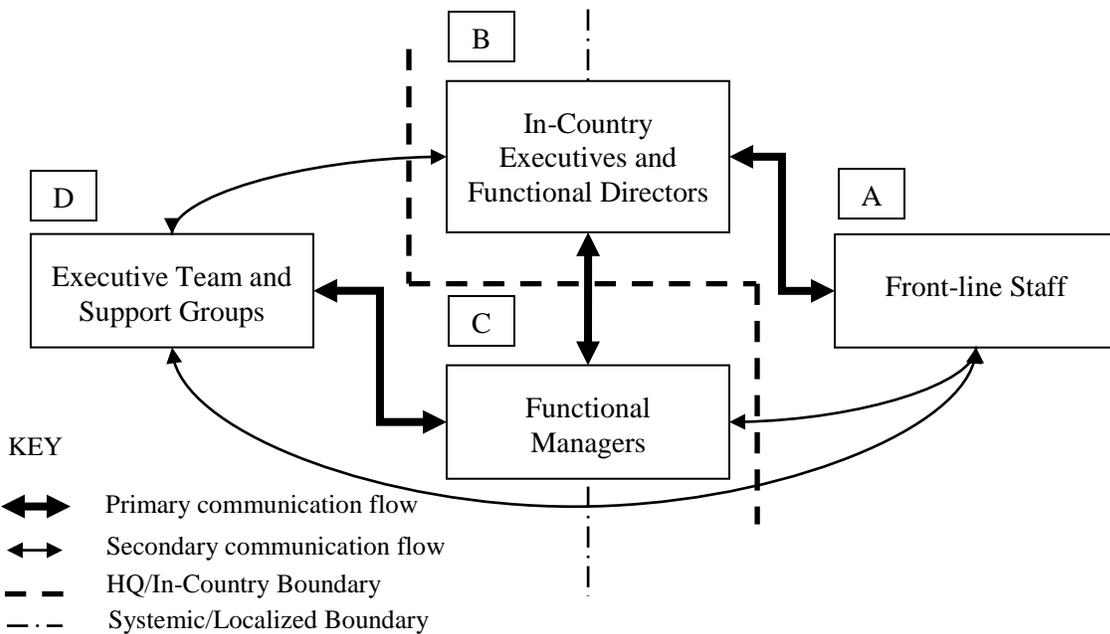


Figure 5.3 Organizational structure that enable effective services by spanning boundaries

The key is a structure that enables the organization to address local and systemic barriers. Note front-line staff (Box A) located in communities are at the fore of addressing localized barriers and implementing the work by partnering with community leaders and other partners. The vast majority of organizational members reside here. All other groups and people support the front line efforts – the organization focuses on the user to ensure effective interventions. They provide constant feedback to the other groups. If they are unable to obtain resources, they can seek assistance primarily from people working within Box B, but also any other group who can assist.

Box B contains indigenous, in-country leaders, as well as functional managers (who could either be indigenous or expatriate) with primary expertise and responsibility in certain core areas critical to the success of the organization. These people live and work in the country where the organization operates. They move between direct field interventions as well as coordinating national and regional efforts working with national, regional, and ministerial government leaders and leaders of other NGOs, communities and the private sector. They also provide a *vital* link across national and theoretical boundaries. They work seamlessly with personnel in Box C. If they are unable to obtain resources necessary to implement the work, they reach back to “touchstones”. Touchstones are core competency experts as well as being managers based in the home office situated in a core or developing country. In this way, the connection between people in Box B and C bridge the gap between geography linking the network of information and resources, as well coordinating efforts to engage energy required to fight systemic forces. People in Box C are typically indigenous to resource-rich countries. While all people working in a country should speak the language of that country, as well as understand the cultures of its people, it is paramount that those situated in Boxes B and C are capable to moving between cultures, languages, and scales of problems. This last point means that they the organization may require them to assist with a minute technical project detail with users one moment and then with a complex logistical issue involving trans-nationals. Additionally, the organization may work in more than one country. Box C personnel will have similar responsibilities to other Box B personnel in those countries as well. One of their roles would be the dissemination of lessons learned to other geographic settings to prevent similar mistakes across the organization. Thus, they must have unique personal characteristics that allow them to quickly move from one context

and scale to others. They also provide the primary link to executive leadership and support groups within Box D as the final link between geography and the local and global.

Box D contains an executive team located in a home office situated in a core or developed country. Various administrative staff also resides there. The executive leaders have been with the organization over a sustained period likely having experiences working across the organization with a profound understanding of local and systemic challenges and channels. The support staff provides resources throughout the organization and advocates formally to change systemic barriers barring effective delivery of service at local levels.

Organizations structured this way may reside at various levels of development until they reach this proposed arrangement. Regardless of where they stand, the organization might enlist highly competent people to play informal roles. These organizational rovers may move across boundaries, perhaps living in-country where interventions occur with responsibilities to the local level, as well as spending a great deal of time in the home office managing systemic challenges. A critical point is that this structure remains flat and fluid in order to foster rapid information and resource flow. Thus, having a primary responsibility in one Box does not restrict a person from stretching one or two steps across boundaries to interact directly with someone in another group.

Imitating PIH's structure, the pinnacle of such an organizational framework relies upon institutional partners that include public, private, and scholarly entities. Together, these partners form a relationship between service, training, advocacy, and research (STAR). A wat/san STAR model would include a stand-alone, independent service organization (NGO) as the primary

effecter arm of the total effort with a primary focus on providing services to communities through public and private partnerships. They would play a key role in training local people such things as personal hygiene practices as well as their front line staff. A university would provide primary responsibility for research to understand root causes of disease and disseminate lessons learned. Their secondary duty would be to educate students who may enter this type of work. They would coordinate and work closely with local and systemic efforts depending on what type of research the organization required. They would support advocacy efforts, booth within the service organization as well as to broader sectors of society such as book publications and conference proceedings engaging with other organizations across the sector. A private industry partner would primarily provide resources to all other groups, but also support technical and logistical field efforts. Figure 5.4 illustrates how a water and sanitation effort would adopt PIH's STAR model.

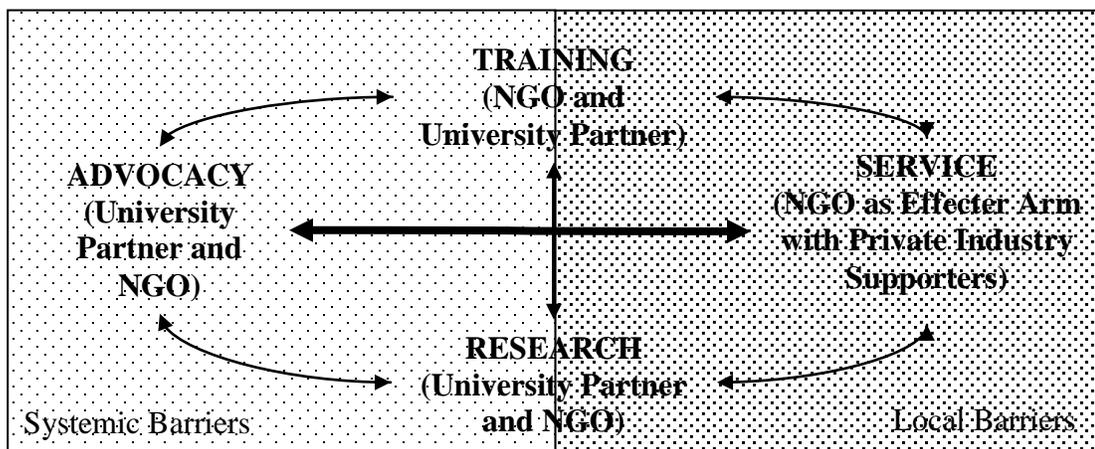


Figure 5.4 Possible STAR Model for a Water and Sanitation Sector Partnership

An effective organization must have an effective organizational structure. The organization's philosophy plays a significant role in determining the relative effectiveness of its interventions. This study demonstrates that solving problems in the context of poverty requires solutions that

consider cultural and structural forces (the local and the global), as well as understanding the powers perpetuating these forces. However, the best theories and philosophies are fruitless if an organization is not equipped to address the full range of barriers preventing effective service delivery. A flexible and nimble structure that fosters creativity and results, reinforced by strong institutional partners facilitate this goal. Yet, equally as important are tactical aspects of service delivery. In the following section, this study recommends specific principles of practice for the water and sanitation sector. Many of these recommendations draw from insight gained from the PIH case study, but they also highlight practices the sector currently does well.

5.4 Recommendations for Delivery of Effective Services

No bullet list of success factors can guarantee effective service delivery. Effectiveness is not the result of following a regimented program, but a long process that requires hard work. As Paul Farmer stated in a *60 Minutes* interview, “If you set your sights high and you stick with it, you can make real progress” (Olian 2008). However, several key principles developed from this research can inform practices of service delivery for the poor. Recommended principles of practice include:

1. Provide high levels of service
2. Actively engage in root-cause analysis and continuous feedback
3. Promote access to effective water and sanitation services
4. Develop deep community-based approaches
5. Continue household and community awareness programs teaching personal hygiene
6. Develop key partnerships
7. Work with the public sector

8. Focus on community health workers and accompaniment

The following subsections explain these eight principles that enable effective service delivery. One is no more important than the other as they are each integral to an overall strategy to serve the poor. Implementing them relies upon a theoretical understanding of cultural and structural forces, as well as an organizational structure that enables individuals and the organization to bridge the gap between the local and the global.

5.4.1 Provide high levels of service

Regardless of setting, people deserve and expect a high level of service from their utility providers. High levels of service contribute to trust formation within the community and with outside groups. They also greatly reduce the risk of water-related disease transmission. As Partners In Health has experienced in the communities in which it works, once people become aware of the benefits of highly effective services, they are more likely to support them.

Services should provide clean drinking water that meets national standards or World Health Organization guidelines (whichever is more stringent). The goal for any intervention should be piped water into people's homes as it is more likely to provide greater health benefits than communal water sources (Hunt 2001). However, when users must collect water from outside the home and store it, services should limit walking distances to 1 km. They should also ensure that users have proper containers with lids; that containers align with any physical and/or gender-related criteria of users; and that users understand proper storage techniques. Service providers must monitor and evaluate water quality regularly, notify users when systems do not comply with regulations, and correct deficiencies as soon as possible. Services must provide quantities of

water sufficient to meet the needs of users to include water used for drinking, cooking, washing, and personal hygiene. Service providers should also understand non-domestic water requirements such as those for small businesses, industries, and agriculture. Systems must adhere to sustainable water-resource methods such as those forwarded by Integrated Water Resource Management recommendations.

Services must also provide adequate levels of sanitation in order to break the cycle of disease transmission. Individual systems are best suited for this. Such systems may include indoor toilets that flush to engineered septic tanks or sanitary sewers and various improved pit latrines as forwarded by the United Nations to include dry compost and other water-less technologies. However, services must support education and awareness programs that teach users how to properly clean and maintain systems, as well as operations and maintenance of systems when users cannot repair. This could be done as a service provided by the utility or private plumbing companies. However, if households cannot operate and maintain their own systems or afford to hire private contractors, then the utility should provide that service. Service providers should also take responsibility of maintaining and cleaning communal toilets.

Technology alone does not guarantee a certain level of service. All technologies defined as meeting access requirements by the United Nations can provide adequate levels of service to break disease transmission cycles. The focus must be on proper operations and maintenance (O&M) of any system. The goal of interventions should be effectiveness. If a community or household cannot support O&M, the service provider must accompany users to ensure expected and effective levels of service are maintained. Systems the sector considers as ‘appropriate

technology' are acceptable if measures are in place to guarantee sufficient O&M. Providing systems whose functionality is independent from outside groups or NGOs are not acceptable if those systems do not meet the needs of users. A failure to provide high levels of service demand root-cause analysis. By knowing users (their culture and needs) and by monitoring outcomes of services (monthly water quality reports, prevalence of water-related diseases, etc.), people on the front lines can relay information and progress back through the organization. Likewise, people in executive and support roles can forward necessary resources and new information to the point of intervention. The following subsection describes this principle of root-cause analysis and continuous feedback.

5.4.2 Actively engage in root-cause analysis and continuous feedback

When practices fail to delivery expected outcomes or lead to unexpected ones, organizations must actively engage in root-cause analysis. Those involved must critically consider local and global causes and honestly examine front-line actions and user behavior. A key to this analysis is a presumption of guilt. In this line of work, those responsible for service tend to first place blame on the user – the organization has supplied the system, the user has not adhered to its proper use or to personal hygiene practices. The organization must ask why a person got sick using a theoretical understanding to explain what led to certain events. Barriers to designing effective systems may also exist. For example, chlorine may be the disinfectant of choice for a particular drinking water system, but not be regionally available. Of course, other disinfectant options should be explored, but so should the reasons for a lack of chlorine. Perhaps cost is an issue or an international agreement prevents its import. Solutions may be to generate chlorine on-site or to advocate for chlorine distribution in that region.

Individual and community's ability to pay and to operate and maintain infrastructure are two of the greatest barriers to high levels of effective services, and compliance with personal hygiene often leads to persisting water-related diseases despite adequate water and sanitation measures. Instead of providing services that people are able to pay for, or systems that can operate and maintain, or blaming a household for not having soap, root-cause analysis and continuous feedback provide an understanding of the broader problems found in the context of poverty. Taking a view that poverty is rooted in global structures as well as local cultures leads to effective solutions as well as mandates for (or justifications of) those solutions that do not align with current paradigms. Identifying critical barriers to access is essential if the sector truly aims to provide water and sanitation access to all people. The following principle, promoting access to effective service, describes several specific recommendations based on root-cause analysis performed by this study.

5.4.3 Promote access to effective water and sanitation services

By 2015, Millennium Development Goal 7c aims to provide access to water and sanitation to half of those who currently have none. The definitions of this access hinge on technical requirements. Yet, I have witnessed in Belize thousands of people who meet UN requirements but do not actually have access to services. If a family lives within 1 km of an improved water source, but cannot afford to buy it, they have 'access.' If the only private place for girl to care for herself while menstruating is a communal latrine covered with feces, she has 'access.' If a boy spends several hours a day to collect water, instead of going to school, he has 'access.' If a community can afford to pay for a hand pump, but there are no insurances to guarantee the

quality of groundwater, they have ‘access.’ If a school has a rain water collection unit, but it only provides water six months out of the year and they must boil it before consuming, the sector still officially counts them as having ‘access.’ Many people considered as having access have access similar to these real life examples. In fact, according to UNICEF, this is the case for the majority of people living in South Asia, South East Asia, and Sub-Saharan Africa (UNICEF and WHO 2008). Imagine what conditions are like for those who lack ‘access.’ The sector must stop supporting access to services whose outcomes are not certain and begin promoting access to services that effectively deliver health benefits and meet user needs.

Technology alone does not guarantee access. When people cannot afford services, providers should subsidize their services. When governments cannot provide subsidies, the obligation falls upon non-governmental organizations. PIH does not charge fees for the health services they provide. However, early on they still met financial barriers to health care delivery. Patients living in remote areas could not afford to travel to the clinic to receive medication. Their solution was to provide patients the cash needed for travel. One of these patients died even after given TB medication that should have cured him. Root-cause analysis and feedback from the community identified that he feared taking the pills, becoming well, and then losing his monthly cash stipend. PIH then instituted community health workers to ensure patient adherence. Promoting access to this level of care regardless of context or barrier enables PIH to carry-out its mission. Water and sanitation services must also come with this attention and care to include cost subsidies if necessary. This places an obligation on the organization to raise additional operating funds beyond what many charitable groups current raise. One way to do that is to find financial supporters sympathetic to systemic views of poverty and social justice.

Solutions must include all provisions to ensure that everyone who is counted as having access to technology also has access to and full use of effective services and their intended benefits. In order to carry out such progress, community-based interventions are crucial. Many sector organizations incorporate community-based approaches in their work. They consult with community leaders and other members before implementing a project and often engage the community with construction of a system. However, as PIH demonstrated, there is a difference between being community-based and based in the community.

5.4.4 Develop deep community-based approaches

Community-based approaches seek to incorporate community members in the decision-making process for service delivery. The sector offers numerous examples of templates and questionnaires guiding this process of data collection. Practices have evolved and now consider gender, cost, and other cultural considerations. However, as previously discussed, the data gathered on community criteria tends to blur with community-level constraints. The information gathered is used more as a gauge to predict what is possible with the given context rather than being incorporated into the final solution that may include various forms of outside assistance. Yet, the most significant critique of the sector's community-based approach is that it fails to capture the essence of pragmatic solidarity.

Pragmatic solidarity comes from leftist ideology with roots in liberation theology. It would be easy to dismiss it as a populous notion with no scholarly impact. Such a perspective would be short-sighted. Engineers focus on projects – that is what they do. Solve one project-based

problem and already be thinking about the next one before the first is completed. This mentality spills into development work. The sector provides a solution to a problem and the users are responsible for maintaining that solution. This logic works in places like the U.S. where supporting conditions exist, but not in places like rural Haiti. If local conditions cannot properly support solutions, then the sector has an obligation to enhance the conditions to ensure results. This is the type of pragmatic solidarity forwarded by PIH. They provide an important lesson for the water and sanitation sector: be presence-based in lieu of project-based.

Having a deep presence in a community enables effectiveness. Organizational members are also community members. They understand local culture and provide feedback to the rest of the organization. They also provide education and training, operations and maintenance, and engage the community in all decision making. Slowly, this builds trust within the community and between the service provider and users. This social capital is vital to long-term O&M, personal behavior, and realizing the full benefits of water and sanitation services. The sector already provides educational support promoting hygiene. Because it is such a vital piece to the overall solution to prevent water-related diseases, it deserves special attention as a principle of practice.

5.4.5 Continue household and community awareness programs teaching personal hygiene

Professionals representing the water and sanitation sector placed a significant emphasis on personal hygiene and behavior to explain the effectiveness gap. While there is room to debate the theoretical understanding of this phenomenon (poor people do not take care of themselves because they either do not know how, do not understand disease transmission, or cannot afford to versus people do not know about personal hygiene, disease transmission, nor can they afford to

because they are poor), personal hygiene practices and behaviors must be an integral part of any water-related disease intervention. The sector places an emphasis on this component, although it is unclear if current educational and awareness interventions are effective.

As the sector adopts these other principles (especially Principles 4 and 8), their programs are likely to result in greater adherence. It will also improve if soap is provided to those who cannot afford it (perhaps donated by a private manufacturer of personal cleaning products) and if the sector mandates sinks and hand-washing stations adjacent to toilets and latrines. University partners may also improve hygiene behavior by supporting training programs and other related efforts. These and other partners play an integral role in overall service delivery. As the next principle demonstrates, partners may be varied and numerous.

5.4.6 Develop key partnerships

Partnerships are vital to ensure effective service delivery. Tasks and responsibilities (and scale if operating throughout a country and/or in multiple countries) are too numerous for one organization. Section 5.2 highlighted the possibility of formal, institutional partners related to Service, Training, Advocacy, and Research such as universities and private companies.

However, other partnerships may exist for one project. Examples might include a consultant who provides design services for a technically challenging project, another service organization that provides pumps over a contracted period, and a joint venture with other NGOs who together provide water, sanitation, and hygiene education (or design, construction, and O&M). However, other partnerships form as service providers discover other needs beyond water and sanitation.

Water and sanitation alone cannot cure the ailments of poverty. Poor people often lack other basic needs and services such as shelter, food, education, transportation, job training, and electricity. As partners come into a community and integrate services, the hope is that the overall well-being of the community improves. Another lesson from PIH is to also partner with the public sector. Principle 7 highlights the significance of this notion of public partnership.

5.4.7 Work with the public sector

Taking a cue from modernization theory, development requires strong national, regional, and local governance. Non-governmental organizations play significant role in development assistance. They often provide innovation and technical expertise, while also implementing policies of development institutions. However, current NGO policies and practices tend to focus on decentralization and ignore working with the government (at least beyond the local level). Often, the sector perceives government as a barrier to service provision. Reasons for this include corruption, instability, bureaucracy, and incompetence. A reason or justification for development assistance is that governments cannot meet the needs of its people. Yet, scalability and functional sustainability require the public sector. As development assistance aims to develop communities and economies, it must also develop and strengthen the capacity of government. This requires an adherence to national policies and regulations by NGOs and other development institutions, as well as constant communication with government officials, especially career people working in ministries affiliated with public works, health, and other related functions.

The water and sanitation sector must see the public sector as a catalyst for effective service delivery, not as impediments. Governments provide the best means to deliver services to the

poor. The best role for NGOs is to accompany governments with delivery strengthening the capacity of the public sector (both its people and infrastructure), as well as acting as a bridge to resources in the core. However, NGOs do not have to be the only ones doing this. A US-based international engineering and construction company recently signed a contract with an African government. Terms of the contract include national and regional master planning, design development, and increasing the capacity of an entire governmental ministry. One might argue that profit-motives may influence final deliverables. Yet, this is an example of new delivery methods supporting national governance. The final principle recommends that all efforts focus on community health workers, both literally and figuratively. They provide an essential connection between the organization and the people they serve. Their accompaniment of communities also exemplifies the attitude required of all organizational members.

5.4.8 Focus on community health workers and accompaniment

Community health workers are the essential link to ensure effective delivery of water and sanitation services. The sector as long promoted their use to operate and maintain infrastructure. Water for People (WfP), a US-based water and sanitation NGO, promotes mobile mechanics who travel around communities to repair systems. WfP trains these workers and communities pay fees for their services. These *accompagneurs* are also the backbone of PIH's effectiveness. However, PIH pays their community health workers directly. They typically live in the communities in which they work. They educate households on disease awareness and prevention and report back to the organization when people need additional assistance. That is, they are obligated to look beyond their primary responsibilities and address the whole person. Paid community health workers trained and responsible for operations and maintenance can enhance

organizational effectiveness when supported by an organizational network able to span boundaries and marshal resources to the front lines.

These recommendations incorporated findings from literature review, analysis of UN and WHO data, opinions of water and sanitation professionals, and a case study of Partners In Health. They helped explain the status of the water and sanitation sector addressing the problem of service delivery to the poor and extant patterns of differential access and diseases prevalent in the modern age. This work reinforced notions in the literature that current policies and practices tend to consider localized barriers only. Through a theoretical analysis of the problem, this work demonstrated how local and systemic forces bar effective service delivery. This understanding helped demonstrate how the effectiveness of PIH's unique approach relies upon its ability to identify and overcome *both* of these forces through pragmatic interventions. Sociological theories ground this work enabling dissemination of results from PIH to the water and sanitation sector and perhaps to the development sector at large. It then proposed shifts in philosophy that that redefine the problem and call for effective solutions and a move away from contextually appropriate ones, forwarded an organizational structure that enables organizations to implement and sustain these solutions, and recommended eight principles of practice built upon current best practice and lessons learned from PIH. This praxis demonstrates how practice and theory informs actions. Borrowing for sociology, technical professions can use theories as tools that that not only informs their work, but also improves it. New avenues of research, as well as potential means to disseminate findings stem from this research. One promising area of future research revolves around organizational effectiveness and classifying the effectiveness of existing organizations.

5.5 Conclusion

This work demonstrated the power of mixed methods, as well as added to the expansion of engineering research to include social analysis. Future research can go in numerous directions including organizational studies, engineering technologies associated with social, political, and economic aspects of design and decision making, international development studies, and critical analysis and scholar activism. Likewise, dissemination may take various forms beyond traditional publications and conference presentations including infusing sociology into engineering education, courses that incorporate findings, and implementing recommendation within new and existing organizations. The following subsections detail (to varying degrees) some of these options and end with a few closing thoughts.

5.5.1 Future work

Findings from this work may initiate new areas of research. The following subsections highlight some of these ideas.

5.5.1.1 Organizational effectiveness within the water and sanitation sector (in progress)

Various frameworks exist to understand and explain organizational effectiveness. These efforts focus primarily on for-profit firms. Charity Navigator rates the effectiveness of non-profit charities, but with a narrow focus on efficient use of donations and other donor-focused metrics. Little understanding exists about operational effectiveness of non-profit service-related organizations. This study proposes a framework to support an understanding of water and sanitation NGOs and a potential evaluation system. Using organizational philosophy, structure, and operating approach as a guide, a draft framework was developed to support this effort. Refer

to Appendix for a copy of the proposed metric. It assesses quantitative and qualitative data from organizational artifacts and espoused values of the organization in order to identify patterns of culture and leadership styles (Morgan 1986) compared with idealized findings recommended previously in this chapter. Figure 5.5 demonstrates one possible way to evaluate organizations based on impact and scale (Michael Garvin initiated and developed this idea). It shows how this metric would likely measure PIH as well as two other NGO, Engineers Without Borders and CARE.

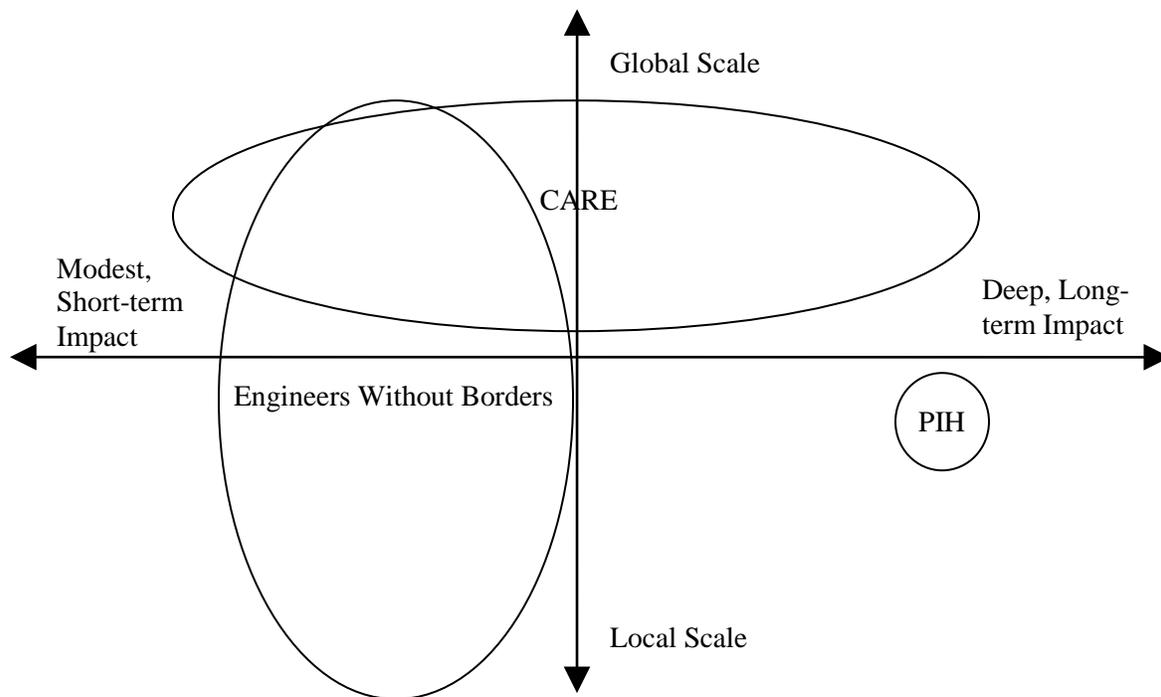


Figure 5.5 Proposed metric for organizational effectiveness (Garvin)

5.5.1.2 Critical success factors for meeting MDG7c at the national level

The purpose of this research is to determine critical success factors that predict a nation’s ability to meet MDG7c for access to water and sanitation. UN and WHO provide comprehensive national-level access data from 1990 to 2006. The CIA World Factbook and the World Bank

provide extensive national-level demographic data associated with social, political, economic, and natural resources. Similar studies have shown critical success factors for general economic development (such as those summarized in popular books such as Jeffery Sachs' *End of Poverty* and Jared Diamond's *Collapse: How Societies Choose to Fail or Succeed*). However, no such study has been done for the water and sanitation sector using modernist and world system lens. A possible hypothesis for this work would be that organizations are effective in countries where MDG7c success can be predicted (developed with Michael Garvin).

5.5.1.3 Infusing notions of social justice into engineering education, research, and practice

Paul Farmer has based his academic career on infusing social justice into scholarly research related to global health delivery, while Caroline Baillie has done similar work with social justice and engineering. Based on methods of scholar activism (Kershaw 2003), more work could be done in the area of social justice and public infrastructure with an emphasis on praxis and applied knowledge.

These ideas relate to new avenues of research. Equally important are means and methods to disseminate findings. The following subsections highlight additional dissemination techniques beyond traditional academic literature and conference presentations. The concept of transformative education (applied research enabling societies to meet their potential) motivates many of these ideas.

5.5.2 Dissemination of research findings

Ultimately, this research aims to change policies and practices of the water and sanitation sector. Scholarly literature aids in understanding how and why organizations function. However, the finding in-action will either confirm or disprove the validity of these findings. The following subsections highlight some of these ideas for applied dissemination.

5.5.2.1 Develop a business plan to engage long-term private industry support

Engaging private industry in long-term partnerships with NGOs act as an example of how research findings impact the poor in the era of globalization. The objective of this proposal is to identify an engineering or construction that would become a formal, institutional partner with a service organization. Such a company could provide professionals to the service arm for extended periods of time (2 to 5 years, for example). Benefits to the firm would include:

1. Providing unique and challenging training grounds for future industry leaders
2. Enable firms to serve communities in which they work through meaningful projects
3. Allow firms to live out industry ethics and respond to various industry ‘calls to action’
4. Assist companies in the recruitment of young professionals belonging to the Millennial Generation

5.5.2.2 Work with existing NGOs

Working with existing NGOs would provide field tests that would confirm, validate, and improve recommendations. For example, PIH could hire a small team of infrastructure professionals to manage their infrastructure-related interventions. This would enhance PIH’s

capabilities as well as being an incubator for ideas. Results could be published and disseminated across the sector.

5.5.2.3 Establish formal accompaniment arrangements with national governments

Many national governments face challenges implementing infrastructure plans, managing internationally funding projects, and maintaining existing systems. By establishing formal accompaniment arrangements, governments can improve technical competencies and increase administrative capacities. Arrangements could be for-hire or pro bono. The former may carry more respect and provide accountability on both sides, while the latter may be more objective and less expectant on future rewards.

5.5.2.4 Develop courses related to findings

Universities could establish new courses based upon findings and the larger concepts related to interdisciplinary studies blending natural and social sciences. Short course could also complement existing engineering and public health courses.

5.5.2.5 Recruit new researchers into this emerging field through award of NSF grants

University faculty could sponsor grants that would support new graduate students working on future work initiatives associated with this research. For example, they could submit a proposal to National Science Foundation (NSF) for graduate research award building upon existing NSF support of this work and in response to NSF's call to develop international skills of future US researchers.

The intent of these suggestions is to highlight what might possibly extend from this research. Additional details would be necessary to support these ideas. It may be bold to suggest that these findings would spur entire new areas of research, but they could support and enhance current trends within engineering education, industry calls for service engagement and international experience, and interdisciplinary studies.

5.5.3 Closing Thoughts

The engineering profession has a long and rich history improving societies. Through the last 60 years, the water and sanitation sector has made great strides in providing access to billions of people who before suffered from a lack of clean drinking water, adequate sanitation, and the means required for personal hygiene. Its policies and practices have changed with societal changes, as well as technological ones. Through vast research efforts, the sector has evolved its praxis to account for social, political, and economic barriers that often prevent delivery of even the most basic services. As population growth rates in developing countries continue to rise exponentially, the world should laud professionals and organizations for keeping pace. Over the past ten years, the number of people lacking access to water and sanitation has remained generally stable. This is remarkable given the number of people living on earth today. While the quantity of people without service is static, the percentage of global population without access continues to decline.

This work does not mean to brush these efforts aside or dismiss them in anyway. Nor do I pretend to believe that if we wipe the slate clean and start fresh by implementing the findings of this work, that all people will soon have access to clean drinking water, adequate sanitation, and

that preventable diseases in developing countries will shortly be the exception and not the norm. But why not?

As Paul Farmer states (2005), “Anyone who wishes to be considered humane has ample cause to consider what it means to be sick and poor in the era of globalization and scientific advancement (p.2).” Despite all that the sector has learned; despite the enormous financial investment; and despite the vast amounts of sweat equity, billions of people suffer today from problems that do not defy solutions. While this is a critical analysis, it hopes to reinforce water and sanitation efforts and engage with the engineering community to understand how the sick and poor can reap the benefits of our practices.

This work employed sociological theories that explain cultural and structural force and provide an understanding about how these forces perpetuate diseases in the context of poverty. It highlighted the work of an organization whose efforts lead to extraordinary results in very poor, rural communities – the very places where the water and sanitation sector has limited success. Perhaps the findings and recommendations presented here are not appropriate for countries on the path towards becoming ‘self-sufficient’. Perhaps they are only relevant in extreme settings of poverty where dependence is almost assuredly ensured. Regardless, they point to an idea that we can do better and advocate that the poor deserve better. Anyone who thinks differently should ask herself or himself, “Would I allow my child or loved ones to drink freely from this source or use those facilities?” If their answer is at all in the negative, then we have an obligation to change the current state of services in resource-poor settings and implement effective solutions that hold the promises of preventing certain diseases.

The way forward demands creativity, imagination, and dedication. However, these alone are not enough to enable effectiveness. To ensure universal promises of scientific advancement, regardless of setting, starts with a new way of thinking. Understanding the structural root-causes of poverty initiates philosophical shifts. This allows a different way of seeing the problem, which in turn influences how we solve it. It is important to appreciate the connection between the way we think and how we act.

The views through which we perceive the world are very personal and determined in large part by our environment. As one of the PIH interview participants suggested, “Most Americans wake up on third base and think they hit a triple.” The truth is, we are at best pinch runners, while many people in the world do not have a bat or are not even on the team. In the U.S., we have certain cultural understandings about poor people and poverty. Our national belief is that a person’s position in society is a matter of personal will. Through hard work, anyone can raise themselves out of poverty and create a better life for themselves. Added to this view is an aversion to blaming the system (at least among those who control and benefit from it). Those who have “made it” often perceive victimization as an excuse for one’s position. Regardless of how egalitarian we think we have become, culture, race, gender does matter; just as social, political, and economic structures and power also influence position and conditions. Through a systemic comprehension of poverty, we begin to understand our role, if not explicit, in fostering a widening gap in global inequality. We not only have a moral obligation to attend to the gap because we have the ability, but also because we are at fault in maintaining it.

This study offers a perspective on poverty differing from that which is pervasive among water and sanitation professionals. It suggests that poverty is a consequence of the world system kept in-check by local and systemic forces. Established theories validate this perspective. Case study findings demonstrate how approaches based in this world view lead to effective outcomes when serving the destitute poor. The significant point is to develop approaches that address local *and* global forces. However, changing mind sets is only the first step in changing outcomes.

Individuals and organizations interested in serving the poor and affirming social justice must infuse this philosophy into what they do. Such a shift informs decision making and calls into question not only differential access to services between rich and poor, but differential prescriptions for the rich and poor. As we redefine how we see the problem, this process begins informing our solutions. The problem we face is a social problem. We already have the technical components of the solution. Instead of devising new technologies to overcome local barriers, our solutions should deliver pragmatic solidarity in the form of supporting conditions necessary for effectiveness. The key then is to develop processes and institutional capacity to implement these creative solutions.

The most well-intended approaches are fruitless without a delivery vehicle. This work went to great lengths to explain PIH's effectiveness and discovered that their unique organizational structure plays a significant role in their success. Philosophies and approaches that consider both local and systemic forces require flexible organizational networks that facilitate trans-border information sharing and resource allocation. Institutional partners strengthen this structure by supporting training, advocacy, and research initiatives. A key component of partnership is to

include private, public, and university entities. Adhering to specific principles of practice also strengthen efforts. This work recommends eight such principles that build upon existing water and sanitation sector practices, as well as borrowing practices learned from PIH. The goal of any such intervention should be the sustained provision of high levels of service in solidarity with the public sector using paid community health workers.

Members of PIH share something in common with members of the engineering community.

When we set our sights high and determine to make something happen, we do it. I do not know what the world should look like. However, I do know what the world should not look like.

Haitians refer to preventable diseases such typhoid as *li mouri bet* ('stupid diseases') – diseases that do not defy solution, but have been relegated to the poor. In the age of Botox, Cowboys Stadium, and unmanned Predator drones, 5 million preventable deaths is an embarrassment to the profession and our humanity. We live in an age of great progress. When we set the bar to solve really complex and difficult problems, our success rate is high. The time has come for us to be less tolerant and accepting of the status quo. Poverty is a consequence of human ego. It is not likely that we would ever rid ourselves, let alone the world, of greed. Conversely, seeking a Utopian world is simplistic. We cannot end poverty, just as we cannot end human suffering. However, as we begin to understand how cultural and structural forces influence differential patterns in access and disease, we will begin to make real progress. As a Boucan Carré community leader said,

We have the springs, we have an organization for community management. That committee manages the springs. But our job is not 100% successful because we could not fully develop the spring. But we were able to provide water for some. We still have a lot of work to do.

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APPENDIX A

Material supporting Chapter 2

Chapter 2 Supporting Information

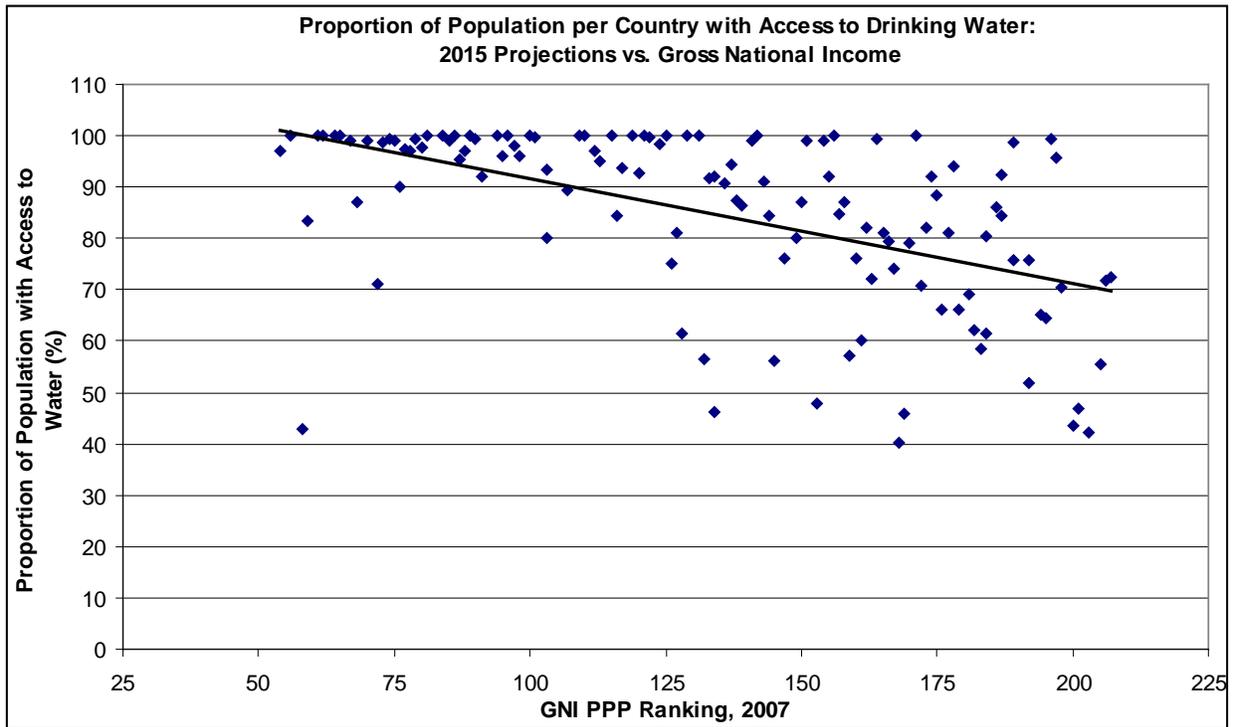


Figure A.1 Proportion of Population per Country with Access to Drinking Water: 2015 Projections versus GNI PPP Ranking

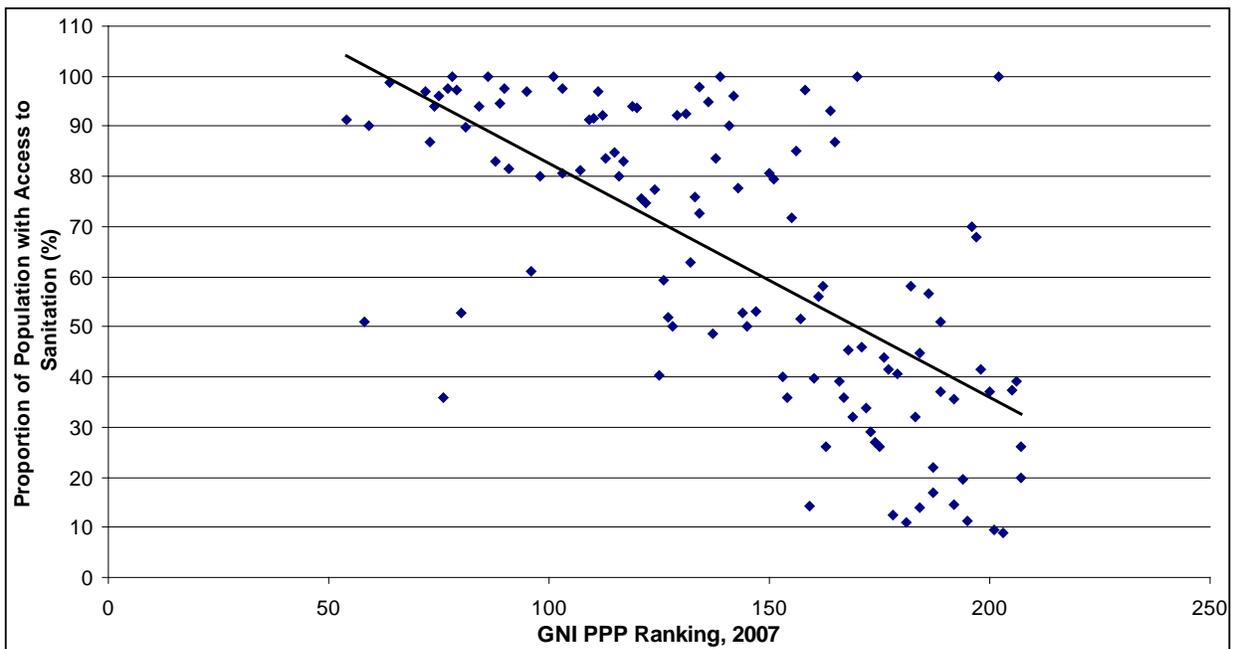


Figure A.2 Proportion of Population per Country with Access to Basic Sanitation: 2015 Projections versus GNI PPP Ranking

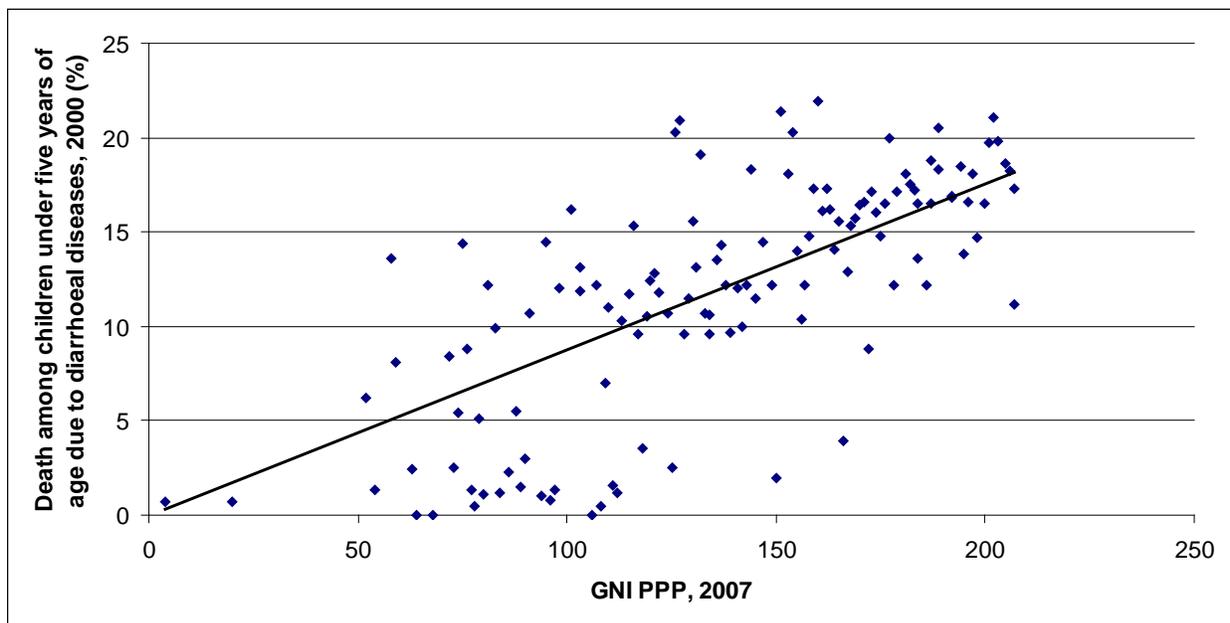


Figure A.3 Relationship between diarrhoeal deaths in a country's under-5 population and national GNI PPP

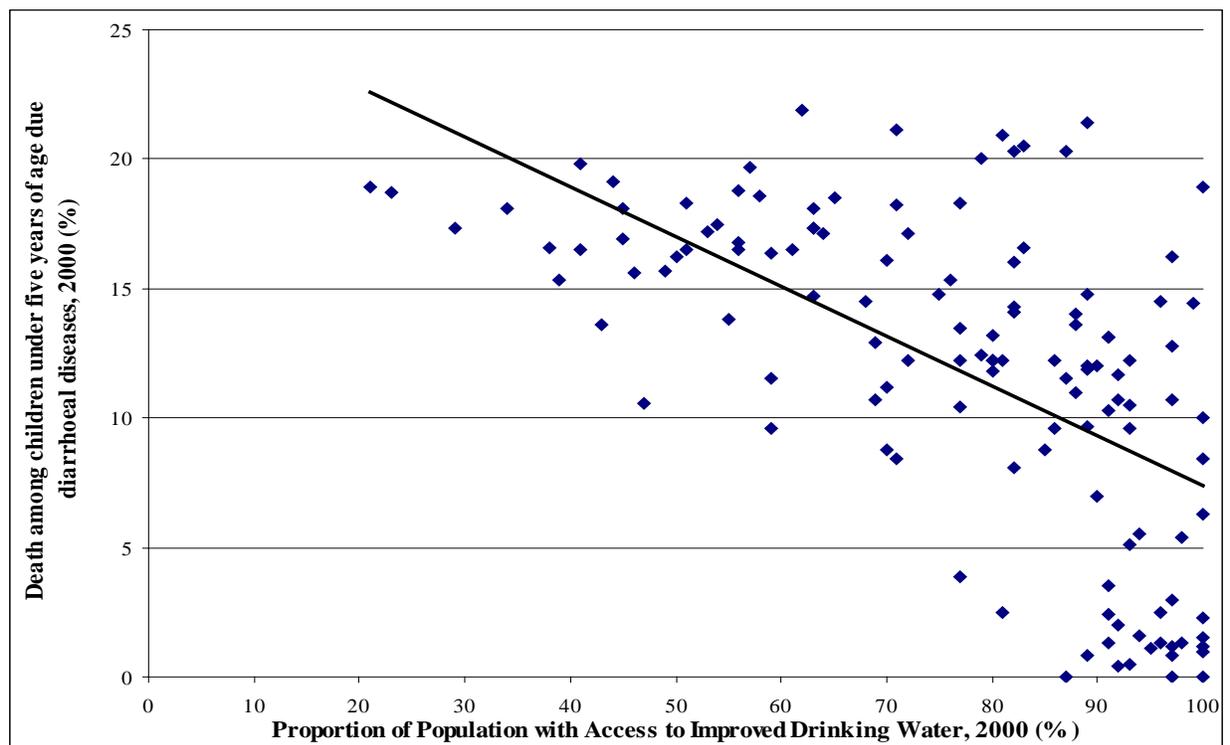


Figure A.4 Relationship between health benefits and access to water at the national level

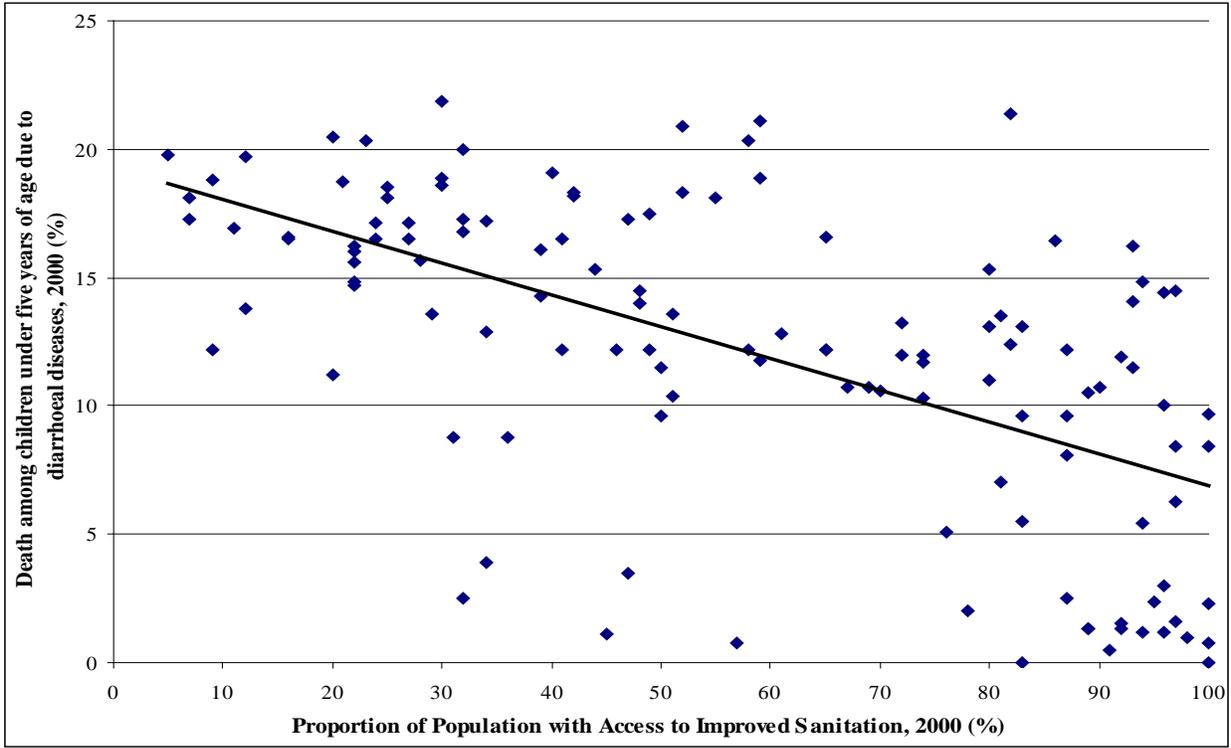


Figure A.5 Relationship between health benefits and access to sanitation at the national level

APPENDIX B

IRB Approval Letters

DATE: January 26, 2009

MEMORANDUM

TO: Maura Jenkins Borrego
Christopher Strock

Approval date: 1/26/2009
Continuing Review Due Date: 1/11/2010
Expiration Date: 1/25/2010

FROM: David M. Moore 

SUBJECT: **IRB Expedited Approval:** "Characterizing Elements of Approach Associated with Successful Implementation of Public Health Infrastructure in Very Poor Rural Communities", IRB # 09-062

This memo is regarding the above-mentioned protocol. The proposed research is eligible for expedited review according to the specifications authorized by 45 CFR 46.110 and 21 CFR 56.110. As Chair of the Virginia Tech Institutional Review Board, I have granted approval to the study for a period of 12 months, effective January 26, 2009.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.
3. Report promptly to the IRB of the study's closing (i.e., data collecting and data analysis complete at Virginia Tech). If the study is to continue past the expiration date (listed above), investigators must submit a request for continuing review prior to the continuing review due date (listed above). It is the researcher's responsibility to obtain re-approval from the IRB before the study's expiration date.
4. If re-approval is not obtained (unless the study has been reported to the IRB as closed) prior to the expiration date, all activities involving human subjects and data analysis must cease immediately, except where necessary to eliminate apparent immediate hazards to the subjects.

Important:

If you are conducting **federally funded non-exempt research**, please send the applicable OSP/grant proposal to the IRB office, once available. OSP funds may not be released until the IRB has compared and found consistent the proposal and related IRB application.

cc: File



29th April, 2009

Dear Mr. Strock,

I am writing as the Chairman of the Zanmi Lasante Ethics Committee, to indicate our support of your research project entitled, "*Non-technical Influences on Water and Sanitation in Resource-Poor, Rural Communities.*" This protocol was reviewed in detail by our committee and finds that it is in compliance with standards for Human Subjects Research. All questions and clarifications have been answered.

Our committee is a US Federally-accredited Institutional Review Board and has been in existence at the Clinique Bon Sauveur and Zanmi Lasante in Haiti for over 10 years. Our committee operates under the principles outlined in the Declaration of Helsinki to assure that all patients cared for at our facilities across central Haiti are provided standard of care. When research is being conducted at our facility, the committee reviews it on a quarterly basis so that any unanticipated risks to subjects, non-compliance with ethical standards or change in research protocol is promptly dealt with. In the past we have worked with the institutional review boards at Harvard Medical School, Brigham and Women's Hospital, and via the Fogarty International Center.

Please feel free to contact me should you have any further questions.

Sincerely,

Dr. Maxi Raymonville
Director of Women's Health
Chairman, Ethics Committee
Zanmi Lasante
maxhaiti@aol.com

APPENDIX C

Web-Based Survey Instrumentt

Virginia Tech Wat/San Survey

1. Informed Consent

Virginia Tech INFORMED CONSENT FOR SOCIAL SCIENCE RESEARCH

Virginia Tech IRB: 09-062

Title of Project: Barriers to effective water and sanitation services in resource-poor settings

Principal Investigators: Dr. Maura Borrego and Mr. Chris Strock, 410 Bishop Favrao Hall, Virginia Tech, Blacksburg, VA 24061, cstroke@vt.edu, 540-231-3804

1. Purpose of the Study: The purpose of this study is to understand barriers to the provision of water and sanitation services in resource-poor settings and to better understand perceptions within the wat/san sector.
2. Procedures. Please complete this on-line survey. I completed a pilot test before sending out this final version. On average, people completed this survey in 10 minutes. You have the opportunity to enter an incentive drawing to win an iPod nano. To be considered for the incentive drawing, you must also send an email to cstroke@vt.edu with the body text "I consent" indicating consent to the procedures described here.
3. Discomforts and Risks: There are no risks in participating in this research beyond those experienced in everyday life. The questions involve personal opinions. It is completely anonymous and I will report the findings in aggregate form.
4. Benefits: Based on planned publications of the research results, participants and the broader research community might have a better idea of attitudes and opinions of engineers in development work.
5. Duration: The survey will take approximately 10 minutes to complete.
6. Statement of Confidentiality: Since the only way you are entering the drawing is by sending an email, your survey responses will remain anonymous. In reporting the survey results, I may use your demographic information to draw out relationships across similar groups.
7. Right to Ask Questions: You may ask questions about this research by contacting Chris Strock, PhD Candidate, Civil and Environmental Engineering, (540) 231-3804 or cstroke@vt.edu. For questions about your rights as a research participant, contact Virginia Tech's Office of Research Administration at (540) 231-6866.
8. Compensation: Survey participants can send an email to Chris Strock (cstroke@vt.edu) to be included in a raffle for a chance to win an iPod Nano.
9. Voluntary Participation: Your decision to participate in this research is voluntary. You can stop at any time or skip any question.
10. Age restriction: You must be 18 years or older to participate in this survey.

Print a copy of this page for your records and future reference.

*** 1. Do you consent to taking this survey (by selecting "yes" you are confirming that you are 18 years or older)?**

Yes

No

2. Demographics

1. What is your primary role within the water and sanitation sector?

- Engineer
- Non-engineer
- Student
- I'm not in this sector

Other (please specify)

2. What type of organization do you primarily work for?

- International NGO related to the water and sanitation sector
- International NGO related to another sector
- Bilateral development organization (i.e. USAID or DFID)
- Multilateral development organization (i.e. UN, World Bank or WHO)
- Public sector within your country (government ministry or local municipality)
- Academic institution
- Private company

Other (please specify)

3. At what level do you spend most of your time?

- In the field (in direct support of community level activities)
- In-country office/capital city (in support of both community and national activities)
- International home office (in support of various in-country and/or international/policy-related activities)

Other (please specify)

3. Trends within the water and sanitation (wat/san) sector

1. Please indicate your level of agreement with the following statements.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Wat/san systems designed around a community's ability to pay are better than systems designed without a cost-recovery model.	jn	jn	jn	jn	jn
The private sector provides more effective wat/san systems than the public sector.	jn	jn	jn	jn	jn
First-world solutions are not appropriate in third-world settings.	jn	jn	jn	jn	jn
It is better to design a more contextually appropriate wat/san system that a community can operate and maintain on its own versus a system whose functionality is dependent upon inputs from outside groups or NGOs, even if the independent system is less effective than the dependent system.	jn	jn	jn	jn	jn
Lack of money is the greatest barrier to any wat/san project.	jn	jn	jn	jn	jn
The most effective wat/san systems involve the public sector.	jn	jn	jn	jn	jn
In regards to water and sanitation services, first-world outcomes are not possible in third-world settings.	jn	jn	jn	jn	jn
With enough money, project teams can overcome all other barriers to effective water and sanitation services.	jn	jn	jn	jn	jn
The prevalence of water-related diseases can be reduced to undetectable levels in developing countries as they are in developed countries.	jn	jn	jn	jn	jn
It is better to design a more effective wat/san system whose functionality requires inputs from outside groups or NGOs versus a system a community can operate and maintain on its own, even if the dependent system is less contextually appropriate than the independent system.	jn	jn	jn	jn	jn

Virginia Tech Wat/San Survey

4. Barriers, Obligation, and Capacity

I have compiled a partial list of factors that can influence design decisions and/or the effectiveness of water and sanitation services in developing countries. Using the drop-down menus, please indicate if the factor is a barrier to service delivery, if the sector has an obligation to overcome that barrier, and then if the sector has the capability to overcome the barrier.

I realize that the influence of these factors may vary from community to community or country to country. Please base your responses on your most recent work.

1. Please use the drop down boxes to indicate level of barrier, obligation, and capability associated with factors that influence effective wat/san service delivery in developing countries.

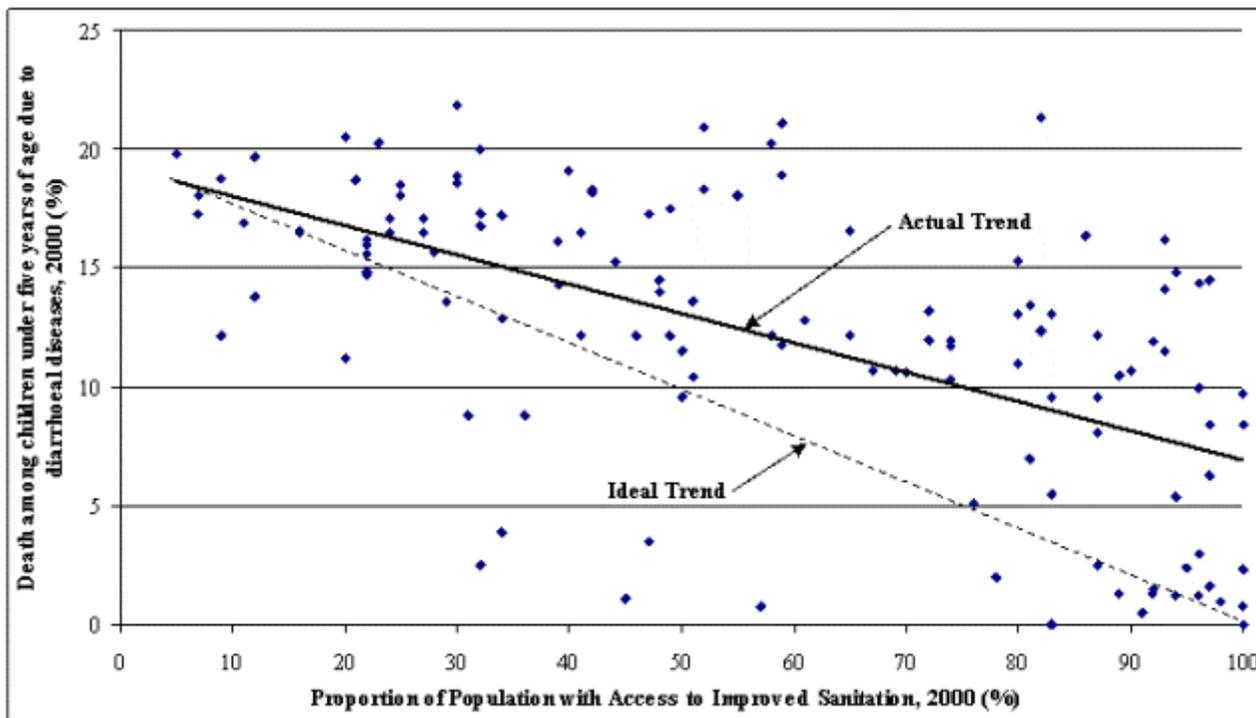
	Barrier	Obligation	Capability
A community's ability to pay for services	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
Availability of energy to power system components	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
A community's average level of general education	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
A community's power dynamics related to gender	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
A community's internal politics	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
Strength of the public sector	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
Availability of water sources	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
Terrain	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
A community's relationship with related government ministries	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
A community's ability to operate and maintain infrastructure	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
A community's ability to access resources for infrastructure (eg. spare parts or chemicals)	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
Corruption	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
Level of trust between community and assistance organization	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
A community's religious practices	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
Availability of public funds	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
Structural adjustments associated with conditional loans	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
International trade policies that influence access to materials and/or equipments	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>
Policies that favor economic uses of water over domestic uses	<input type="text" value="6"/>	<input type="text" value="6"/>	<input type="text" value="6"/>

Virginia Tech Wat/San Survey

2. Please provide any comments to support or clarify your responses to the previous question (optional).

5. Defining Success (Final Question)

Millennium Development Goals related to water and sanitation base success on "access to improved drinking water and adequate sanitation." The wat/san sector has widely accepted this goal of access for their own objectives in lieu of other metrics. Many countries are increasing access to wat/san services, while water-related diseases and deaths will persist in many of these same countries. Per the graph below, if all countries had 100% access to sanitation, over 7% of all children under 5 would die of water-related diseases (data obtained from World Health Organization). A graph of access to water reveals identical results. Yet, water related diseases in developed countries are nearly non-existent where populations effectively have 100% access to water and sanitation.



1. Why might access to wat/san services not equate to the elimination of water-related diseases in developing countries as it does in developed countries?

APPENDIX D

Final Interview Protocol

INTERVIEW PROTOCOL

For semi-structured interviews

PIH/ZL participants

I am a doctoral student at Virginia Tech, and I am very interested in learning more about how Partners In Health and Zanmi Lasante carry out their work. The goal of my project is to more fully understand the PIH Model and universally apply it towards public health infrastructure practices.

I will use the data I collect from our interview to identify and synthesize non-technical influences on an organization's ability to sustain public health-related services in resource-poor, rural communities. I hope to learn about how you plan and organize your work for long lasting, meaningful impacts on the communities you serve

1. What is your job title and what are your roles and responsibilities within PIH?
2. Why do you like working for PIH? Give me your Top 3 reasons.
3. PIH is a very successful organization. What three things, in your opinion, are the reasons for this success?
4. We can learn a lot about how an organization operates through specific examples. Tell me about one of your most successful programs or projects. [Probe for certain constraints and seek out how PIH overcomes them].
5. We can also learn a great deal from programs and projects that have been less successful or difficult. Are there specific lessons learned that you would like to tell me about? How have you changed your approach given these lessons?
6. Do PIH place any preconditions on communities or countries in which they work?

Thank you so much for your time. I will be in touch with you soon for possible follow-up questions and ask you feedback on my analysis. It's been a pleasure!

APPENDIX E

Pilot Interview Protocol

DRAFT INTERVIEW PROTOCOL for March 3rd Committee Meeting

For semi-structured interviews

I am a doctoral student at Virginia Tech, and I am very interested in finding ways to interject social justice into engineering practice and applying lessons learned from you to make a meaningful difference towards the reduction of what should be preventable water-related illnesses. The goal of my work is to more fully understand the PIH Model and universally apply it towards building and maintaining infrastructure.

I will use the data I collect from our interview to characterize elements of approach associated with the PIH Model and so hope to learn about how you plan and organize your work for long lasting, meaningful impacts on the communities you serve

1. Explain your role within the organization.
2. Tell me about your most successful program or project.
 - a. Probe for interaction with/influence of local customs and traditions (How have programs/projects tried to incorporate local customs and traditions? What customs and traditions have you tried to change and what was the result?)
 - b. Probe for interaction with/influence of external social influences (that of the participant and/or of donor/assistance countries and organizations)
 - c. Probe for local constraints and freedoms on technology choices (Were you given a wide range of technology choices?)
 - d. Probe for international constraints and freedoms on technology choices (Were you given a wide range of technology choices?)
 - e. How did you decide on technologies?
 - f. Probe for interaction with/influence of local government (What gaps still exist?)
 - g. Probe for interaction with/influence of international governments
 - h. Probe for interaction with/influence of local financial support/financing
 - i. Probe for interaction with/influence of international financial support/financing
3. We can learn a great deal from program and projects that did not succeed. Tell me about your least successful program or project.
 - a. Probe for interaction with/influence of local customs and traditions
 - b. Probe for interaction with/influence of external social influences (that of the participant and/or of donor/assistance countries and organizations)
 - c. Probe for local constraints and freedoms on technology choices
 - d. Probe for international constraints and freedoms on technology choices
 - e. Probe for interaction with/influence of local government
 - f. Probe for interaction with/influence of international governments
 - g. Probe for interaction with/influence of local financial support/financing
 - h. Probe for interaction with/influence of international financial support/financing
 - i. What did you learn from this example and how has your approach changed as a result?
4. Are you aware of any international policies or economic legislation that either helps or hinders your work?
 - a. Is so, please give me specific examples and explain how they influence your work.
 - b. How does this help your work?
 - c. How does this hinder your work? Are you able to overcome hindrances? If so, how? If not, why not?
5. Do you personally or PIH as an organization deal with bi-lateral or multi-lateral international organizations?

- a. If so, please give me specific examples and explain how they influence your work.
 - b. How does this help your work?
 - c. How does this hinder your work? Are you able to overcome hindrances? If so, how? If not, why not?
6. How easy is it for you to obtain the resources required to carry out your mission?
 - a. Do you have enough resources?
 - b. What facilitates this?
 - c. What hinders this? How do you cope and still meet the needs of those you serve? Are you able to overcome hindrances? If so, how? If not, why not?
 7. How might the global nature of the economy influence your work?
 8. What are your funding sources?
 - a. How hard is it to obtain funding?
 - b. Can you name specific barriers to funding? How do you cope with limited funding? Does this cause you to reduce the scope of your services?
 - c. Are you able to overcome these barriers? If so, how? If not, why not?
 9. Let's talk a little about sustainability. A major debate within the international assistance community is how to build national and community capacity so that assistance is no longer necessary. I believe PIH provides health care free of charge to all of its patients. Is that true?
 - a. Certainly, PIH cannot continue such practices indefinitely. Is there an exit strategy? Please explain your answer.
 - b. What is the long-term role of PIH?
 - c. What might help or hinder this role?
 10. Decentralization is another common theme within the assistance community, a phenomenon based on the idea that national governments are corrupt and the only way for lasting solutions is to rebuild nations from the bottom-up, although some suggest it may be to maintain weak national governments. Yet, PIH makes a point to work along side national governments and ministries. Would you please explain the motives behind this approach?
 - a. Can you think of an example when this approach hindered a specific project?
 - b. How were you able to overcome this hindrance?
 - c. Can you think of an example when this approach helped a specific project?
 - d. Are there perhaps concurrent short and long-term goals?

Thank you so much for your time. I will be in touch with you soon for possible follow-up questions and ask you feedback on my analysis. It's been a pleasure!

APPENDIX F

Survey Results (Barriers, Obligations, and Capabilities)

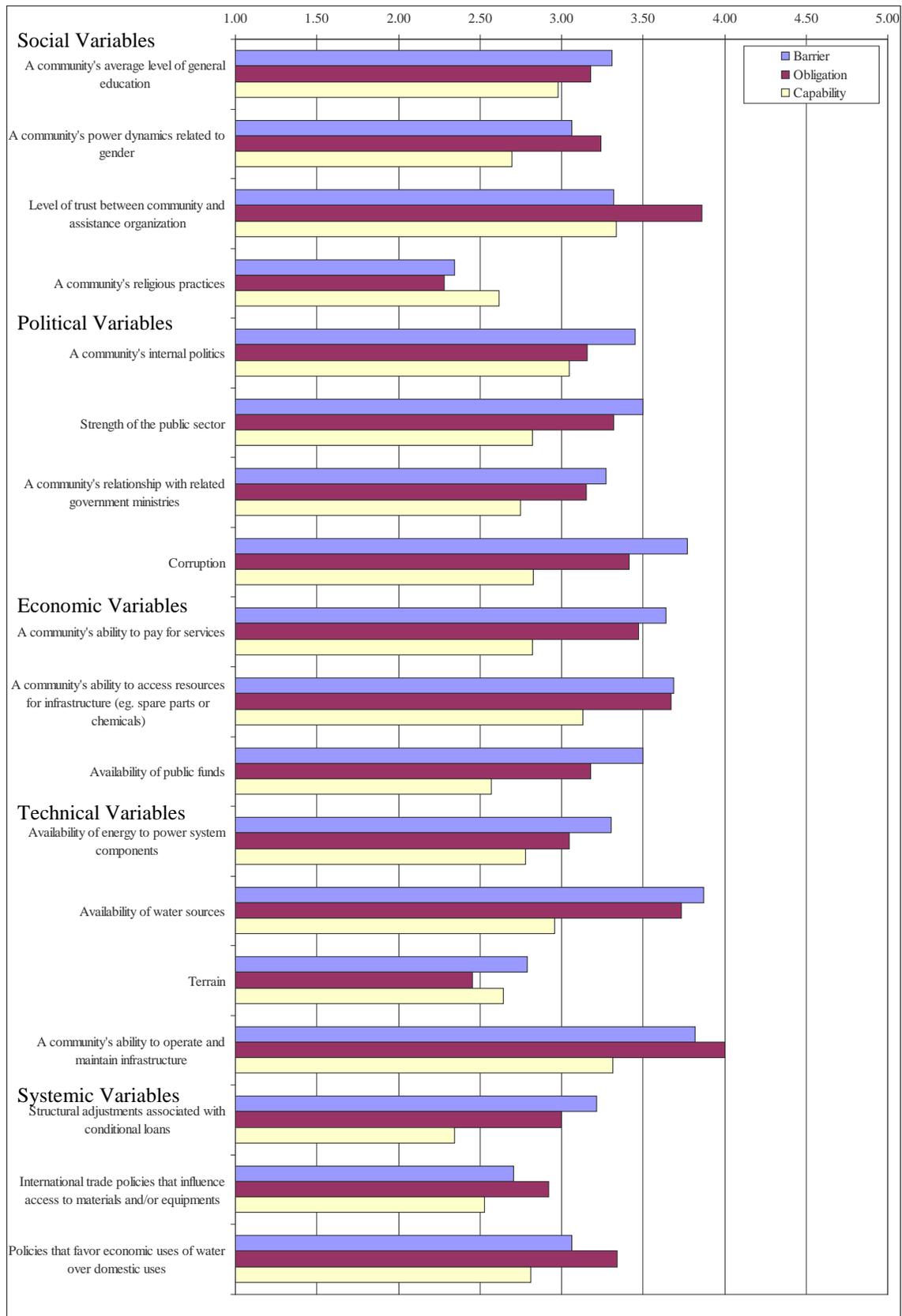


Figure F.1 Survey results on barriers, obligation, and capability

APPENDIX G

Survey Results (Effectiveness Gap Explanations)

Virginia Tech Wat/San Survey

Why might access to wat/san services not equate to the elimination of water-related diseases in developing countries as it does in developed countries?		
		Response Count
		49
<i>answered question</i>		49
<i>skipped question</i>		76

Response Text		
1	access doesn't mean use of facilities. come on bro. its about behavior not hardware.	Feb 25, 2010 3:14 PM
2	Topography, maintenance, cultural knowledge about sanitation practices.	Feb 25, 2010 5:28 PM
3	Hygiene education is unadequate. Access numbers are misleading, do not take into account projects that functioned 5 years ago that have fallen into disrepair. Water tables are dropping, groups need to look at the whole picture in the watershed as well.	Feb 25, 2010 7:35 PM
4	(Sounds like a test question!) I think the major factors might be cost and convenience. "Access" doesn't necessarily mean the consumer has the financial and/or physical wherewithal to get the needed services.	Feb 25, 2010 9:12 PM
5	It is not only water and sanitation services. it is tied to agriculture and water used for irrigation, immunizations, health foods that boost immunity, personal hygiene, food preparation, etc.	Feb 25, 2010 9:25 PM
6	Other hygiene-related issues may still exist, e.g. cleanliness of water collection bowls, breeding of mosquitoes in stagnant waters, etc.	Feb 25, 2010 9:29 PM
7	Poor hygiene behaviour. Poor functioning of watsan systems eg leaky sewers.	Feb 25, 2010 9:31 PM
8	weakened immune systems from other prevalent disease challenges and/or lack of appropriate hygiene practices	Feb 25, 2010 9:41 PM
9	First, your use of statistical trends with these scattered data is HORRID! This is extremely inappropriate use of these data! Second, I suspect that the feedback on access to wasan is far more complicated than simple access. The wasan must be used to improve hygiene practices. The wasan must be used to improve food prep, utensil cleanliness, etc. Finally, access to wasan does not necessarily imply use of wasan (the story I heard 3 weeks ago in Benin was of the young man who had a wonderful water supply at his house, but needed to drink from untreated sources while working in the fields).	Feb 25, 2010 10:00 PM
10	The living conditions are not comparable to developed countries. Poor housing and the way the water is stored can be a potential source of some deases.	Feb 25, 2010 10:52 PM
11	Disease-causing organisms are endemic in tropical environments, and also have higher survivability, and children are exposed in environmental water.	Feb 26, 2010 2:24 AM

Response Text		
12	There is a great deal of user contamination by people introducing fecal matter into the system post community treatment. Also, what the UN considers "improved" water is not the same thing as clean water. I know professionals that work for the Center for Disease Control internationally, and "improved" means a touch of treatment and maybe a pipe, not highly chlorinated and filtered water. Standards aren't as high enough in many of these countries, especially with such large rural population.. Also several places have not been revisited to ensure operating water and sanitation services. Several treatment options are not continued in use by the communities after several months have passed. It is not accurate to say the water and sanitation services are the same for these improved water supplies.	Feb 26, 2010 6:53 AM
13	personal hygiene. medical intervention for disease control. I find the biggest problem to this dire situation is the propensity to "study to death" each and every problem, NGO's are so top heavy with academia that they are ineffective in the field. they need to put "lever pullers" in the field to get the job done and train the people to maintain systems.	Feb 26, 2010 1:49 PM
14	Other factors contribute to poor water delivery/sanitation such as compromised catchment protection, weak land usage policy and non-compliance to good environmental practices where they exist. Corruption leads to poor/lacking policing of violators of regulations governing water/sanitation development and distribution	Feb 26, 2010 9:46 PM
15	Two ideas: 1. Access to "improved water" doesn't mean great water with clean water coming out of the tap any time of day and night, etc. 2. Access to water doesn't automatically guarantee practices of handwashing, clean dishes, safe storage, etc. So there are still barriers to obtaining health regardless of water availability.	Feb 26, 2010 10:43 PM
16	Look at the swine flu situation in USA, even though we have 100% safe drinking water, still thousands of people died due to not washing their hands properly. We need education in addition to water and sanitation.	Feb 27, 2010 3:00 AM
17	Several hypotheses deserve investigation. 1st, "improved" per WHO/UNICEF definition may not equate to "safe" as in free of disease-causing organisms, e.g., many pipe systems do not treat the water. 2nd, water use practices between withdrawal and use may introduce contamination, e.g., water storage in open buckets and use of a dipper. 3rd, sanitation facilities and practices may differ from developed country norms.	Feb 27, 2010 3:11 PM
18	Access to water and sanitary services is not enough. Other elements of public health must also be taken into consideration. It is equally important that locals are provided with educational programs in which they learn about how the system works and proper sanitary practices to deter the spread of water-related diseases.	Feb 27, 2010 8:43 PM
19	Even in developed countries water-related diseases exist. They are often overlooked, because they are often not notifiable and not recognized within the public health system. Access to improved sanitation does not necessarily mean the sanitation system is accepted and used by the population. Once installed, sanitary facilities need maintenance otherwise they become destroyed, misuse occurs and the system breaks down. Then the user might return to traditional sanitation habits.	Mar 2, 2010 6:40 PM
20	A lot of other factors come into play	Mar 4, 2010 3:07 AM
21	In my opinion, water-related diseases are not always associated with water scarcity or quality. The public education, culture and hygiene practices should not be ignored in such studies.	Mar 4, 2010 6:52 AM
22	It is a problem of the "last meter" (hygiene standards when handling water at home), which is primarily an education issue.	Mar 4, 2010 9:40 AM
23	- not percentage of served capita counts but the level and quality of service? - sustainable management, cost recovery and public participation are also crucial - other routes of dietary intake of pollutants including food, air and health care products	Mar 4, 2010 9:57 AM

Response Text		
24	ziaul75@yahoo.com	Mar 4, 2010 12:44 PM
25	<p>from my readings to reports that relate the issues I found that it is seldom to talk about the supplied water quality. you can see +95% of the population have access to water but you don't see which quality standards this water meets.</p> <p>a second good reason I found is that water quality is tested at the source (outlet of the treatment plants), and rarely in the network, but almost never from the tap.</p>	Mar 4, 2010 3:41 PM
26	<p>Lack of quality standards and enforcement of them</p> <p>Poor use of donor assistance funding</p> <p>Poor O&M practices</p> <p>Poor management</p> <p>Unskilled labor</p>	Mar 4, 2010 5:00 PM
27	Children in low-income countries tend to have poor underlying health status while children in wealthier countries have more robust health, due to poor nutrition, living conditions, etc. All children are affected by diarrheal diseases (e.g. rotovirus), however children in low income countries are more prone to deleterious effects.	Mar 4, 2010 6:02 PM
28	Maintenance and management practices influence the level of treatment. Availability of chemicals and testing equipment might also be a factor, as well as knowledge and understanding of the physical and chemical processes that must be carried out to effectively eliminate water-related diseases.	Mar 4, 2010 9:13 PM
29	It could likely be that there are additional indicators that need to be covered beyond access. Also, it seems weird not to include access to potable water, as sanitation is only one form of contamination of drinking water.	Mar 5, 2010 10:00 PM
30	In some cases the cause for water borne diseases can be due to cross connection problems due to bad design or implemnetation. Another cause for water borne disease is the illegal tapping to water distrubution systems.	Mar 7, 2010 2:45 PM
31	Education is also necessary to help prevent the spread of water-borne diseases.	Mar 8, 2010 6:02 PM
32	Access to wat/san services doesn't imply elimination of water related diseases in developing countries. Elimintaion fo water related diseases can be realized only with raising the awareness of the public to protect the service, better management of the services etc. For example, handling of water at home has to be perfect to eliminate the water related diseases. PErsonal hygiene practices have a major impact in reducing the water related diseases, not only access to wat/san services. Personal hygiene and Sanitation education is very vital to eliminate water related diseases in developing country settings.	Mar 9, 2010 8:07 AM
33	ignorance /lack of education/personal hygiene	Mar 10, 2010 11:31 AM
34	Its just the way it is. Sanitation is a bothersome activity. If you have to do more than get it from a well it is too much effort.	Mar 11, 2010 1:07 AM
35	Water-related diseases/deaths in developing countries persist because, despite wat/sanitation services are delivered to communities, there continues to be cultural practices, environment-related factors, and system-operation procedures that prevent the elimination of such diseases.	Mar 12, 2010 6:58 PM
36	Cultural issues. Practical issues such as distance to water source - someone will still walk shorter distance to a bad source than longer to a good source. Free projects don't work - community must have a stake/investment and the ability to maintain project.	Mar 17, 2010 4:58 PM
37	the situation in developing countried is complicated by access to adequate food and nutrition	Mar 18, 2010 9:18 PM
38	Lack of personal hygiene education.	Mar 19, 2010 1:39 AM

Response Text		
39	The conditions are entirely related in terms of infrastructure of delivery, usage and maintenance, and dread of diseases. Also proneness to infections and infestations are more in the climatic conditions prevailing in developing countries, and so also is the tolerance of populace to disease strains. The climate change impacts are making way for more infestations when the situation may become serious till people develop immunity	Mar 19, 2010 4:03 AM
40	because there are other factors which effect the public health in addition to wat/san services. That include: human nutrition, pollution, general public health issue, availability of health services,..etc	Mar 19, 2010 6:13 AM
41	The implementation of structures and other gadgets in developing countries make the already developed countries think that the problem is solved. Wrong! Any tool is useless if not properly used or maintained. Equally important to the transfer of technology, we have to be able to transfer the knowledge as well. As a matter of fact, training locals in the use of these techs should be the first step.	Mar 19, 2010 9:26 AM
42	I think there are many factors to water-related diseases in developing countries rather than water/sanitation services. Governmental corruption, the absence of obligation and good governance and the way of management and tackling problems could be considered major problems in water sector in developing countries. Moreover, cultural inherited issues in some communities may form some barriers; for example, in some African's countries using raw wastewater for irrigation is considered one of traditional practices in which people are very happy with.	Mar 19, 2010 11:50 AM
43	education, social structure and other social factors	Mar 19, 2010 8:03 PM
44	It is fundamental to promote hygiene practices and to improve the global environmental conditions. Diseases spread also as a consequence of an inadequate management of solid and liquid wastes. Access to sanitation is good, but a good management of sanitation is also important.	Mar 22, 2010 10:55 AM
45	not availability of resources as in developed countries	Mar 22, 2010 12:41 PM
46	If one village has clean drinking water, but neighboring villages don't, the diseases still persist among the population. We won't see the expected results until we are much closer to universal availability.	Mar 22, 2010 2:18 PM
47	The straightforward answer is that MDG targets do not include provisions related to water quality, so while access may be achieved, the quality of water being consumed is not under control. Very often there are limited standards and when there are, there is no capacity to enforce, control or test if these standards are met. Further, access to water is only one factor, in addition to access to food, solid waste management, that affects child mortality.	Mar 22, 2010 6:10 PM
48	Filth is everywhere and sanitation is terrible. However, I have seen some pretty amazing and clean human waste facilities in Mauritanian oases.	Mar 24, 2010 6:25 PM
49	Access is a definition of proximity to the well and number of users to the well. There are many other factors that influence use of the well, most importantly ownership and round-trip travel time differences between an open hole near the house, and a protected source at the limits of the defined access boundary. People in developing countries are more likely to accept water and sanitation facilities not acceptable to those from developed countries as they tend to be more fatalistic regarding their control over their water and sanitation situation.	Apr 2, 2010 9:09 PM