Project Number: LDH-PW40

Methods of *Schistosomiasis haematobium* Control in Adasawase, Ghana: A Case Study of Cultural Awareness in Public Health Campaigns

A Major Qualifying Project

submitted to the Faculty of

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the

Degree of Bachelor of Science

By:

Victoria M. Mason

Date: April 28, 2011

Approved By:

Lorraine D. Higgins
Professional Writing Advisor

Abstract

This project analyzes cross cultural factors in a public health program that was implemented to control for schistosomiasis, a parasitic disease in Adasawase, a rural village located in eastern Ghana. This report is a narrative of my own experiences there as I worked in this program and it is an analysis of the ideological, sociopolitical, institutional/professional, ethnocultural, and material factors that might have account for the success and failure of the initiative. I use this study to propose a culturally sensitive model for communicating health in communities.

Acknowledgements

I am truly indebted to my adviser Professor Lorraine Higgins for her continued guidance and support throughout my project. Her motivation was a tremendous source of encouragement and instilled a greater sense of confidence in my writing.

I would also like to acknowledge Karen Kosinski for providing my project group the opportunity to complete our MQP in Ghana and advising us while we were there, in conjunction with completing her doctorate thesis research. I am very grateful for the experiences gained while working both on and off campus.

I would also like to express thanks to following individuals that comprised the research team while we were on ground: Mr. Osabarima Kwame Tia II (the Chief of Adasawase), Mr. Michael Nii Adjei (cultural translator), Mr. Dickson Osabutey (lab technician), Mr. Quincy Moore (research partner), Karalee Conover (MPQ partner), Carrie Ellsworth (MQP partner), Mr. Kofi Danquah (Head Mason), Mr. Sammy Tetteh (construction team), Mr. Ernest Asante (construction team), Mr. Felix Adjei (cultural translator), and Ms. Mavis Akyaamaa (cultural translator).

Table of Contents

Table of Figures

Table of Tables

Introduction

Sample Collection Day

A mob of kindergarteners rushed to the ledge of the weathered concrete wall that encases their class room, chanting "*Obruni coco machee*." Their slender arms projected through stained yellow uniform sleeves as they desperately try to pull themselves up to see the approaching research team. Their laughter and giggling overwhelmed the relative tranquil presence of the rural village of Adasawase in the Eastern Region of Ghana. Four *obruni omas*, white women, one *obruni bema*, a white man, and a man, one of their own kind, an *obibini*, walked in single filed line on the red clay path towards them. They came bearing unusual gifts. A cooler which made a rattling sound with each step and to their dismay it did not hold chilled bottles of Coke-a-Cola. But empty conical tubes that slide in unison into the sides of the cooler as the weight of it shifted between the two carriers. The *obruni bema* with strained biceps had a tightly packaged bag of water sachets, resting on his forearms and another *obruni oma* gripped a black square bag.

The rusted metal canopy provided shelter from the noon time sun which glowed iridescently as the team processed the children's urine samples. Containers went from one pair of white gloved hands to the next, being swiftly passed down the chain as they got coded, labeled, and placed into the collection cooler. The boys ran wildly up and down the scarcely grassy field, chasing after a patchless soccer ball while girls danced in little groups, kicking up red dust as their feet shuffled. Classes of children lined up against the side of the building, waiting anxiously to hand in their samples, watching with hopeful eyes as their peers played, yearning to join them.

A small girl approached, her blue dress uniform hung delicately from her slender frame. Her hand was in the pocket of her dress, and the vague outline of her sample container was

evident as it pushed against the fabric. Karen Kosinksi, the head researcher from Tufts University, asked for her name. "*Ye fre wo sen*?" The cacophony of her schoolmates' play overpowered her quiet reply. Karen shifted her chair closer, placing her arm around the girl, pulling her face closer to her ear. "*Ye fre wo sen*?" The girl whispered it while Karen fixed her gaze on her lap-top screen trying to find her name in the infinite Excel file of students.

"PR156, PR156," Karen called out the code to the team as they took the green covered container from her. Inside, cloudy red liquid moved from side to side as it was placed in the hands of a researcher: bloody urine, *dwenso mogya*. This girl was one of nearly fifty percent of the local children with schistosomiasis, a neglected tropical disease caused by a parasitic worm that affects the urinary system and progressively damages organs (Acha and Szyfres 2001, 146-157). During the summer of 2010, my senior Major Qualifying Project (MQP) group comprised of two Biotechnology majors and a Civil Engineer from Worcester Polytechnic Institute traveled to Ghana to assist with Kosinski's schistosomiasis control efforts. What follows is the story of that journey and of what we learned, not just of the disease, but the role culture can play in public health communication.

Road to Adasawase

During the months leading up to our travels to Adasawase, my team and I learned that the disease is prevalent in tropical and sub-tropical areas, especially in poor communities without potable water and adequate sanitation (World Health Organization 2010). Adasawase is primarily a farming community that relies heavily on its natural resources to survive. But interestingly, the main contributing factor that predisposes the community to schistosomiasis is not due to economic instability, but rather to the residents' interaction with the environment,

particularly, Tini River, which serves as source of water collection and recreating, and hosts the parasite which is causes the infection.

Within three days of arriving on ground in June, my team ventured into Adasawase to become acclimated to our new surroundings. We met Kosinski, who invited my project group to join her for her last year collecting thesis research; Quincy Moore, a Public Health graduate student; and Michael "Tom" Ni Adjei, our cultural interpreter and a Ghanaian native.

Figure 1. Research Team

Photo courtesy of Carrie Ellsworth, June 2010

Adasawase is directly accessible by a three mile red clay path that branches off a major highway that connects the capital, Accra, to other numerous cities. The landscape is overtaken by luscious greenery that grows wildly in the humid climate of the rainy season. Plantain and cocoa farms and corn fields divided the expanse of brush and lined the sides of the crimson dirt road. "Heart of Oaks" were scattered along the way, distinguishable by their long and smooth trunks

that climb into the sky. Different from their Western oak brethren, their branches were collectively at the top of the tree and not dispersed along the trunk.

Figure 2. Road to Adasawase, June 2010

Colonial buildings with worn pastel paint built by early European settlers barely stood erect and increased in number as we approached the town. We passed the Methodist and Presbyterian schools nestled far back from the road. From a distance, I saw students sitting in their classrooms, matching uniformly in yellow or navy blue outfits. Due the lack of the electricity, many schools are constructed without side walls that separate the interior of the school from the outside; they depend on natural light to illuminate their rooms.

Concrete compounds with the rusted metal roofs comprised the center of town. A few refurbished Hyundai's congregate here and made up the taxi station; we were told that the spidered windshields or heavily dented sides were not indicative of the driver's skills since these cars were donated from foreign countries. Wild animals collected here as well; goats and spray-painted chicken roamed freely between elderly gentlemen. They gathered in cliques exchanging

gossip and news on the recent World Cup matches. Chickens were often "colored" red, pink, or purple to distract preying hawks from above that can target them easily, since they are normally white and stand out amongst the red earth. It was amusing to find multicolored chicks scamper around our feet.

Between cylinder block homes and the Chief's palace were stalls that sold products similar to a convenience store. A multitude of brightly colored foil packets of laundry detergent, butter, powered milk, and candy hung down the ceiling and created a curtain in front of the stand. Scratched plexi glass display cases held packages of oatmeal, toilet paper, and non-perishable food items. That day, my team and I walked through the town and we proceeded towards the swimming pool that Karen's team built in 2009. It was an alternative recreating center for the children, intended to promote safer health practices and deter them from playing in parasite-infested waters of the Tini River.

The rocky path towards the pool extended away from the town's center. Rain water had naturally eroded the sides of this trail, unearthing rocks. We stayed close to the center to avoid the deep crevices formed from the rushing floods after a heavy rain fall. The houses were spaced more distantly here, where a tropical wilderness flourished between the buildings. As we journeyed to the pool, I saw an elderly woman bent over a broom of palm reeds, sweeping the bare space in front of her home to keep it "neat." Clearing the areas around a home is imperative; locals believed it reduced malarial infections and warded off poisonous snakes.

The Proposed Solution: A Swimming Pool

The swimming pool appeared as an artificial oasis in the midst of coconut trees and a plantain grove. The vibrant sky blue walls stood out amongst the dominantly green and red surroundings. There was no water in the pool, and Tom informed us that there had been issues

draining it and that it had not been used in over a month. Dried remnants of red clay stained the bottom and tiny feet imprints from children playing in it were noticeable. I walked around the perimeter of the pool, staring at it, bewildered, thinking it had only been a year since it was built and already it's not functioning.

Figure 3. Swimming Pool
Photo courtesy of Karen Kosinksi, 2009

The Source of Disease: Tini River

The path to Tini River was an alluring refuge from the oppressive sun that shined above in the cloudless sky. A natural canopy of tree branches shaded the well-traveled ground that bared the marks of feet, sneaker threads, and sandals of varying sizes. The sound of children splashing and laughing resonated louder as we drew closer to our first view of the river. We stood on the steep embankment of soft mud that dropped significantly to the edge where the muddy water met the shore. A boy, probably around the age of eight, jumped off from a rock into the river, and made tiny waves that splashed his friends. It is close to noon and Wednesday, a school day, and these boys were not where they were supposed to be.

"I know these kids and they *know* better than to do this," Karen said in a dismayed tone. They looked over at our direction once she spoke, but they resumed swimming, unaffected by an audience, a group of *obruni*, watching them. I stood there shocked, wondering how often the children still swam here. Even after Karen's work with disease prevention by constructing the pool and mass treating the student population with praziquantel. Did they not know they could get sick? Did they not care?

Figure 4. Children Playing at Tini River, June 2010

Cross -Cultural Barriers

In a way, the empty pool was an anachronism, a symbol of good intentions, but an oddity, completely out of place in the rural Adasawase village. The pool represented much more, though-a larger problem that many public health projects encounter: How to create effective, relevant strategies in a cultural community that differs from the researcher's. Kosinski was originally met with resistance by her advisors when she proposed the idea of creating a recreating center, which would function as safer alternative to the river. "There's no way a

swimming pool in West Africa is going to work!" repeated one of her advisers adamantly as he tried to deter her from pursuing what he conceived was an absolutely ludicrous thesis proposal. Concerns about the novelty of it, lack of construction supplies and monetary funding, limited community involvement and interest were all reasonable disclaimers: What if the pool does not hold water, a child gets injured or drowns, or there is no money to build it? What if people use the pool and it does not change the disease burden? And what if they do not use it? But Kosinski persevered, devising a PhD project that implemented and studied multiple avenues of schistosomiasis control.

Schistosomiasis Control in Adasawase

Kosinski began schistosomiasis control in Adasawase in 2008 after her initial diagnostic tests on school children revealed that 49.8% were infected. In the first phase of the project, she screened a total of 474 children three consecutive times for the presence of *S. haematobium* eggs in urine. Screening multiple times increases the possibility of identifying an infection because it potentially catches the schistosomes at different phases of maturity in the host's system. Following screening, Kosinski organized and coordinated with Ghana Heath Services to treat those infected with praziquantel, a drug that is effective against all schistome species. Children who were tested positive prior to treatment were rescreened afterward to ensure they were egg negative.

In the second phase of the project in 2009, a year after the initial drug treatment, Kosinski again established the annual incidence of infection, which had rebounded from 0% after treatment in 2008 to 19% a year later. This number signifies the percentage of infections acquired in a single year after mass drug administration and when no other interventions were implemented to control morbidity or transmission. Children that were egg positive and treated in

2008 were re-screened about four times for accuracy of incidence estimates; new students were also invited to participate as well, and total of 437 students were tested. Although, Kosinski added new students to the study, the data she collected on the annual incidence of infection was representative of the cohort of students she began testing and treating the previous year. Immediately after testing in 2009, those infected were treated and the infection rate went down to 0% again. Shortly after, in August, a community pool opened commencing the third phase of the project.

Kosinski arranged for a public water recreation area to be constructed collaboratively by the Adasawase community, undergraduate and graduates students from Tufts University, and engineering and health professionals. Kosinski's thesis of designing an infrastructure intervention to address recreational exposure to schistosomes was a novel approach to schistosomiasis control that had yet to be explored. The goal was to create a structure that met the community's needs, was economically appropriate, and attractive to users (Kosinski unpublished). More importantly, the objective was to provide the children of Adasawase with an area to recreate in that was free of schistosomes. Prior to the swimming pool, children played in Tini River, which was their only escape from the humid weather. The river was also contaminated with human waste and host to the *Bulinus* snail, which were factors involved with perpetuating the life cycle of the parasite.

Funding for the construction came from various sources at Tufts University. In order to establish town ownership of the pool, Kosinski emphasized the building process to be a cooperative effort between her research team and the community, which would assist with future maintenance. Materials used were found locally for sustainability and reproducibility, in case neighboring towns wanted to employ this model. Children did visit the pool between 2009 and

2010, but the attendance waned as time passed, and by the summer of 2010, the draining system was clogged and the pool remained empty for at least a month in disrepair.

Kosinski invited a team of students from Worcester Polytechnic Institute to help her finish her research in 2010. My project group assisted with collecting parasitology data on the annual infection incidence rate in 2010, a year after the children had last been treated and the pool had opened. This would provide a comparison to the rate of reinfection in 2009. The rate of infection we identified was around 5%, which showed an additional decrease. How much of this can be attributed to general awareness about the disease that our presence provoked or to the treatment or to the actual pool itself can probably not be determined. Yet clearly some combination of these factors had worked to reduce infection. In addition to testing infection rates, our group also created a filtration system to make the pool more environmentally sustainable, and we added yet another strategy to prevent further reinfection: an educational initiative to raise the teachers' awareness about the disease. Through a Knowledge, Attitudes, and Practices Survey (KAP) we conducted with students and through focus group studies with the teachers, we found that a general understanding of the disease life cycle, causes, and preventative measures of an infection were not known. We focused on educating the teachers who were primarily responsible for instilling health values and practices in the students. Thus, Kosinski's research and our project reflected the multi-faceted approach of schistosomiasis control suggested by Acha and Syfres (2001). They outlined six methods to effectively control schistosomiasis as seen in Figure 5. Kosinski's program had addressed three of the six methods: testing for the presence of an infection, selective mass treatment with praziquantel for those infected, and changing the environment (at least one aspect of it) by building the swimming pool. Controlling the intermediate host, the *Bulinus* snail, was not pursued since the Adasawase

community decided that the use of chemicals to eliminate them from Tini River would be detrimental to the environment. Also, improving water supply and access to latrines was out of the scope of research for both Kosinski and my group. Therefore, the focus of my group's project was on creating an educational initiative and making the pool a more sustainable resource for Adasawase.

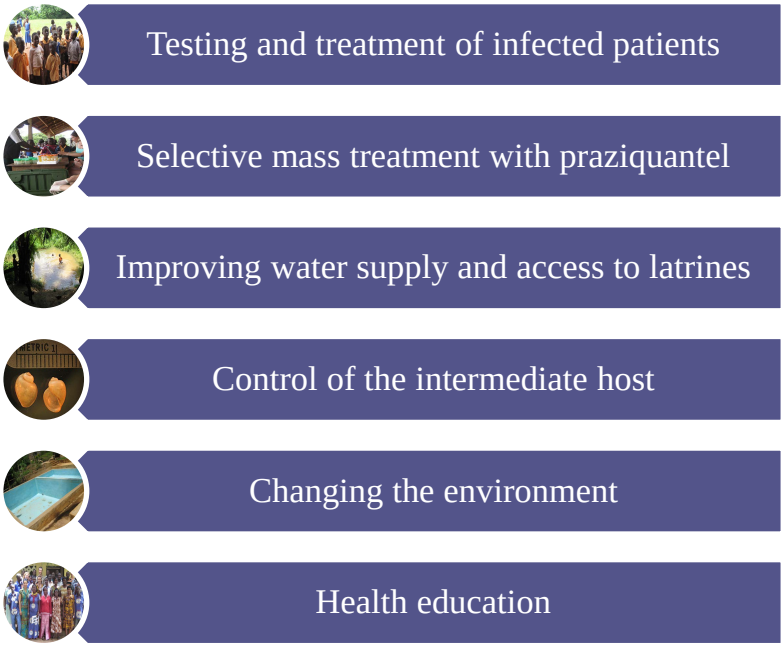

Figure 5. Six Methods of Schistosomiasis Control

Overall, between 2008 and 2010, infection rates fell from 49.8% to 5%. Kosinski credited the pool for some of this success in reducing infection rates initially. But when the numbers were analyzed, there was actually a greater drop in the annual incidence of infection between 2008-2009 before the pool was built than between 2009-2010 when the pool was functioning.

Also, within a year of building the pool, technical problems emerged. It did not drain properly, so it was not in use for over a month. Questions and fears about the pool (whether it was dirty or even safer than the river) were also raised by the community, and these material

constraints and community beliefs could potentially compromise the use of the pool over time. The novelty of the pool was waning; a clear difference is evident with the amount of activity in 2009 opposed to 2010, as shown in Figure 6. The lack of community initiative to maintain the pool lead to it not functioning properly, and students reported to us that they were still using the river. Finally, although the community gained free access to the praziquantel over a three year period because Kosinski had arranged and funded treatment, it is unclear whether continued access to the drug will be there in her absence. How might all these factors influence infection rates in the future?

There is no doubt that this project in many ways stands as a success story, since fewer children contracted the disease and many were treated during Kosinski's project. Yet, the empty pool and the open questions that remain served as a reminder that health care professionals and researchers need to be sensitive to cultural, biomedical, and social factors to be fully effective in communicating public health in communities, especially culturally diverse ones like Adasawase.

Figure 6. Comparing the pool in a year's time span

Professional Writing MQP Objectives

I am currently double majoring in Biotechnology (BBT) and Professional Writing (PW) and concentrating in Pre-Medical sciences. I began the PW project reported here four months after returning from Ghana. The project narrates the key events in my BBT project in

Adasawase, but it does more than tell the story of my research. I use this experience in Ghana to investigate questions about what makes health communication work and to outline a theoretical model for establishing culturally sensitive public health initiatives in specific communities.

The significant decline in infection rates for the Adasawase community suggested that Kosinski's public health initiative worked well for this rural village in Eastern Ghana during the period she worked there. But what worked specifically and how? Even though there was success in achieving a lower disease burden in the school children, some strategies were employed without fully anticipating cultural barriers, which may create problems for long term effectiveness. How might inattention to cultural factors influence the long term success of Kosinski's strategies? What are the implications of this project and what can others learn from it?

My goal is to research what other public health communication experts have said about cultural sensitivity in the design of health campaigns and to outline a model for cross cultural communication, illustrating parts of my model with examples from my Ghana experiences. My example may assist future researchers and public health educators in understanding how cultural, societal, political, and health aspects of a community can influence the success or failure of a public health initiative.

Chapter 1: Colliding Cultural Frames for Disease

It was late June and our group recently finished revising our Knowledge, Attitudes, and Practice (KAP) survey to perform on the school children. We created and conducted this interactive KAP survey to gain an understanding about the students' knowledge on schistosomiasis, so that we might devise an educational initiative to supplement the work Kosinski started. Tom and I were going to start the day at the Presbyterian Primary school conducting surveys, while the others were collecting urine samples at JHS.

A desk chair rocked slightly on the cracked concrete ledge of the school where I was about to sit. As I shifted my body to conform to a small space usually occupied by a child, the head of a school boy peered out of the entrance of his classroom and turned cautiously in my direction.

Figure 7. Adasawase Presbyterian Primary School, July 2010

The whirling buzz of my ancient lap-top echoed down the empty portico lined with classroom doors. Tom called gently to him, "*Bra, bra,*" signaling with his hand to come towards us. The boy took small, timid steps in our direction, passing the open windows where his attentive classmates were; he switched his uneasy gaze from them to us. His blue shirt was tucked in neatly at the waist, where a tattered black leather belt fastened to the last hole gripped tightly his khaki shorts and top, keeping his uniform securely in place.

Tom balanced on the opposite edge of the desk bench scanning the mountainous scenery; he stood up slowly as the boy came in his peripheral view.

The boy tilted his head back slightly to take in Tom's 5'11 muscular frame conditioned from an earlier boxing career. Tom proceeded to squat down so their eyes were leveled and placed his hands on the boy's shoulders.

"*Ye fre wo sen?"* Tom asked softly.

"Asabre, Fredrick." The boy replied formally.

"*Class ahin? Woadi*...uhhh" I interjected, questioning his year in school, but struggled to figure out how to ask his age. I

"Name Days"

In Ghanaian culture, a child is given a birth name as well as a "name day." This signifies the day of the week they were born on and there are different ones for both males and females (Owusu-Ansah 2000).

Usually, certain personality characteristics are also associated with each name day as well. For instance, I was told that those who are Tuesday born tend to be outgoing, mischievous, and gregarious, which interestingly reflects my character fairly well.

Males and females that share the same weekday of birth call each other, "name sakes." When we met another person who was our "name sake," we were received with even more enthusiasm and excitement! It served as a way to bond and connected us with them by sharing this.

Also, when we first arrived in Adasawase and introduced ourselves by our name days, usually others will respond by providing theirs as well. Otherwise, they would state their birth name.

Day of the Week	Male	Female
Monday	Kojo	Adjoa
Tuesday	Kwabena	Abena
Wednesday	Kwaku	Akua
Thursday	Yaw	Yaa
Friday	Kofi	Afua
Saturday	Kwame	Ama
Sunday	Kwesi	Akosua

quickly switched my focus from the blinking cursor on my screen to Tom and forced an uneasy smile to mask the embarrassment.

"*Woadi mfe sen?*" followed Tom promptly adding a reaffirming chuckle.

"Class two, eight," said Fredrick as he reoriented his position to face the desk where I was taking notes.

"Abena, it is okay, you have learned Twi fast, fast!" Tom exclaimed proudly to me as he looked back at Fredrick.

"*Woaye adee pa obruni*!" cheered Tom while clapping, "Good job white person!" Fredrick laughed loudly using his hands to cover the widened grin he displayed.

"*Me da ase*," I retorted saying thanks in a sarcastic manner, but eventually gave into joining their merry chorus.

Tom placed his hand on Fredrick's back and guided him to the desk to be interviewed. Fredrick took a seat next to me as Tom knelt down beside him; there was no way all three of us would have made it on the bench! Tom explained in Twi the purpose of our Knowledge, Attitudes, and Practices survey (KAP), while Fredrick's eyes were fixated at the laptop screen, which displayed familiar images of his town on the introductory slide of our PowerPoint presentation.

Figure 8. Carrie and Tom performing a KAP Survey at Presbyterian Primary School, July 2010

Our MQP group adapted this survey from a basic one that Kosinski initially had written and orally translated in neighboring endemic towns. She wanted to gain a sense of local understanding of the disease without actually implementing the survey in Adasawase, fearing it would be a confounding variable that could potentially influence her experimental set-up, which focused on treatment and building the pool as the primary methods of schistosomiasis control. Questions generated from her survey received approval from Tuft's Institutional Review board. We used them, formulated additional ones, and asked a total of thirty questions on the following topics: water usage, sanitation and hygiene, knowledge of schistosomiasis, attitudes and health practices, and use of the swimming pool; see Appendix A and B to compare Kosinski's survey to my MQP group's. We expanded upon Kosinski's survey by asking additional questions about pool usage to improve the site and see how often the children actually went. We also tailored the questions to be specifically focused on schistosomiasis and their interaction with Tini River.

Brief History of Bilharzia:

Theodore Maximilian Bilharz, a German pathologist, (1825-1962) was the first to describe schistosomiasis in humans (Coon 2005, 163-8), which was the most widespread tropical disease of the time: bilharziasis (Science Photo Library 2011).

In 1851, he discovered male and female schistosomal worms in the portal system and bladder while performing autopsies on infected patients in Egypt (El-Zayadi 2004). Bilharz originally named the worm *Distomum haematobium*; it is currently known as *Schistosomiasis haematobium*.

He also identified the eggs with their peculiar pointed terminal projection, which is a distinguishing feature for eggs of this species. The disease is named after Bilharz in honor of him being the first to discover it.

Figure 9. Theodore Bilharz (Science Photo Library 2011)

Whereas, Kosinski asked general questions on water usage, health practices, and knowledge of various diseases such as Bilharzia, malaria, and helminth (worm) infections.

We also upgraded the surveying medium from paper to a laptop to make it more engaging (Conover, Ellsworth, and Mason 2010). Colorful visuals were intended to stimulate the students' interest and photographs were taken in Adasawase to bridge the language barrier. Although native interpreters were used to translate, our MQP group hoped that local photographs would assist the children in pointing out answers more quickly and aid in gathering accurate information if the children could not simply understand what was being asked.

Figure 10. Screen Shot of KAP Question #6

For instance, question number six read: "Which of these places have you ever used to urinate?" The slide had five pictures

labeled from A.) to E.) which pictorially represented the words that were associated with the locations: bush, Tini river, latrine, ditch, and road. Fredrick was advised to point to any and all the places he would go urinate, and I recorded his answers, taking note of where his finger would slide across the screen.

The space bar clicked down and the next question appeared. Tom carefully asked Fredrick if he knew about, *dwenso mogya*, bloody urine, and Fredrick nodded his head signifying that he did. Then Tom inquired if Fredrick knew what "Bilharzia" was and Fredrick replied, "*dabi*," no.

A Disease without a Name

Like Fredrick, 93% of students when asked knew about *dwenso mogya*, a colloquial Twi phrase for "bloody urine." But only 24% of the students acknowledged the term Bilharzia, which is a synonymous term used for the disease. Furthermore, when the children were asked an open ended question on what they perceived as health risks in the community, only 6% referred to the disease, and all of those used the term Bilharzia. This suggested to us that Fredrick, similar to the majority of his peers we surveyed, recognized what medical experts call schistosomiasis as a condition, a state of being, but not as a disease, a threatening problem in the body which elicits a more urgent response and carries greater health implications. After looking at this data, we began to realize that. It seemed that the children did not "frame" schistosomiasis as a "disease," as medical experts might, but as benign condition, blood in the urine, which they tolerated and saw as inevitable. And was this possibly the reason why it is missing on the community's health agenda?

Understanding the Frame

A frame is the way people define social problems like public health issues. It implies a name and definition for the problem, explains the causes of the problem and its effects (Rosenberg 1992). In turn, this understanding leads to options for responding to the disease and prescribing remedies (Entman 2003, 51-58). The frames people use have the power to influence and shape private opinion and action. But also the way disease is approached in the public and professional sphere can influence legislative policies and medical practices. In the public health domain, once a problem is "discovered," by naming it, assigning responsibility for causes and solutions, this forms the crux of discourse on the issue (Lawrence 2004, 56-75). But a disease's "causes and solutions" are often not, in the public domain, simply perceived as biological phenomenon. Frames incorporate social, cultural, and biomedical explanations from the patient and physician's perspectives. When analyzing health frames, it is important to examine factors such as emotions, beliefs, lifestyle, and peoples' understanding of bodily functions and processes.

Kleinman (1978) explains that patients and medical experts often see disease differently; patients experience illness whereas medical experts diagnose disease. Illness can be defined as the "innate experience of symptoms and suffering," and is personal to the sufferer. The patient responds to this experience by categorizing the forms of distress: "Illness is shaped by cultural factors governing perception, labeling, explanation, and valuation of the discomforting experiences;" this process is embedded in a complex nexus of family, social, and cultural values (Kleinman 1988). Conversely, disease is defined by doctors as abnormal "pathophysiological processes," and the product of "recasting [the] illness in terms of theories of [physiological] disorder." A clash between a patient's experience of illness and the doctor's diagnosis and

treatment of a biologically focused disease can complicate communication between these respective parties.

In the case of health and disease, medicine often frames the experience of illness in a confined sphere of science, “treating suffering as a problem of mechanical breakdown requiring a technical fix” (Kleinman 1988). Physicians use the biomedical frame to understand the causes and provide solutions that focus on specifically treating the body. However, patients draw from personal, cultural, social, spiritual, moral, and experiences to understand their illness and how to address it. For example, a Catholic female who has acted out of the Christian ideals of abstinence may perceive her sexually transmitted infection as a result of her sinful action. A person’s understanding of illness is called an explanatory model that draws upon personal, familial, and cultural beliefs and values. The explanatory model of a patient is comprised of the informal decision of what an illness is about (Kleinman 1988). Similar to how doctors create an explanatory model that concentrates on a biomedical/physiological foundation, patients “use intellectual building elements available to their particular place and generation” (Rosenberg 1992). Explanatory models refer to individual interpretations of disease or illness. Frames are interpretations that arise out of shared values, interests, and experiences of particular groups. The Adasawase community is in a rural setting and their beliefs, level of health awareness and education, and geographical surroundings influence their framework for understanding schistosomiasis.

The community’s perception of *dwenso mogya*, as a condition, and neither as an illness or disease may possibly allow them to dismiss the severity of schistosomiasis; long term consequences include bladder cancer, which can lead to death. Researchers who have studied views of disease in Africa have noted similarities individuals view malaria: “Even malaria,

generally associated with more morbidity and mortality than schistosomiasis, is regarded by many rural people as an inevitable part of their lives and less important than poverty, hunger, and lack of basic services such as electricity, roads, schools, and employment" (Kloos 1995, 1497-1511). It is even more disheartening for me to think that it would ever be considered "acceptable" to have painful urination or bloody urine. But for many, such as 85% of the African population that potentially is infected (King and Dangerfield-Cha 2008, 65-79), it is probably a reality that they must learn to live with and manage.

Rosenberg, a professor at Harvard University in the History of Science, wrote in *Framing Disease* that a "disease does not exist until we have agreed that it does by perceiving, naming and responding to it" (xii). Unfortunately, there is no "official" medical term for schistosomiasis in Twi, which is the primary spoken language in Ghana; whereas specific nosology appears to exist in Western medicine and public health fields. Since the disease lacks a label that marks it as a problem, the community may view it as an issue that does not need to be addressed immediately or with appropriate medical care such as going to the pharmacy, clinic, or hospital. The KAP survey suggested that the way this community frames schistosomiasis--or what we perceive as schistosomiasis--may be very different and complex. To thoroughly understand it, we must recognize the socio-cultural factors that might influence the naming, etiology, and classification of schistosomiasis in the Adasawase community, and explore the consequences and responses that are elicited in such a framework. In what follows, I attempt to sketch out the community's framework and how it may be influenced. Through this analysis, I outline a culturally sensitive model of communicating health. Part of this model is adapted from Barbara Sharf, a communication researcher, and pediatrician, John Kahler. This model will provide insight on the factors that influence frames of the community and how they name, define causes,

and respond to disease. The model can help health professionals see what factors to consider when communicating about health and illness. I will use this model and expand upon it as I analyze my experiences working with the community to control the schistosomiasis burden. The continued theme in these narratives will be on the novel creation of the alternative water recreating center, the importance of health education, and also the strategy used to make medication more accessible. I use the story of these interventions to explain the necessity of cultural awareness in public health communication.

A Culturally Sensitive Model for Communicating Health

Sharf and Kahler (1996) explain that the purpose of human communication is to create meaning with others. Since each person operates out of individual experience, the ability to produce conjoint meaning can never be perfect or complete. But a compromise can be reached through a degree of shared understanding. In intercultural communication, this process can be complicated, since cultural differences and each individual's unique explanatory model of health and illness influence defining, diagnosing, and treatment for a disease. Thus, successful health promotion campaigns must emphasize cultural factors and use this information to create culturally sensitive messages (Geist-Martin, Ray, and Sharf 2002). Martin (2002), a professor in the School of Communication at San Diego State University, believes that by deepening our understanding of health beliefs and practices of individuals in cultural communities, we can maximize the potential benefits of technology and care in order to meet their diverse and often unserved health care needs.

Sharf and Kahler recommend that health educators understand how the individual, family, organizations, and community influence behaviors and beliefs about disease (Best et al. 2003, 168-176). Although their model focuses on patient-physician communication, it can also

be applied to becoming more aware of understanding how a cultural community defines and responds to a disease and perceives effects. In turn, this information can be utilized to create an effective program that is considerate of the community's cultural values and beliefs, and that fosters community support and maximizes health care delivery outcomes.

Communication between a community and health care researchers occur in a larger society where "institutional norms, economic realities, and sociopolitical forces impinge powerfully and subtly" on each party (Perloff et al. 2006, 835-852). Sharf and Kahler (1996) noted these social forces lead to five different layers or levels of meaning exhibited in physician-patient communication, as seen in Figure 11. Their "systemic model" of organizing the complex layers starts from a broad level, ideology, which consists of basic organizing principles that influence the other levels, such as sociopolitical, institutional/professional, ethnocultural/familial, and successively leads to the individual's belief.

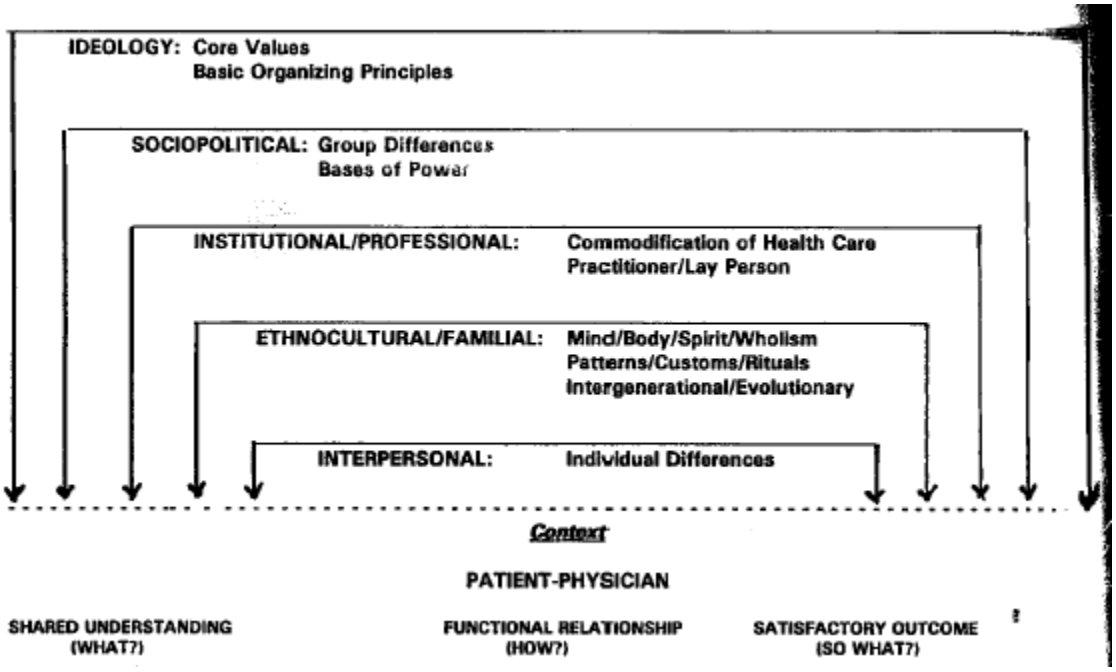

Figure 11. Culturally Sensitive Model of Patient-Physician Communication (Sharf and Kahler 1996, 95-115)

The ideological level, according to Sharf and Kahler (1996), is the crucible from which the philosophical "truths," the ethical underpinnings, of the society are generated. It represents cultural, symbolic, or belief systems that are agreed upon and it creates coherence in that particular society as well (Gerring 1997, 957-994). For example, in America an ideology of individual freedom is widely accepted and acclaimed by its citizens, because of the country's founding on the principle of religious autonomy. In Ghana, the supremacy and value of nature is an ideology that permeates cultural and belief systems.

Value is attached to the land and natural resources in Ghana. Dr. Asabere (1990), a Ghana native and professor at Temple University, states that in his home country, as in most sub-Saharan Africa, "land" has several dimensions economic, religious, and political. He recognizes that land is an economic asset, a significant resource, and a factor of production. Since land is the most important input in subsistence agriculture, which is practiced by a majority of the African population, it is a key factor in the economic life of the people (Asabere 1994, 281-289). Religious beliefs "created a reverence for nature and natural places which meant that people and nature interacted in such a way that harmony was maintained and a balanced ecosystem existed" (Omari 1990, 167-175). Also land is claimed by lineages and tribal leaders, and because tribal land is ancestral property kinship, reverence for the ancestors, and the trust in the spiritual power of the earth have combined to give land tenure a special character (Gildea 1964, 102-104).

Chapter 4 focuses on the implications of overlooking the supremacy and esteem of nature in the Adasawase community and how this ideology may have influenced the community's response to framing schistosomiasis. Although, the river was recognized by the researchers and the elders in the town to be the source of infection, the community members may have found it

challenging to believe that a naturally revered commodity could potentially be harming them. Also, the difference between views of nature and man-made structures will be explored.

The sociopolitical level focuses on societal group differences and how this can produce an unequal distribution of power. Sharf and Kahler (2006) stated that social and political forces form the backdrop and operant patterns for all human interactions. The prominent group differences that form the primary base of social power in America include race, class, and gender. Within these social categories, certain groups of Americans have enjoyed privileged status, the cumulative effects of which have been correlated with increased employment advantage, higher economic status, and greater access to resources (Sharf and Kahler 1996, 95-115). Conversely, the authors assert that individuals who are members of subordinate groupings, in particular racial minorities, have been marginalized in regard to the same opportunities. Similarly in Ghana, poverty, occupation, educational and socioeconomic status, lack of access to water/sanitation infrastructure, and gender are also social determinants of health.

As of 2008, 85% of all schistosomiasis infections are found in sub-Saharan Africa (King and Dangerfield-Cha 2008, 65-79), mostly among poor people who live in remote areas, without access to health services, safe water, sanitation, and education. Thus, the presence of schistosomiasis can be argued to be an indicator of poverty (Watts 2005). In addition, schistosomiasis is also one of the thirteen neglected tropical diseases (Hotez et al. 2007, 1018-1027)and these neglected tropical disease are considered poverty-promoting because of their chronic and stigmatizing character and impact on child development, pregnancy outcomes, and worker productivity (Hotez and Ferris 2006, 5787-5799) .

Characteristics of poor populations relevant for schistosomiasis research in sub-Saharan Africa are lack of access to resources especially health services, safe water and sanitation, education, inadequate diet, and limited social capital and access to social networks essential to obtain resources and overcome periodic domestic crises (Watts 2005). I would not necessarily classify Adasawase to be a "poor" community, but it does attain characteristics to be categorized as one. The most prominent issues are the lack of access to resources, in particular professional health care and medical treatment for the disease. There are three "chemical" stores in town, but they are not certified to distribute praziquantel, the most effective prescription drug against schistosomiasis, which is only available in pharmacies or hospitals located in larger cities. The closest facility with staffed doctors is three miles away, and costs incurred with treatment and transportation would amount to a week's wage, approximately equivalent to $5-10, or significantly more. Access to healthcare remains a major challenge in Ghana, particularly in rural regions. The Ministry of Health estimates that only 45% of rural households, compared to 92% of urban households, have access to a healthy facility, meaning they are within an hour's travel to a public or private facility by any mean of transportation (Segre 2008). Prior to Kosinski's research, the community did not have a recreating area with "safe water" for the children, which was exposing them to the parasite. Lastly, the rural community has a limited ability to influence policy or governmental institutions to respond to inequity in treatment and medication, since they are geographically isolated from cities where decisions are made (Aagaard-Hansen 2009).

I did not ask questions about different "class" systems which operate on a subtle level that influence decisions about what type of health care to receive and treatment options. But I wish I did have the ability to study in more detail this aspect of the model.

Limited access to education is also a contributing sociopolitical factor. Ghana began to take the first steps towards state-organized education in the last quarter of the 19th century. Until then informal systems of education in Ghanaian communities prepared their members for citizenship. Homes were the schools, parents and elders in the family were teachers, and the curriculum focused on learning life lessons (Eyiah 2011). For the Adasawase community, the primary occupation for many adults is farming and since it is a rural community, many did not have opportunity to receive formal education. Although children are currently benefitting from governmentally funded schools, a majority of the adults have a limited knowledge about the health risks of schistosomiasis, since formal education is one of the only means of disseminating the information.

Another sociopolitical factor is gender and occupation, which are social determinants of health that predispose children and women of contracting an infection. Children from the ages of 7 to 14, farmers, fishermen, and village women have the highest risk of becoming infected because of their interaction with contaminated water (Acha and Szyfres 2001, 146-157). Through our KAP surveys, we found that as much as 73% of the children were potentially exposed to an infection because of domestic use. The following shows the number of students who performed daily chores in which they relied on Tini River: 29 fetch water, 24 wash their clothes, 17 use the river to bath, and 9 to go fish. Kosinski's research specifically focused on children infected in the community, but I wonder what the disease burden is in female adults who also perform domestic tasks. Although these "factors" cannot be changed, such being a child or a female, control programs can be altered to benefit those who are more inclined to being exposed to the disease; this will be further analyzed in Chapter 2 in regards to the health education initiative as well.

The institutional/professional level addresses health care and related organizations that instate rules and regulations about health and disseminate information (Sharf and Kahler 1996, 95-115). World Health Organization (WHO) represents a larger professional organization, which works in conjunction with United Nations system and is "responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends" (World Health Organization 2011). In a recent country profile on Ghana, the WHO (2008) identified research priorities for public health professionals who there. The WHO recommends information on schistosomiasis distribution, mapping status, and implementation status of control. In addition to the WHO, local institutions shape understanding and treatment of schistosomiasis in Ghana, which include the schools, chemical stores, and council of elders in Adasawase. Also, I would extend this concept to incorporate informal infrastructures and networks that assist with spreading health awareness and instilling health practices, such as the local healers and religious leaders of the community.

From our interactions at the schools in Adasawase, we learned that all of these institutions play a role in educating the children. But teachers are primarily responsible for teaching general hygiene and disease prevention; these lessons were incorporated into their science curriculum. In addition, the family also serves to impress ideals of cleanliness and health on the children. In our survey, we noticed a difference in how the family and schools focus on specific health issues. We believe the information gap is representative of the fact that students are learning about certain diseases in school, while their families maybe uninformed or unaware of them. Since the children are primarily affected by schistosomiasis, our intention was to raise

teacher awareness so that their knowledge would directly influence them and diffuse throughout the community; Chapter 2 will elaborate further on this process.

There are three “chemical stores” in Adasawase that carry over-the-counter medicine, but do not have the certification to distribute prescriptions, which would include praziquantel. This means that medication for treating schistosomiasis is not available in the community. Kosinski was able to utilize her “cultural capital” to fund and organize mass treatment in the schools, but will the community be able to make this a sustainable method of control in the absence of her presence? This question will be explored in more detail in Chapter 3, which covers equity and access to health care and medication.

The local council of elders and the chief of Adasawase also assisted in making health decisions for the community. Kosinski appealed to elders and chief when she first arrived to conduct research for the community and after establishing the need to control the disease burden, she worked collectively with them to devise a public health program. She made recommendations and respectfully allowed the elders and chief to decide what methods of control to employ. In order for the community to be accepting of her work, it was imperative that she follow the cultural tradition of seeking the elders and chief before starting. Kosinski wanted her methods not just to work in the short term; she knew for long-term success she would have to involve the local council and she clearly tried to build a relationship with the community by engaging their hierarchy of power to increase health awareness and preventive methods of schistosomiasis control.

Sharf and Kahler’s (2006) “ethnocultural” level concerns cultural values and beliefs embraced by particular ethnic groups. Ideology encompasses the larger organizing principles that

influence all levels of society, whereas ethnocultural values are specific to groups within a collective society. The ability to provide culturally sensitive care to promote positive health outcomes for patients has emerged in recent discourse (Perloff et. al 2006) for public health scholars, psychologists, communication researchers, and health practitioners (Crandall et al. 2003, 588-594). Conflicts can arise between public health researchers and communities, if cultural customs or beliefs are not respected, which can hinder the progress of work or make programs completely ineffective.

Ethnocultural values and beliefs can incorporate religious preferences and ideals. In the community, I was aware of Christian and Muslim religious denominations, but I wonder how this influenced how people in each group framed schistosomiasis. Would treatment options change, such as not seeing a traditional healer or only attending a hospital? Are there religious beliefs that affect pool versus river usage and dependence? Does acquiring an infection reflect negatively on one's spiritual or religious status? I did not have the opportunity to ask these questions or explore specific ethnocultural values and their impact on the community understanding, but future researchers or health educators in this area should study this aspect of the model in more detail.

Chapter 4 discusses the various cultural traditions in the Adasawase community such as pouring libations. This act of reverence is performed at rivers and other natural sites, which serve as a passageway to the gods, and provides a way to communicate to the sacred. This traditional practice is performed as a ritual to petition for blessings, peace, healing, and prosperity. The reverence for nature is exhibited through this cultural act and will be further expanded upon in this report.

The final level of Sharf and Kahler's model is "interpersonal," which incorporates the individual's beliefs, expectations, and attitudes learned through culture and shaped through unique personal experience (Perloff et al. 2006, 835-852). The informal and formal discussions our research team had with the individuals students showed that they did not always see the disease the same way, even though they are from similar cultural groups or even families. Because my goal was to understand the larger beliefs and patterns of the community, we focused on the general perception of the interventions instead of focusing on specific individual differences. However, I believe the individual opinions in regard to this disease and how it perceived should not be neglected or overlooked by those treating them. There is value in exploring the interpersonal level when treating individuals.

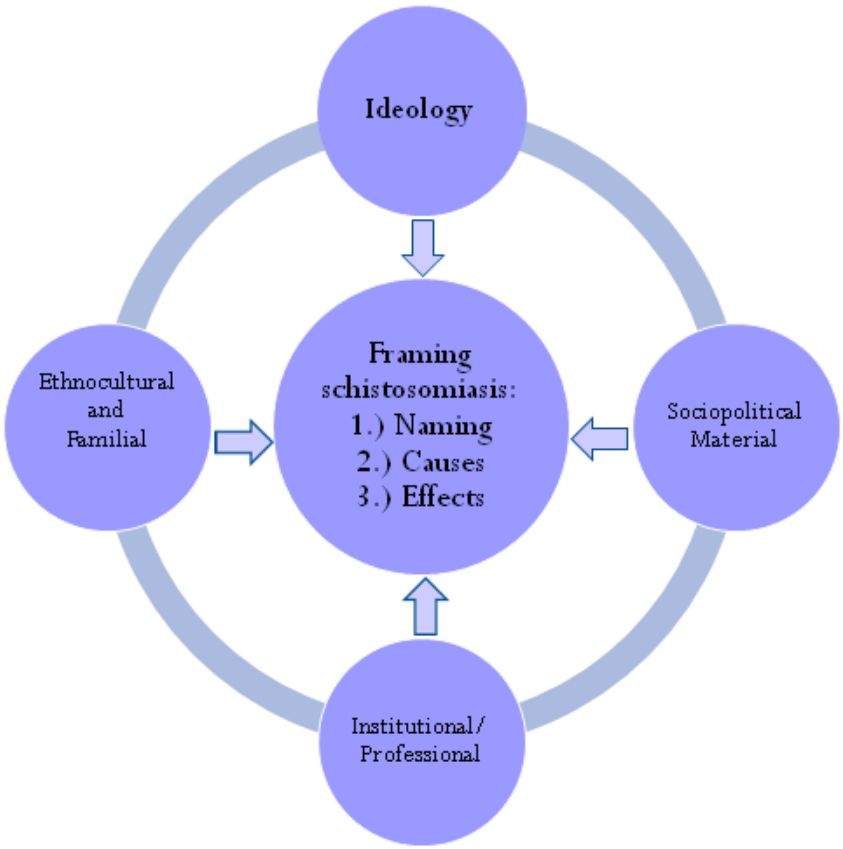

Figure 12. Adapted Culturally Sensitive Model of Communicating Health (Sharf and Kahler 1996, 95-115)

A New Culturally Sensitive Approach to Understanding Disease

I propose combining the idea of framing with an adapted version of Sharf and Kahler's model to understand how culture can influence a community's ability to name and identify the causes and effects of a disease. The levels that Sharf and Kahler present (ideology, sociopolitical, ethnocultural, institutional/professional) are organized in my model to be factors that collectively influence how the disease is framed. I also removed the interpersonal level, since the focus of my project was on the community's beliefs and values, not the individual's. I made an addition by combining the sociopolitical level with "material" factors. This is relevant because inequity to health care, treatment, and resources greatly affect how the community responds to a schistosomiasis infection. In the following chapters, I analyze all of these factors in the Adasawase community to better understand how they might have responded to the public health initiatives and how they might right respond in the future. These factors also pointed to areas where I did not have enough knowledge and could pose additional questions that could be investigated for future public health campaigns there and elsewhere.

Two Frames

To start, I would like to briefly attempt to describe the Adasawase community's understanding of schistosomiasis: how they name the disease, acknowledge the causes of it, and perceive its effects. This might help explain what their responses are to it. Although I do not completely understand their frame, I can piece together parts of it based on my experiences.

The Adasawase community recognizes schistosomiasis as a condition, but not a disease, since there is no biomedical term for it in their native language. The cause of the disease is vaguely understood by the students we surveyed. Approximately 84% of them knew that "*dwenso mogya*" was contracted by playing in the river, but did not specify or recognize how schistosomiasis transmission occurs. 16% expressed that they learned from their headmasters or

teachers that it was also caused by chewing a certain type of tree leaf which dyes the urine red, suggesting that they may or may not perceive the color of their urine as being indicative of a serious health issue. Their knowledge of such a disease and what causes it by medical standards at best is incomplete and at worse, inaccurate.

We found through our survey that the community does not correlate the symptoms of schistosomiasis to a disease or acknowledge it as having problematic effects warranting a medical response; this may explain why many who are infected do not respond accordingly. By respond, I mean seeking medical attention for symptoms, such as bloody urine or painful urination that they exhibit when infected. But in addition to their understanding and experience of bloody urine, even if they were to attempt to get help, material factors such as distance from medical facilities and funding for praziquantel, the drug of choice for treatment may determine their ability to get treated. Parents would need to travel three miles to the closest hospital and pay for medication, which may not be a financially feasible option and is a time consuming process. Through our KAP survey, there is evidence that supports the community seeks prayer clubs and traditional healers as alternative options and institutions of healing.

Figure 13. Comparing Frames

In order to understand a community's behavior towards a disease, public health researchers need to investigate ideological, institutional, socio-political, ethnocultural, and material factors that influence a cultural community's framework. Here I present three extended stories that illustrate how the community names, understands the causes, and respond to schistosomiasis by analyzing institutional forces such as education, the unequal access to medication, and the importance of nature.

Chapter 2: Health Education Initiative

Education is not often a prevailing method of schistosomiasis control, but my BBT MQP group wanted to utilize educational institutions as means to spread awareness and possibly change behavior. F.L Dunn (1979), who was a professor of Epidemiology and International Health at University of California Medical School in San Francisco, elaborated on the communication barrier between disciplines within medicine and public health. He noted how health educators and biomedical researchers may overlook how to utilize each other's disciplines and calls for more collaboration and integration between the two to increase the effectiveness of communicating health. By studying the parasitology data and the results from our KAP survey, we wanted to use education as an interface to convey information about schistosomiasis from the researcher to student, teacher, and community. We also wanted to understand how culture can influence health practices, behaviors, and how they frame schistosomiasis.

In order to create an educational initiative, we needed to assess the students' knowledge of schistosomiasis by conducting a KAP survey for baseline reference. The survey was divided into five sections with thirty questions that focused on the use of Tini River and the pool, general schistosomiasis awareness, and overall disease knowledge. A brief outline of the survey is shown below:

1. **KAP: Water**
   -5 questions focusing on the students' interaction with Tini River to determine their risk of acquiring an infection.
2. **KAP: Sanitation and Hygiene**
   -5 questions inquiring about the students' sanitation and hygiene practices; explored bathroom habits and where they observe people in their community urinating/defecating.
3. **KAP: Knowledge of Disease**
   -7 questions determining whether or not the students have a basic biomedical understanding of schistosomiasis.

4. **KAP: Attitudes and Practices**
   -5 questions asking the students what they are taught in school about health and disease, what they do when they are sick, and whether they self-report a schistosomiasis infection.
5. **KAP: Swimming Pool**
   -8 questions gathering data on pool use, what can be improved at the pool site, and to learn who is using the pool to recreate.

The complete survey is available in Appendix B. Two survey mediums were used; one was on paper and the other on a laptop using PowerPoint presentation. When researcher work with communities, they usually gather information orally by conducting focus groups (Lansdown et al. 2002, 425-433) or on paper through questionnaires (Magnussen 2003, 243-254). During the trial phase of testing the paper format of our survey, we found that students exhibited a limited attention span. This incident provided the impetus to create an interactive version of the survey using a lap top. Eye-catching colors and visuals were used to engage the students and help bridge the language barrier. The question appeared at the top of the slide and answers were written and pictorially represented. Photographs were taken in the Adasawase community of familiar locations, so the children could recognize and make visual associations and point to their answers.

A total of 85 students were surveyed from all three schools in Adasawase (Methodist Primary, Presbyterian Primary, and Junior High School) from July 8-16. Three native, Twi speaking Ghanaians were employed as translators to conduct the survey in the student's primary spoken language to minimize miscommunication and yield the most accurate results. Students were surveyed during school hours, between 8:3AM and 1:20PM, either when the children were on break or while class was in session by excusing students from class one at a time to cause the least disturbance to their lesson; the survey would take between 10-12 minutes to complete. Both the paper and PowerPoint surveys were written in English to prompt the translator, who spoke

Twi to the students, and then relayed the students' answers to a project group member in English. We collected all the students' responses and compiled them in an Excel file. Upon analyzing our findings, we further studied how the students characterize health issues and disease, their knowledge about schistosomiasis, and if they recognize the biomedical name for the disease.

Figure 14 shows what the students identified as health issues. Questions 10 and 18 on the KAP survey were open ended and allowed the students to classify what they perceived as health risks in their community (Question 10), the black bar, and what they learned in school about health and disease (Question 18), the gray bar. The comparison between community observations and what the students learn in school reflects on the health issues different institutions emphasize. Students were allowed to provide more than one answer to each question. The students' responses were organized into different categories as shown on the y-axis to consolidate the information we obtained.

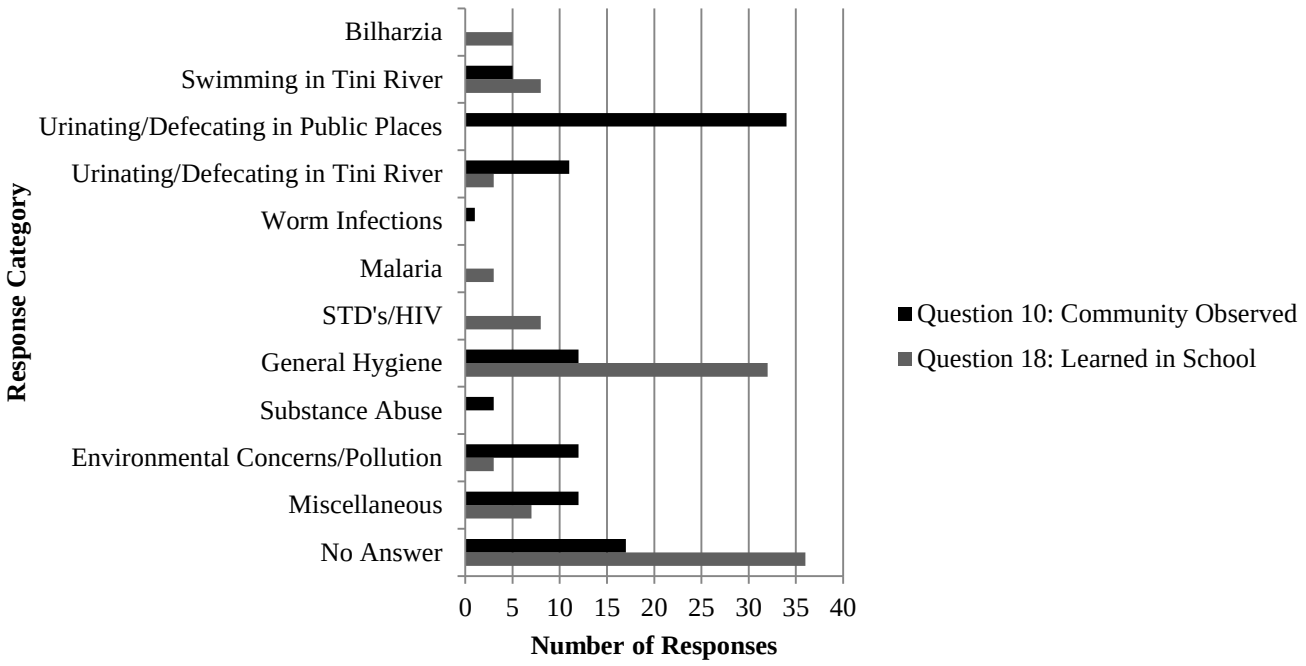

Figure 14. Characterized health issues and disease

Health Risks Children Observe in their Community

Urinating/defecating in public places was classified as the most frequently reported health issue in the community from the student's perspective with 34 responses in this category. Although we did not extensively study religious practices and beliefs, we were aware that a few families in Adasawase were Muslim. According to this faith tradition, I learned from Reverend Cheryl Leshay, a WPI Campus Religious Center chaplain that Muslims must maintain physical purity in order to participate in the Salah, five daily prayers. Before prayer they need to perform a cleansing ritual and to make themselves physically pure, washing any impurities such as human waste. Furthermore, depending on the child's religious or cultural values, viewing nature as sacred and how it is an ideology, they may not urinate in the river as well; only 5% reported doing so. Family and religion are institutions that can be responsible for influencing how a student perceives health risks. For instance, a student's religion may focus on bodily cleanliness, which may also be symbolic of spiritual purity. Therefore, they may believe that depositing

excreta publicly would be violating this belief and viewed as a health risk, since it is a spiritual violation as well.

The second most common health factor mentioned was environmental pollution, which showed how nature as an ideology was also evident in these results. Environmental concerns and pollution collectively received 13 responses. Students specifically mentioned throwing trash in the river and around town as well. If I had the opportunity to return, it would have been beneficial to ask the students why they believe polluting the river is bad and see if there is a correlation between this and how they revere nature.

Health Risks Children Learned in School

The most common health risk that students learned in school was about general health and hygiene. The school as an institution also impresses certain health lessons that are important for promoting health and safety. The Institute for OneWorld Health (2011) on their website claim that 1.6 million children die annually of diarrheal diseases. In developing countries, poor sanitation and hygiene contribute to the prevalence. By raising awareness for hand washing and sanitary waste disposal this can help reduce the number of sicknesses. A rural community like Adasawase would have an increased likelihood of diarrheal disease cases because of limited access to potable water and knowledge of sanitary practices. This may provide support as to why general hygiene received the highest response from students about a health topic they learned from school. If schools focus more on general health and safety because this could potentially prevent certain disease, then teachers should educate on how specific diseases are acquired, because general hygiene is not enough to prevent malaria or schistosomiasis.

Comparing Community Observed and School Learned Responses

No students specifically stated that schistosomiasis/Bilharzia was a health risk they observed in their community. However, five students said Bilharzia was a health issue they learned about in school. I believe the limited responses we received for this category in particular signifies that both the community and school still do not perceive schistosomiasis to be a disease, a threatening problem which elicits an urgent response, but how they view it as a condition, bloody urine, which can be considered lower on their health agenda. If the school as a health care institution does not frame schistosomiasis as a disease, then why would the students see the need to seek medical attention if they did present bloody urine?

General knowledge about schistosomiasis was also collected from the KAP survey as well. Although 93% of the children mainly identified schistosomiasis by its colloquial Twi phrase for bloody urine, 73 out of the 85 students also associated swimming in the Tini River to be causing this condition. Even though a majority of the children did make this connection, they still did not see or possibly understand the detrimental effects of presenting this symptom. The students also provided alternative answers to what was responsible for bloody urine: six believed that chewing a certain tree leaf, one thought accidently swallowing water while swimming, and two said there were worms in the water. Once again, this brings to question how the community and school are health care institutions that can influence how the students understand the causes of the schistosomiasis.

After reviewing the KAP results, we decided to create an educational initiative for the students on raising awareness about addressing schistosomiasis by a biomedical name instead of labeling it as a condition, explaining the long term consequences of an infection, and how to prevent the disease. Originally, our intention was to visit each of the classrooms in all three

schools, but there were two reasons that deterred us from pursuing this option. Firstly, we were working on a limited time frame and probably could not individually reach all 15 or more classes. Secondly, in regards to the longevity of the educational program, it was more feasible to concentrate our efforts on the teachers who are mainly responsible for instilling knowledge about disease and health. There was also a realization that occurred amongst our group that as much as we wanted to "do the work," we would not be able to return every year to teach the students ourselves. We needed to be involved in the process a different way to ensure that the future success of our educational program we were establishing. I believe this was an extremely valuable lesson to learn, because it is easy to unintentionally distort the focus of one's work. My group decided to take a proactive role in educating the teachers instead of the students because this would ultimately achieve the maximal benefits for the community, and that is what should be the first priority in any project.

Focus Groups with Teachers

In order to create an educational initiative for the teachers, we held focus groups with them to gain insight about what they knew about the disease and what they taught. An abridge version of the KAP survey was made and a full list of the questions can be seen in Appendix C.

Since we decided to visit the teachers after school in order to limit interference and distraction from their students, the cultural interpreter noted that an incentive would be needed for the teachers to participate. We purchased meat pies and soft drinks to distribute during the focus group session. This was also done as an act of appreciation for their cooperation and assistance during urine sample colleting for the past years Kosinski has been working in Adasawase. She was cautioned by her PhD advisers about distributing "gifts" and incentives

when she initially started began work in 2008. She did not want to start a precedent which would make the teachers or community members expectant of favors in exchange for their compliance.

Our focus groups were held in a large classroom or the head masters' office; seating was organized in a circle. Our cultural interpreter assisted with facilitating the discussion, translating our questions and the answers for us when needed. But my project partner and I were able to communicate directly with the teachers, since English is a language requirement when they attend secondary schools or university. A question would be asked and we would wait for a response, but found that the same teachers would speak. We did not want to target questions to individuals in this setting in order to avoid making the teachers uncomfortable or embarrassed if they did not know the answer or if they were apprehensive of being wrong. Even though we encountered this minor dilemma, we still gained insight about their knowledge about schistosomiasis. Table 5 compares the responses we received from the focus groups in each of the schools.

What they do and do not teach

It appears that schistosomiasis is not a disease that is highly emphasized in the health curriculum, even though 85% of those infected live on the African continent (King and Dangerfield-Cha 2008, 65-79). Rather the main health topics were about HIV/AIDS. Even though the teachers claim they teach this, not many students mentioned HIV/AIDs when we surveyed them. So is there is there a disconnect between the students and teachers?

We also asked about schistosomiasis (Bilharzia) and discovered that teachers at all three schools knew that an individual can become infected if they swam at Tini, but none of them knew what caused the disease. If there are gaps missing in the way a disease is framed, such naming it, understanding the causes, and the effects, then a disease fails to exist. If the teachers

did not recognize schistosomiasis an important health issue or topic they teach, then do they view it as a disease at all? I was also surprised that malaria which also is endemic was not mentioned as well. I think it would have been interesting to compare what diseases and health topics the schools focus on and how it differs from the pressing issues that dominate biomedical discourse.

Table 1. Comparing focus group answers for the three Adasawase schools

	D/A Junior High School	**Methodist Primary School**	**Presbyterian Primary School**
What topics about health and disease do you teach?	-HIV/AIDS -Communicable diseases -STDs	-HIV/AIDS	-General health -No specific topics
How do you teach health and disease?	-Integrated in science and social studies curriculum -Students tested with exams	-Health charts -Follow a syllabus -Textbooks -Students tested with exams	-Natural science and integrated science text books
How does one get Bilharzia/bloody urine?	-Swimming in the river	-Water related issues -Being in the same water at the same time with another person who has Bilharzia	-When a person urinates in river and then other people go in the river they become infected
What are the symptoms of Bilharzia/bloody urine?	-Urinates blood	-Painful urination -Bloody urine -Itching of penis/vagina	-Bloody urine -Painful urination
What is the causative agent?	-Small snail	-Water	-Water
What part of the body is affected?	-Urinary tract	-No comment provided	-No comment provided
How does one prevent from contracting Bilharzia/bloody urine?	-Not swimming at the river	-Do not go to contaminated water, river, or stream	-Do not go to river
Where did you learn about Bilharzia/bloody urine?	-University -Workshops	-Textbooks -Workshops/handouts	-Workshops -T.V. -Newspapers
Additional comments	-Design an educational initiative and conduct a pilot study program	-Children self-report more since Kosinski's arrival -Suggest students go to health services for treatment	-When one of the teachers was younger, he contracted Bilharzia and was treated at a hospital

A general understanding about schistosomiasis was known, such as recognizing the name Bilharzia, but there were also misconceptions about how an individual becomes infected and what causes the infection. Teachers in all three schools understood that swimming in Tini was a problem, but teachers in two of three schools attributed water as the causative agent. Although the river is the environment in which the infection spreads, schistosomes or blood flukes are responsible for penetrating a human host's unbroken skin either through sweat glands or hair follicle causing the infection (Acha and Szyfres 2001, 146-157). Only teachers from one school knew the snail as the causative agent, but it actually serves as an intermediate host in the parasite's life cycle. If the snail is missing in the environment, then the life cycle is broken, which is why the pool serves as a safer alternative than Tini river. The snails cannot survive in the pool, since the vegetation they need for survival will not grow or can be sustained there. Even though the teachers recognized that students should not swim at Tini River, no one mentioned the pool as preventative measure.

We also found that only one of the three schools knew what part of the body was affected by an infection. Also, they focus on urination and the urinary tract, but do not seem to know that other parts of the body can be affected as well. I believe this is a key factor that needs to be stressed in order to convey the long term implications of the disease and motivate them to seek medical attention to prevent this from occurring. In my group's BBT MQP report, we found that the parasites attach to the transitional epithelium lining of the bladder, which can lead to irritation and bleeding. This may cause cysts, ulcers, cystitis (bladder inflammation), and/or leukoplakia (hardening of the bladder walls due to keratinization) to develop in the human host's bladder. Bladder irritation can lead to calcification of the epithelium and result in the most serious complication: development of a squamous cell carcinoma of the bladder. Another health

concern that can arise from an infection is the increased likelihood of contracting HIV. The parasite copulates near the blood vessels outside the bladder and produces eggs that tear through the bladder tissue to be excreted in the urine. These tears that form can facilitate the transmission of HIV (Conover, Ellsworth, and Mason 2010). This should provide another reason why the Adasawase community should seek treatment for a schistosomiasis infection to take preventative measures against HIV/AIDS, since Sub-Saharan Africa is the most heavily affected by HIV and AIDS than any other region of the world (Avert 2011). Recent studies also show that heavy infections early on in one's childhood can potentially affect cognitive abilities, which is why treating and educating students is of particular importance.

When the teachers were asked where they learned about Bilharzia a consistent response was from workshops hosted by their respective Methodist or Presbyterian school systems. If we were aware of these workshops, I would have enjoyed attending one to learn about what they teach and focus on about schistosomiasis education and prevention. It would be interesting to observe if what they teach is accurate and who leads these discussions at the workshops, if they are health professions or public health researchers.

Information Session with the Teachers

After conducting the focus groups and analyzing the results, we decided to go forward with planning an informational session with the teachers in order to educate them about the biomedical factors of disease. We sent formal invitations to each school's headmasters to inquire what day would work best for their teachers to meet. We were willing to go to each school and host the informational session, but the three headmasters worked collectively to have all the teachers together at one location on July 23, 2010.

The talk was divided into three sections, which each of my MQP partners lead. We began with a brief introduction of the MQP team and our project objectives, listing the six methods of control for schistosomiasis. We also made a point to refer to the disease as "Bilharzia," instead of addressing it as *dwenso moja*. It was our intention to raise awareness for naming the disease accordingly, hoping this would help change the perception that this not a condition, but a health issue in need of medical attention. Next, we elaborated on the parasite and life cycle, drawing out the various hosts and stages of the schistosomes' development on the chalk board. In the second section, the symptoms of schistosomiasis were described as well as treatment options, recommending they tell students to seek medical attention in Anyinam where Praziquantel is available. When surveying the teachers, a few of them responded that students did self-report to them and its imperative that the teacher can provide an answer and guide the student about what to do if they have an infection. We also emphasized how a heavy burden can potentially lead to bladder cancer and also increase the chances of contracting HIV and AIDS. Lastly, we focused on how the pool serves as safer alternative than Tini River. There was also an opportunity for the teachers to ask us questions. They expressed a genuine interest in seeking more information. The following lists a few of the questions they asked:

- Does the parasite affect any other part of the body as it travels through the circulatory system before it reaches the final resting place outside the bladder?
- If a child urinates in the pool, how do they not infect other children?
- How does the medication work?
- Is Bilharzia a problem in America? Why is it common in Ghana?
- If you fetch river water and bath with it can you still get infected?
- How can you protect yourself if you use river water?
- Does it hurt when the blood fluke penetrates your skin?

We also distributed two handouts as visual teaching aids to each of the school's headmaster. One depicted the *S. haematobium* life cycle seen in a Macmillian Primary science wall chart which we found in the Presbyterian school (shown in Figure 15). An infected boy is

seen urinating in the river, releasing schistosome eggs which hatch upon contact with the water into miracidum. The miracidum use chemotaxis, chemical signaling, to locate the intermediate host, a *Bulinus* snail. The miracidum develop into another larval stage of the parasite called cercariae. The snail sheds the cercariae, which then try to find a human host to infect, which can be boy swimming or fishing. The life cycle continues when the infected boy returns and urinates into the river.

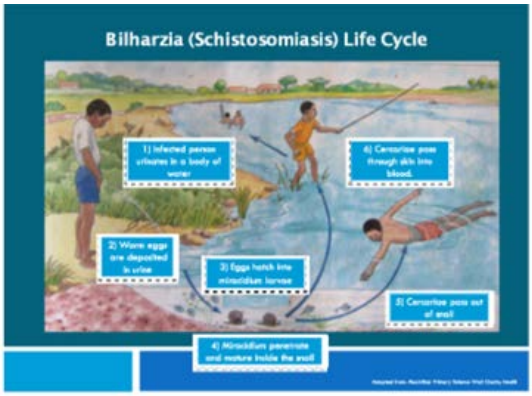

Figure 15. Handout #1 showing the schistosome life cycle

The second handout (shown in Figure 16) consisted of four pictures illustrating the different aspects of an infection. The first picture in the upper left hand corner was of the intermediate host, a *Bulinus* snail. The snail is placed below a ruler to give the viewer a reference for the size, which is less than 1 centimeter. The upper right hand picture shows a male schistosome mating with a female and provides the length of each: a male is 10-5mm in length and a female is 20mm long. The lower left hand picture showed the microscopic view of a schistosome egg at 400X magnification, which was obtained from a urine sample collected that summer (2010). Lastly, in the lower right hand picture was of three urine samples from previous years presenting microhematuria, bloody urine.

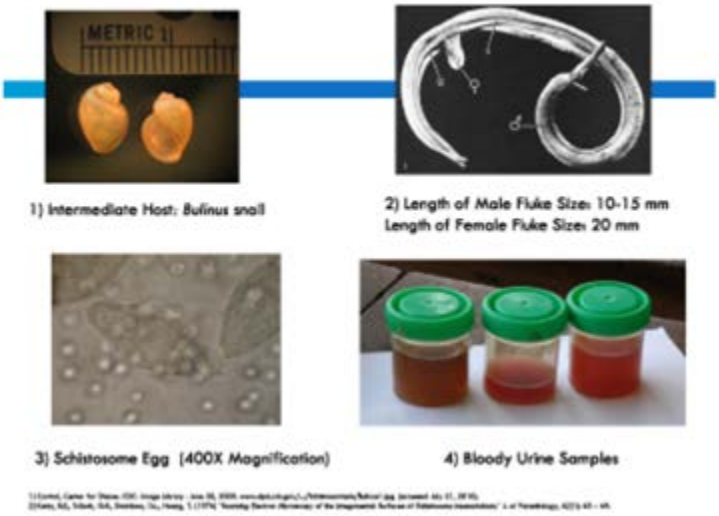

Figure 16. Handout #2 depicting different aspects of an infection

We also compiled a more detailed informational packed on schistosomiasis, which the teachers of Adasawase could utilize when teaching about the disease. Research compiled for the background of our BBT MQP report was used along with additional work focusing on addressing misconceptions.

My MQP group wore traditional outfits for our informal session, matching the teachers who also wore their "Friday best." Different from Western culture where there are casual Fridays, Ghanaians will wear formal clothing fashioned from *batik*, hand-dyed, cloth or traditional cloth. Many of the women wore their *kaba* (top) and *sleet* (skirt) made out of fabric that was representative of their schools' Christian denomination, and men wore dress shirts made out of the same material and dress pants. Figure 26 is a group photo of all the teachers in the Adasawase community who attended our presentation.

Figure 17. Adasawase teachers who attended our informal session

Chapter 3: Healthcare Systems in Ghana

When surveying a drug store in Adasawase, I became more aware of the institutional, material conditions, and sociopolitical factors that influence how the community perceives the effects of a schistosomiasis infection and how this also impacts their response in regards to seeking medical attention.

There were three drug stores all within a short walk from one another and centralized in the center of town. In comparison to other buildings, each of these stores were maintained fairly well, more elaborate in design, and had their own distinguishing features: the first one on the road leading to town had a covered porch and fenced entrance, the second drug store was in the center of town and in a metal storage unit next to where harvested crops are stored, and the last one we visited on July 21, 2010.

The bright blue structure, which contrasted greatly from the predominately red earth, was the size of shed and had the word "drugstore" written artistically on the front. It had a concrete foundation unlike the other housing complexes or structures around it which balanced on raised wooden beams or rocks. Two wooden doors that opened out, revealing a space comparable to a large closet or pantry. Shelves lining the interior walls were sparingly decorated with colorful little boxes and small brown bottles, which were organized in concentrated clusters.

An older gentleman, probably in the mid-60s, was resting in a plastic chair behind the counter. He stood up as we approached him, making the glasses he wore slide down and settle on the end of his nose. He was the owner and gladly obliged to being surveyed. The purpose of surveying the drugstores and the clinic in town was to further develop our understanding of how the community understood schistosomiasis and more importantly how medical facilities and

institutions perceive the disease: Did they know about Bilharzia and the life cycle of the parasite? Do they carry praziquantel? How many cases have they seen? What do they recommend for prevention?

Joel Segre (2008) conducted a case study on pharmacy franchising in Ghana and claims that while Ghana's health care infrastructure includes a multitude of public, NGO, and private institutions, the private sector is often better suited to meet patient demands, with far greater geographic accessibility, and consistent availability of essential drugs. Tonia Marek (2005), the Lead Public Health Specialist in the Africa Region of the World, found that roughly 65% of all treatment seeking behavior in Ghana occurs in the private sector from providers, which include traditional healers, informal drug vendors, non-governmental organizations and community groups.

The rural population is much less likely to seek care outside their home or village and is more likely than the urban population to use the private sector in the form of traditional healers and shops (Marek et al. 2005). The survey we conducted supports this, since the owner stated that community members tend to seek the drug stores as "quick action" to treat their ailment. Normally, the first point of care is often a drugstore run by a licensed chemical seller (LCS) who distributes the most common over-the-counter medication such as antiseptics and pain killers. But the LCS shops lack standardization, and "while they are an indispensible part of the health care system, some present a threat to public health through the provision of incorrect, expired, substandard, or counterfeit drugs" (Segre and Tran 2008).

As our conversation progressed, the man told us that he has been the owner of the drug store for the past ten years and attended the University of Ghana, studying medical science.

Generally, drug store owners or LCS's, do not have formal training, since specific health-related training has not been a requirement and the licensing criteria for chemical sellers "are relatively lax" (Segre and Tran 2008). According to the Ghana Pharmacy Council, LCS's must annually apply for an operating license and show proof of completing senior secondary school (similar to high school) or its equivalent and have no criminal record (Segre and Tran 2008). This drugstore owner shared that he tries to provide the best medication to the symptoms his customers present, but undoubtedly, mistakes can occur, and even more so when these LCS's do not have formal training about disease treatment (van den Boom, Nsowah-Nuamah, and Overbosch 2004). Furthermore, concerns have been raised about the distribution and selling of counterfeit medications or fake drugs, which can cause debilitating health risks to clients (Ghana News Agency 2007).

During our survey with the drug owner, we also asked questions pertaining to schistosomiasis. He was aware of Bilharzia and how children can contract it by swimming in Tini River, but was unfamiliar with the life cycle. If this was the case, it could have been possible that he would not have known that multiple treatments maybe necessary depending on the date of exposure. If parents tell him that their child has blood present after they urinate, he recommended they seek medical attention at the hospital in Anyinam where they can also obtain treatment. But I wonder if he thought if the parents actually did go to the hospital and if they could not, did he have alternative options to offer them? He also explained that since he was a Class C drug dispenser, he and the other drugs stores and clinic in town were not qualified to distribute prescription medication such as praziquantel.

Segre (2005) notes that the Pharmaceutical Act instated in 1961 currently defines and establishes drug prescription and dispensing rights according to following classification of drug

classes: A, B, C, and exempted drugs, see Table 3. In practice, Segre asserts the Pharmacy Council has a very limited capacity to enforce drug class legislation and penalize chemical sellers who illicitly carry Class A and B drugs. Though the Council has the authority to revoke licenses, the infrequency of punitive enforcement means that pressures to carry restricted drugs often outweigh the threat of closure. Chemical sellers, especially in rural areas, face strong financial and social incentives to have class A and B drugs, which account for up 50% of their revenue. Beyond the financial incentive, some LCS's argue that their ability to dispense class A and B drugs mean the difference between life and death for their customers (Segre and Tran 2008). In recognition of this reality, Ghana National Chemical Sellers Association has been lobbying the government for training programs that would qualify LCS to legally dispense class B drugs (Ghana News Agency 2007). However, I am under the impression that drugstore owner we surveyed and the other drugstores in town did not legally or illegally carry praziquantel.

Table 2. Drug classification and dispensing restrictions (Sagoe 1966)

Class	Drug Dispenser
Class A	Class A drug definitions are divided into two parts: - Part I: Drugs such as barbiturates, amphetamines, sulphonamides, antibiotics, etc. which should be supplied only on medical practitioner's prescription - Part II: Narcotic drugs
Class B	Class B drugs are those which are supplied by Registered Pharmacists only to "responsible persons," but not on prescription.
Class C	Class C drugs are drugs can be supplied by both chemical sellers and registered pharmacists; not sold on prescription.
Exempted	Exempted drugs (i.e. those not in classes A, B, and C) are drugs such as aspirin and sodium bicarbonate which are readily available and easily obtainable.

Praziquantel is a class B drug (Republic of Ghana Ministry of Health 2004) and the Adasawase community would invariably benefit from having the local drug stores distribute this prescription. The drug store as an institution affects how the community responds to this disease.

Schistosomiasis does not cause immediate lethal or severe health complications, but the possibility of developing cancer and cognitive impairment can occur over a prolonged period of time if an individual is not treated properly to clear the infection. If treatment is not available at such institutions like the drug store or clinic this promotes two different mentalities. It could signify that the risk such an illness poses must be minor. Secondly, it could perpetuate negative behavior about unequal access to health care and treatment, creating apathy or indifference about responding to health issues; if treatment is not available in town then this "problem" or disease must not be important, therefore the individual may not decide to seek medical attention or care. Even if both of these perspectives were considered, how does a public health researcher empower a community to demand social justice or seek to change the political agenda, so they can receive the health benefits and access they are entitled to? Although there is no defined solutions to this challenge, if I had the ability to return to Adasawase I would have liked to ask the following questions to community members to learn more about how the drug store functioned as an institution:

- Where do go or what do you do first when you are sick?
- What makes you decide to go to the drug store over visiting a clinic or the hospital or vice versa?
- Has medication you received from the drug store either not worked?
- Do you trust the opinion of the LCS and what he/she recommends when you are sick?
- Do you have access to all the medications needed in the community?
- Do you know what Praziquantel is and how it works? Do you know of people who have used it? What happened? Where did they get it? Would you use Praziquantel if you had bloody urine, why or why not?
- What medication or treatment would you get if you had bloody urine?
- If praziquantel was available in town, would you purchase it?
- What medications are not available at the drug stores or clinic that you think would be beneficial to have?

Ghana's Pluralistic Health Care System: Modern and Traditional

M.M. Tabi (2006), an associate professor at Georgia Southern University, suggests the health care system in Ghana is categorized into two types: modern and traditional. Modern

medicine is dominant in western societies and is firmly rooted in a scientific paradigm where medical science is used to explain the cause of disease, using a biomedical practice model (Bruce 2002, 161-167). Tabi (2006) states the modern medical system includes government-operated/and financed delivery systems, which provide medical care at hospitals, health centers, clinics, health posts, and maternity homes. In addition, she also considers private healthcare services sponsored by religious missions such as the Catholic Mission, the Presbyterian Church, and Seventh Day Adventist Church to be a part of the modern medical system. Health posts and clinics predominantly provide preventative and primary health services, while the hospitals are the main providers of curative tertiary health care (van den Boom, Nsowah-Nuamah, and Overbosch 2004).

In modern medicine, there is standardization. Physicians, nurses, and technicians receive accreditation from specialty schools or by attending university. Modern medicine also utilizes technology to assist with diagnosis and treatment; the mainstay of treatment includes drugs, medical interventions, and advanced surgical techniques (Bruce 2002, 161-167). During a clinic or hospital visit a prescribed process occurs: a patient check-in, there are forms or paperwork to sign, a waiting area, and finally the doctor or nurse tends to the patient. This is similar to Western health practices. Therefore, modern medicine lies in the rational and biological realm of understanding and traditional medicine seeks to approach healing and illness by methods that fall outside standard medical practices.

Traditional medicine operates within an indigenous, spiritual realm, which explains disease as a result of social and psychological conflicts or imbalance (Bruce 2002, 161-167). Tabi (2006) mentions traditional medicine consists of health practices, approaches, and knowledge and beliefs incorporating animal or mineral based medicines and spiritual therapies to

treat, diagnose, and prevent illness to maintain well-being. Approximately, 80% of the population in Africa uses traditional medicine for health care. Traditional medicine is also a part of Ghanaian culture and includes not only herbal remedies for specific diseases, but also folk knowledge, traditions, and values. There are many types of practitioners available in Ghana, each with a distinctive approach to diagnosis and therapy (Tabi, Powell, and Hodnicki 2006, 52-58). According to Theophilus Yeboah (2000), a Medical and Health Science librarian at the University of Namibia, the two main types of healers are priests/priestesses and herbalists.

Yeboah (2000) notes priests/priestesses owe divine allegiance to a local deity, rarely travel outside his/her shrine, and never advertise traditional preparations or medical knowledge for commercial purposes, since they are associated with divine powers. The priest/priestess is a highly respected member of the community "whose word is truth" because they were chosen by the god and ancestral spirits to be a healer and advisor of the people. For this reason, the person is regarded with high esteem, because they have won the favor of the spiritual world. The herbalist is also recognized as being selected by spirits to heal and possess supernatural powers, but does not represent a deity. Herbalists are the main source of freely circulating health knowledge and interact more with rural people compared to priests/priestesses and modern medical practitioners (Yeboah 2000, 203-208). Tabi (2006) states theses secular healers known also as traditional pharmacists, use herbal medicine prepared from selected leaves, roots, or other parts of pants and animals, where as priests/priestesses use divination and rituals in the healing process to cure organic and spiritually based diseases. Others such as sacred healers are faith healers who use prayers, fasting, incantations, herbal medicines, and occultism (Tabi, Powell, and Hodnicki 2006, 52-58). Tables 4 and 5 provide an overview of health care providers in Ghana and the types of traditional health care providers.

Table 3. Overview of health care providers in Ghana (van den Boom, Nsowah-Nuamah, and Overbosch 2004)

Type of provider	Provider
Modern (formal training, clinic/hospital based, modern medicines)	Doctor Dentist Pharmacist Medical Assistant Nurse Midwife
Traditional (informal training, outside of clinic, traditional medication)	Herbalist Spiritualist Fetish priest Traditional birth assistant Unsupervised druggist

Table 4. Traditional health care providers in Ghana (van den Boom, Nsowah-Nuamah, and Overbosch 2004)

Practitioner	**Activity**
Herbalists	Persons versed in the knowledge of herbs and other natural products and their medical uses.
Herbalists-occultists	Herbalists who use occultism in their practice.
Neo-herbalist	Herbalists with some education who operate in the urban areas.
Priests, Muslim Mallams, spiritualists	Persons attached to a mosque, church, or shrine of a minor deity who act as a medium or messenger for the deity.
Traditional birth assistants	Usually old illiterate women (occasionally men) with the experience in conducting child birth.
Unsupervised druggists, medicine peddlers	Persons selling modern medicines without mediation of an physician or medical practitioner.

Based on my observations, the availability and accessibility of modern and traditional health systems in the Adasawase community creates a hierarchy for seeking medical attention. The drug store and traditional healers are the primary sources for the community to seek, then the clinic in town, and lastly the hospital in Anyinam. There are a multitude of factors considered

when an individual in Adasawase is deciding what type of health care provider to seek. A few are proximity of health service, seriousness of disease, costs, familiarity, and religious beliefs. Also, disease classification as natural versus supernatural determines whether a modern or traditional health system is used as well, which was the focus of sociologist, Gabriel Fosu's research from Brown University.

A rural community in Berekuso, Ghana, which is about 60 miles away from Adasawase, was studied in the mid-70s to understand the way they classify disease and how this affects the type of medical service they sought for its treatment. Similar to Adasawase, Berekuso was an agricultural community with 73.8% of the population being economically active in subsistence farming. The research findings show that 51.5% of the farmers classified disease as supernaturally caused. It was assumed that this was merely a reflection of their concept of the universe. Since they live very close to nature, and come in contact with events which are difficult to explain in natural terms, they tend to have a greater respect for the unseen forces of nature (Fosu 1981, 471-482).

Furthermore, interviews conducted in the Berekuso community revealed that *dwonsoyayaa*, Bilharzia, is perceived to be caused by both natural and supernatural causes, which is an important factor in determining what type of remedy is sought. Natural was defined to encompass worms, insects, animals, and inherently unhealthy environments, like rapid changes in the climate, an improper health regime, and malfunctioning organs. The supernatural included diseases caused by witchcraft, breaching taboo customs like eating a totemic animal, committing incest, or adultery, and the ancestral gods/deities inflicting wrath for those who break important social or religious injunctions. His findings show natural causes of disease were treated in a clinic, but supernaturally caused diseases were treated in the context of traditional

medicine. He also elaborated on the reason why self-medication may be preferred over attending a clinic or hospital. For an illiterate patient, which constitutes a majority of the population in a rural farming community, if their sickness is reduced to a modern scientific view provided by a doctor this conflicts with their traditionally holistic and integrated view of disease. Therefore, a patient searches for a more "understanding practitioner who speaks a language they understand and give explanations about causes of disease which they can accept" (480). Thus, Fosu states doctors are not visited, except at critical stages, or their advice ignored because of their supposedly narrow approach to disease causation. In relation to Adasawase, our KAP survey helped reveal some of these previously discussed factors to elucidate which health system the community seeks and when.

In our KAP survey, 85 children were asked where they go when they are sick. Their responses were as followed: 26 drugstore, 25 hospital, 16 local clinic, 9 prayer club, 6 traditional healer, and 4 parents. I hypothesize since schistosomiasis is viewed to be caused by both natural and supernatural agents there would be a relatively equal distribution of responses for modern and traditional health care systems, but there is a noticeable difference. Although only 6 students reported that they see a traditional healer, collectively there were 67 students who sought modern health care by going to a drugstore, chemical shop, hospital, or local clinic. When comparing what students take when they are sick a smaller disparity is revealed between modern and traditional health care preferences: 34 students responded that they take prescription/drugstore medicine, while 17 have tried traditional herbal medicine; the other options were food (2 responses) and not taking anything (0 responses). From this data, I generalize that Adasawase community is not as resistant as I originally perceived them to be of utilizing modern health systems even though they display traditional values and ideals. It is encouraging to know that

some are willing and indeed go to the clinic and hospital when needed, but under what circumstance does this happen? I wonder if the numbers would change if we had specifically asked the students where they go and what they do for treatment when they have *dwenso mogya*, bloody urine.

Also, when we originally were running pilot versions of our survey, students repeatedly mentioned “prayer club” as alternative establishment where they seek healing. This was a learning point for me and broadened my limited perspective that institutions for health are not solely restricted to a clinic or hospital. But can also include religious and even culturally relevant places, such as a church or the shrine of a traditional priest healer. It is important to fully engage the community a researcher is working with and being knowledgeable about different places of treatment to see if those institutions can be avenues of spreading public health awareness as well, which an assist in reaching different populations.

Studying the pluralistic health care system in Ghana allowed me to understand how the Adasawase community uses both the modern and traditional approaches to medicine. A researcher should not implement a public health program fully base on their own ideas and perceptions, but be considerate and build it upon the values and needs of the community. If Adasawase sided more towards the traditional healthcare system, then maybe Kosinski and our group would have to reevaluate how to work with the traditional practitioners to spread education about prevention and treatment of schistosomiasis. Or just to simply find out what these traditional healers actually do! In rhetorical theory, it is well known that by truly understanding the audience the delivery can be more effective, and the same idea can be applied to public health communication. The message conveyed can be the most beneficial for the community when it appeals to them in a specific manner and from a perspective they understand.

I think this process entails learning about what institutions of health care such as modern or traditional the community has to available to them and what they prefer to use. Depending on what type of health care system they seek, this can influence how they frame schistosomiasis. It can also affect how they acknowledge the causes of it, whether the disease is natural or supernatural. Through studying this I have gained a more diversified perspective about how health care is organized in a cultural community and how traditional medicine cannot be discredited as alternative method of healing and treating a disease.

Inequitable Access: A Social Determinant of Health

The WHO's Commission on the Social Determinants of Health released a report in 2008 on "Closing the gap in a generation: Health equity through action on the social determinants of health." They recognized that social justice is a matter of life and death and affects the way people live, their consequent chance of illness, and their risk of premature death. Life expectancy and good health can continue to increase in parts of the world, but it is alarming when they fail to improve in others. Within countries there are dramatic differences in health that are closely linked with degrees of social disadvantage, but variances of this magnitude should not happen. These inequalities in health, which the WHO believes are avoidable, arise because of the circumstance in which people grow, live, work, and age, and the systems put in place to deal with illness. Furthermore, these conditions in which people live and die are, in turn, shaped by political, social, and economic forces (Commission on Social Determinants of Health 2008).

In addition the Commission acknowledges that the poor health of the poor, the social gradient in health within communities, and the marked health inequities between countries are caused by the unequal distribution of power, income, goods, and services both globally and nationally. They state that the consequent unfairness in the immediate, visible circumstances of

people's lives--their access to health care, schools, and education, their conditions of work and leisure, their homes, communities, towns, or cities-- all impact their chances of leading flourishing lives. In Adasawase, inequity of access to health care, especially to praziquantel, is a social determinant of health.

G.J.M. van de Boom (2004), a researcher for the Centre of World Food Studies in Amsterdam, found that 1 out of 4 in Ghana live outside a 15km radius of a doctor, which is a commute approximately equivalent to 9 miles. For rural populations, more than a third lack access to a modern health care provider within 5km (~3miles) and more than two-third lacks access within 5km to a doctor. Although Ghana has set up an extensive network of public health care facilities including hospitals, clinics, and health centers that offer subsidized care. Current public health care provision is biased towards hospitals in urban areas supplying curative care, putting less emphasis on prevention and basic care in rural areas. This is evident in the fact that only hospital available to the Adasawase community is in Anyinam, which is a more developed town on a major highway system and is three miles away from Adasawase. Self-medication is the cheapest alternative, costing approximately less than $1.50, while visiting a doctor is the most expensive option with an average cost of $10. This creates a mentality where more serious conditions will be addressed by going to the hospital, but illness that falls on a lower scale of priority may be dismissed or not correctly treated.

The WHO Commission on the Social Determinants of Health (2008) considered misdistribution of health care, not delivering health care to those who need it, as a consequence of poor social policies and programs, unfair economic arrangements, and bad politics. Therefore, all key sectors of society must be involved to promote health equity not just the health, but also the government, civil society, local communities, businesses, global flora, and international

agencies (Commission on Social Determinants of Health 2008). But what does this look like and how does this function? In the next section, I want to describe Kosinski's action in obtaining access to drug treatment and care.

Wielding Cultural Capital

Kosinski organized mass treatment for the Adasawase schools in 2008-2010 by using external funds to purchase praziquantel and coordinating with Ghana Health Services to have a nurse available to help administer the drug at the schools. In her doctoral thesis, she notes the price of Praziquantel in Ghana remains high; in 2009, the average dose of 3 pills cost $0.50, which may be sufficient reason why treatment and medication is not sought. It is expensive and not readily available. She also mentions the price does not include any of the associated cost of transportation of the drug and personnel, salaries for a professional health care worker to distribute, which is necessary according to governmental regulations, or administration costs. Moreover, she stated the drug was scarce in Accra, the capital of Ghana, and in July and August of 2009. Usually, she would leave very early on a Friday or Saturday and endured a three to four hour journey to the capital to find enough Praziquantel (~700+ pills) to treat the infected students in all three Adasawase schools. She tried to make this a "day trip," but if she was unsuccessful, more costs would be incurred with finding accommodations to stay there overnight, and to continue the search the following day. One time she mentioned how she had to visit six pharmacies in the city before the drug was found to be available.

Although Kosinski overcame numerous obstacles, were they easier because she could wield cultural capital? Did they give it to her because she had money or would they have refused if she were just a local person? How did she convince them or did she need to? And how does the community sustain continual mass treatment as method of prevention even after she has left?

It may have been beneficial for her to take a local community member who works at the clinic or is a part of the traditional health care system, so they are aware of the process and how to obtain the medication for mass treatment and seeking Ghana Health Services to have a nurse available to help administer the drug. How much does it costs to pay for a nurse working on treatment days? Is it easy to organize this? Funding would also indefinitely need to be generated either within the community or externally. But how do the council of elders and the chief garner fiscal support when the people are also limited financially? How can this aspect of the public health program be improved or revaluated to be sustained over time? Good intentions were exhibited when Kosinski helped the community have access to treatment, but more important question that remains is what can be done to make an initiative lasting instead of temporarily addressing the problem.

Chapter 4: Ideological and Ethnocultural Values of Nature

The journey to Tini Falls allowed me to reflect on the value and meaning of nature, an ideology that the Adasawase community embraces, and also provided insight into ethnocultural rituals that incorporate their beliefs about nature and religion. The three mile hike from Adasawase to the base of the trail that leads to the Falls passed quickly. I was distracted by the endless stretch of green that started from the edge of the dirt road and continued to the horizon. Fortunately, it was overcast and the expanse of clouds provided respite from the harsh sun on an open path. Before us was the rocky trail of clay that winded through the burgeoning landscape. The steps of our feet, compressing loose pebbles and the occasional breeze that rustled palm frawns were the only sounds, accompanying us on our walk.

Figure 18. Path to Tini Falls, June 2010

As we approached the end of the clay road, the steady beat of a mechanical noise echoed. A wooden hut with a thatched palm roof came into view, looking similar to a gazebo, but much

larger in size. The distinct sound of a saw stopped suddenly and the shuffling of feet on a hard surface grew louder. Until this point it was just the research group and Ernest, a construction crew member, but now there was third party member unbeknownst to us.

Tom and Ernest walked towards the edge of the woods and descended down a path, disappearing into the thick greenery.

"*Ama bra*," Tom called out from the forest, beckoning Karen by her "name-day" to come.

In a synchronized manner, Carrie, Karalee, Quincy and I followed right behind her one-by-one. We cautiously navigated through the boulders that stood firmly on the hill as we walked towards Tom and Ernest. They were conversing with a gentleman wearing a navy blue button down, dark khaki's, and rubber galoshes.

Figure 19. Deck overlooking the forest, June 2010

Tom was resting on the weathered steps that lead to a deck overlooking the forest. New pieces of plywood lay scattered behind him and contrasted greatly with the worn, darkened boards that were already in place. Ernest's flip flops slid smoothly, and the weight of each step strained the boards, causing them to creak.

"When there are celebrations or parties that happen in town, normally they are hosted right here," said Karen as she nodded her head in the direction of the deck. "Tom told me that the community is planning to build a restaurant to draw more tourism," she continued, "but I don't know when they're expecting it to be done."

The gazebo like structure was surrounded by towering trees, hanging vines, and a tropical wilderness that flourished infinitely all around. I admired the beauty of Tini Falls and realized that it was not only an aesthetic asset to Adasawase, but had the potential to be a financial one as well. In fact, I later read that Hannah Asomaning, a columnist for the GhanaWeb website, visited the Falls on World Tourism Day in 2005 and also supports this idea. She noted that a member in the Ministry of Tourism and Modernization of the Capital City who traveled to the site called for a close collaboration between stakeholders to develop and manage Tini Falls, which was described as "nature's delight" and as one of the most exciting adventure tourism products in West Africa. Asomaning further mentioned that Ghana was "comparatively blessed with a rich, unique and diverse natural and cultural heritage, which should develop in a manner to achieve the goals of [the country's] poverty reduction strategy"(Asomaning 2005).

The Adasawase community is an agrarian society that relies heavily on the land for its' main source of income. This view can be extended to include the Falls to be a natural commodity that the community has a deep appreciation for, but can also contribute to supporting them in a

fiscal manner as well. Although I am not sure whether the community's efforts to build the restaurant was a result of the World Tourism Day event from 2005, what became apparent to me that day we hiked to the gazebo is that Adasawase was invested in showcasing this resource, the Falls, because it is not only a source of pride, but also a means to further sustain their community and the country. The esteem of nature is a part of Ghanaian ideology and a public health initiative that does not respect this deeply valued belief will not be beneficial.

Alternate World: The Jungle of Tini Falls

After our brief stop at the gazebo, we were on our way to Tini Falls. The abundance of trees sheltered the trail and made a natural canopy that blocked any light from above. Occasionally, a clearing of brush by oak tree harvesters made a spot light appear in the midst of the darkened surroundings. Although it is well into the afternoon, dew remained on the tendrils of vines that extended across the red dirt trail, creating a cooler environment. They brushed lightly against our ankles and legs, transferring refreshing water droplets. Ernest led us, being a conscientious guide, and checked frequently to make sure we were together. Even if too much distance lapsed between us, we probably could have followed the sound of his slapping flip-flops to find him again. He traveled quickly, navigating easily through the changing terrain of the mountain and being cautious of raised tree roots that sporadically grew out from the ground.

During the hike, I could not help but contrast how this scene differed significantly from the pool. The path both to Tini Falls and Tini River had trees and palms that provided refuge from the sun. Even when the children swam at Tini River, palm frawns extended over the water and shaded the areas where they played. The pool lacked this natural shade. A few coconut trees lined the terracing around the pool where children could sit in a cooler area, but a significant portion of the pool was exposed to the sun. I noted that cloudy days were rare in Ghana from

June to July. In addition, since the country lies in the latitude 4° and 11° north of the equator, the sun's rays are more powerful and exhibit greater intensity (Addison 2007). The allure to Tini River lay not just in its natural beauty, but also was inviting in regards to escaping the tropical weather than the pool.

Figure 20. Comparing the environment around the pool and river

As we continued our journey to Tini Falls, Ernest, Quincy, and I stayed quiet to hear Tom, who was behind us. He was explaining to Carrie the reasons why our trip was delayed. Since we arrived during the rainy season, torrential down pours occurred regularly and did not provide the ideal conditions for hiking. Also, prior to this weekend the chief and elders came to the Falls to pour "libations." This was a new term for me and I kept mentally saying the word hoping a definition would come to me, but I was unsuccessful.

"Quincy, what is a libation?" I asked, drawing out my words between breaths. We were close to reaching the top of the ascent and the hike was now having its moment of being a cardiovascular work-out as well.

"A libation is fancier word for alcohol," said Quincy who was behind me, "But in regards to what Tom said, it's normally performed as an act of respect or appreciation."

Karen joined the dialogue and informed us that before they began construction at the pool there was a ground breaking ceremony, which is a ceremonial tradition, and it was held where the chief and elders were dressed in cloth. The chief poured peppermint schnapps, which is the preferred drink of choice, offered thanks, and asked the ancestors to bless the land and oversee the building process.

Figure 21. Pouring libations at the ground breaking ceremony for the swimming pool
Photo courtesy of Karen Kosinski, June 2008

"Girls, do not get any ideas that Tini Falls is going to be water fall of peppermint schnapps though," continued Karen while laughing, "it does not work that way." What I was slowly becoming to realize was the supremacy and value of nature as an ideology that permeated cultural and belief systems.

Descent of the gods

We finally arrived at the Falls which had an ethereal glow cast by a hidden sun behind the expanse of clouds. The currents gently dropped down the gray mountain side, creating sheets

of mist which green vegetation thrived under and decorated the plain cliffs. From where we stood, the boughs of trees framed the sixty meter cascade of fresh spring water as it showered over black rocks that comprised the base of the mountain. The water pooled then followed a natural path through the forest, which would eventually feed into Tini River and the swimming hole where the children would play.

Even though 68.8% of population is Christian (Central Intelligence Agency 2010), I learned that Tini river is significant to the community's traditional practices, which is exhibited in the act of pouring libations. The reverence for nature, which the community displays, is a reflection of their dependence on God. Marion Kilson, an anthropologist who has studied practice of pouring libations in the Ga sub-cultural group of Ghana, found that appeals to God, the Supreme Being, are made through gods and ancestral shades which serve as mediators, since man cannot directly connect with God. Men will petition to the gods and ancestral shades, wanting blessing for the living and unborn, to increase the population, for abundant food, for rain to nurture plants, for success in human endeavors, and for peace. Kilson further asserts that certain gods are associated with specific topographical features, such as lagoons, mountains, and rivers, which have their customary places of descent. If men anger God by failing to perform certain rites or violating divine injunctions, God may punish man by causing calamitous events, such as epidemics (Kilson 1969, 161-178).

Also, the river and other natural sites serve as passageway to the gods, and provided a way to communicate to the sacred. The implications for schistosomiasis control are that chemically treating the snail intermediate host is not a feasible option. They would not dump poison in a sacred site. In a recent WHO document, Loker (2005) states it is difficult to control a population of snails at a level sufficient to interrupt transmission in a sustainable, cost-effective,

and environmentally acceptable way. Commercially produced molluscicides are toxic to other aquatic organisms, including fish, and raise ecological and economic concerns, since they would need to be used over an extended period of time (Gryseels et al. 2006, 1106-1118). When Kosinski presented various control options to the chief and elders in 2008, it should have been no surprise that they chose against focusing on snail control, since it was not an effective means of addressing schistosomiasis transmission and posed detrimental effects to the environment and the river, which has spiritual value.

If the river is a location where a mortal can attempt to establish contact with the divine this also signifies the importance of nature to the Adasawase community as well. The river not only physically sustains life, but also attains spiritual value. At the time, I did not make this connection, but looking back I see how it may be challenging to convince the community to be less dependent on the river and to view it as threatening, since it is, to them, not seen as the primary source of infection, but also served an integral role in their religious practices and culture, while being source of pride and a financial commodity as well.

Figure 22. Tini Falls, June 2010

Dirty Water

While reflecting back on my trip to the Falls I realize the stark contrast between the Falls, the river, and the pool. I remember the day my MQP partners and I were sent on a cleaning expedition, and how this experience allowed me to better understand the community's perception of the "alternative recreating area."

We were scattered along the concrete terracing that skirted the pool area, staring at the murky, turbid water that had collected in the almost empty pool. Each of us was content, slowly eating our breakfasts, *cha-booms*, egg sandwiches, and lingering outside of the pool. I eventually made my way over to the swallow end and walked along the border. Small, tad poll eggs floated on top in jelly masses and dragon flies landed briefly, leaving behind small ripples when they flew off again. The sky blue painted bottom was impossible to see and the red debris clouded whatever could potentially be in the water.

“That water does not look the least bit inviting,” stated Karalee between sips of Tampico, “No wonder why parents do not want their kids playing here.” She explained how a few days ago during KAP surveying, several students remarked that the water was too dirty to swim in and I could not help but think: If we did not want to go in, why would they ever?

Still, we saw it as our responsibility to take care of the pool and Carrie mused that, “Hopefully Karen or the elders will be able to pay Sammy to maintain it when we’re gone.”

Figure 23. Pool Cleaning, July 2010

Who’s first?

I was standing at the edge of small platform leading to the shallow end, “After you my dear,” I politely suggested to Carrie; motioning with my hands that she could have the honors. I was trying to restrain from laughing through my forced grin.

“Oh no, but I *insist* you go before me,” replied Carrie, nodding her head in agreement.

I hesitantly raised my leg and my foot disappeared into the brown discolored water, which slid quickly along the slimy bottom. “Oh man, oh man, oh man,” I quietly chanted, trying to avoid fully expressing my discomfort. The clay that the children tracked in created a slick layer on the pool floor as it disintegrated into finer particles.

I turned around to see how Carrie was managing. She released a sigh through a strained smile and had her eyes closed, “This feels great, really great.”

As our feet were shuffling around to move the red sediment, Carrie and I talked about how Kosinski designed the pool. We wonder if she took into account for the abundance of clay that would accumulate and if there were any plans to create a wash area. We also speculated this could potentially be a deterrent though, since the children do not have to “wash off” for the river and it would a prerequisite for them to do before going swimming.

Figure 24. Comparing turbidity in Tini River vs. the pool

“Ewwwwww, this is so gross, oh my gosh, oh my gosh!” exclaimed Karalee, rattling the palm reeds of the broom she held in a clenched fist. She hopped back onto the steps and

furiously scrubbed the area near her to have a relatively cleaner place to wade. “You know what I really hope, that we don’t find any dead scorpion bodies. I don’t think I can handle that.”

A few weeks before, a scorpion carcass had leached toxins into the pool water, which a few children accidently ingested and became ill. Now, I think about the incident and wonder if it could have happened in the river. Since the pool is stagnant, anything can collect. But the river is always moving, so harmful substances would not harbor in the water. Kosinski had earlier told me about an informal conversation she had with members in the community about the cleanliness of the river. They do not perceive it as a health risk if a person urinates or defecates in the river, because they believe the current will clear the impurities. In a more extreme case, she explained that in another town a dead body was found upstream and the locals continued to use the river nonetheless. It is possible that the Adasawase community adopts this perspective as well and thinks that the pool is more likely to contain bacteria or pathogens that can harm their children, since the water does not move like the river. Their belief --its ability to renew and have a purifying aspect-- may hinder them from fully understanding that in some ways, the river is not a safe place to swim, which shows why it might be hard for them to frame the causes of a serious disease as coming from a sacred, valued, and natural commodity.

Tini River vs. Swimming Pool

The river is natural and represents the ideal environment to the locals, whereas the pool is a man-made structure. The question is not how nature can be bad, but the concept that an artificial object supersedes or is better than nature. In the West, we have a tendency to believe man-made is often the improved version of nature; we associate pools with sanitation and a standard of cleanliness, since they are treated and maintained. But in the untreated pool Kosinski had built, since chemicals were costly and unavailable, bacteria maybe more prone to thrive; the

water sits and does not have a continual current. Also, incidents like the dead scorpion carcass leaching toxins do not support the idea the pool is a safer alternative. The pool is primarily a better option in regards to preventing schistosomiasis, but do issues of hygiene and the previous issues raised outweigh the advantages that pool offers? How does this affect how the community responds to the disease?

We learned through formal and informal surveying that the students' parents were greatly influential in deciding where the children would play. When given options about where the student preferred to swim, 52 out of the 85 stated they like the pool, 2 said the river, 3 agreed to both the river and pool, and 23 claimed they did not swim. A good majority of females were in this category who claimed they did not swim, because they were preoccupied with chores and helping their families; chores that often involved interacting in the river! But approximately 8% also expressed that their parents believed that the pool was not safe or clean enough to play in and based on this information I assumed some who preferred the pool might not use it and would either continue swimming at the river or not go to either location.

Kosinski shared that the original appeal to building the pool may have evolved from the idea that the rural community would have a "luxury item." In Ghana, swimming pools are found in the developed cities or seen on television as luxuries, and so the pool may have been approved for its status and as an attracting factor for tourism and visitors. Regardless, the actual local families might have seen the swimming pool as a foreign invention lacking familiarity and functionally mysterious. The strangeness could build fears and misconceptions, even though the elders and the assembly men went to churches and held community meetings to teach about the purpose of the pool and raise awareness for the disease. Why was there still apprehension about the pool and how do public health officials work through these barriers?

One of the barrier questions to address was how much time was spent at the pool versus the river. When surveying the children, they were asked to self-report how much time they spent at both the river and pool on a weekly basis. Table 1 shows that in total more time is spent at the pool, but there were large discrepancies in the distribution of time spent at either of the two locations on certain days. For example, on Saturday the river is used almost four times more than the pool. This can possibly be attributed to domestic chores that children are sent to do at the river. Unfortunately, as many as 73% of the children in our survey were potentially exposed to an infection because of the amount they spend there on a Saturday. The number of students who performed daily chores in Tini River were: 29 fetched water, 24 washed clothes, 17 used the river to bathe, and 9 went to fish. The pool has the most activity on Thursdays and Fridays, but consistency in use of the pool is lacking. The initial purpose of asking this question was to develop an operations and maintenance schedule for the pool. But in asking about the chores, we learned much more. The river is not just a site for scared rites or place of beauty for rest and retreat, but also is also bound in their everyday practices of washing, doing laundry, and fetching water.

Table 5. Comparison of total hours and minutes children spent at the river and pool during the week according to self-reported data

Day	Time spent at Tini River	Time spent at pool
Monday	8 hrs 30 min	13 hrs 0 min
Tuesday	12 hrs 30 min	12 hrs 0 min
Wednesday	13hrs 45 min	9 hrs 30 min
Thursday	5 hrs 5 min	12 hrs 0 min
Friday	4 hrs 31 min	14 hrs 15 min
Saturday	11 hrs 51 min	3 hrs 10 min
Sunday	3 hrs 21 min	5 hrs 0 min
Total	**59 hrs 55 min**	**68 hrs 55 min**

The students were also asked what they did not like about the pool, and 38 of them replied that it was not clean. In order to fill the pool, a community member would have to commit a day's work to manually operate a hand pump; usually this person would sacrifice time from farming or their own work to help. The hand pump collected water from a natural aquifer underground, which then went through a connection device, carrying water to be deposited into the pool. The children would track in clay and sediment, and after two-three days the water would become murky. The pool would then need to be drained completely, cleaned, and refilled.

Figure 25. Sammy pumping water for the pool, July 2010

There were two hand pumps near the pool site, which the water was utilized for cooking, washing, and bathing. From September 2009-May 2010, a small fee (~$0.20) was placed on using the hand pumps in order to have a fund available to pay for fixing it when it was broken. When Kosinski finished the pool in 2009, the chief approved of reserving one of the two hand pumps to fill the pool regularly. But when the fee was instated, there was resistance that the pool would take priority over community members who needed the water as well. Moreover, water was no longer a dispensable commodity, and the fact that it was simply being used to fill the pool for the children to play in probably did not settle well. Even over the summer, our group encountered these problems. Women were upset that they would have to wait in line for water,

while the pool was being filled. Sometimes we would take a break from pumping and someone would disconnect the filling line attached to the pump, so they could use it instead. The town also had an elderly woman who collected the change and she would mandate that we were not allowed to use the pump because others needed it or because we already took a lot of water. Since the purpose of the pool was not collectively understood by the community, that it was a safer place to swim, the conflict emerged about the pool needing to be filled and was exacerbated when the fee was technically waved for doing so. Conversely, maybe they did know the purpose, but still disagreed that the purpose was important. If they did not see the disease as harmful, and if they truly needed water, why would they need to be patient about the pump? The river had always been an acceptable place to swim and why does the pool get filled for free just so children can play in it? An even greater concern was around the fact that water from the aquifer was being depleted much faster than usual since it was used for pool. Our group tried to address this issue.

In order to make the pool more sustainable for the community, my MQP group created a filtration system. This would allow the water to be reused a few more times before it was completely drained. Previously, water would be pumped and after two to three days it would need to be drained and refilled; with the filtration system we hoped that the water could be kept for longer period of time. We built a gravity, up-flow roughing filter, which was comprised of two parts: a filling tank and a roughing tank with three layers of aggregate media. The children were required to transfer water from the pool to the filling tank, where gravity would take it down hill to the roughing tank, trapping dirt and sediment in the pore spaces as the water moved up. Even though our system required the children to perform work, they considered it to be similar to performing a chore. Moreover, we built an incentive, which the filtered water emptied

from and poured out into the pool. This allowed the children to take turns filling, so they could enjoy the benefits of using the filter. This part of our project was not completed until a few days before we flew back to the States, so we did not get to see if it resolved the controversy over water use.

In conclusion, Figure 26 summarizes the possible contrasting views on the Tini River and the swimming pool.

Figure 26. Comparing Tini River and the Swimming Pool

If I had the opportunity to return I would like to ask the following questions to parents of the children in the community. The questions are organized by the four factors I have in my model. These may help us understand how core values might explain their views about the pool, their view of safety in relation to the pool and river, and to further understand their perception of what causes schistosomiasis:

- Ideology
  -Do you think the river is sacred?
  -Are you aware that libations are poured at Tini Falls?
  -Why do you think the libations poured?
  -Would you rather your children play in the river or the pool?
  -Which is a safer place to swim: Tini River or the pool?
  -Do you think the river can possibly be harmful in any way?
- Sociopolitical/Material
  -What water sources do you rely on to do domestic chores?
  -What water sources are available to you?
  -What water sources are not available to you?
  -Where do you allow your children to go swim and why?
  -Are there any other places your children go to swim?
- Institutional/Professional
  -Has the chief or council members informed you about the pool?
  -Do clinic nurses suggest that your children go to the pool?
  -Do clinic nurses/hospital professionals inform you about the dangers of unclean water sources or using the river water?
- Ethnocultural
  -What religious values/beliefs influence where you collect water, swim, and bath?
  -What is the purpose of the river?
  -What is the purpose of the pool?

By analyzing the supremacy and value of nature as an ideology, I can understand how the community members may have found it challenging to believe that a naturally revered commodity could potentially be harming them. In turn, this affects the way they frame and perceive the causes of schistosomiasis, since how can sacred passage way to the spiritual world also be the source of infection. Even further, I learned how culturally complex their dependence on the river is and the challenges that are presented when the pool conflicts with their religious beliefs and cultural values.

Chapter 5: Conclusion

Both of my MQP's allowed me to thoroughly assess the success of the work accomplished in Adasawase, but also showed me areas of improvement.

How the community was and could be educated

Through our KAP survey we found the student had a general knowledge about schistosomiasis. Although they mainly identified the disease by its colloquial Twi phrase, most of them could associate swimming in the river to be causing this condition, bloody urine. Even though a majority of the children did make this connection, they did not understand the long-term detrimental effects of presenting this symptom.

When conducting focus groups with the teachers, we noticed that the disease was not recognized a prominent health topic. Many of the teachers also held misconceptions about what was causing the disease and how the pool was actually benefitting the children. They perceived the water as the causative agent; therefore the pool did not appear as a safer alternative. Since the teachers are primarily responsible for educating the students, we believed what they did not understand and know got transferred to the students. Hence, our educational initiative focused on raising awareness for the teachers about addressing schistosomiasis by a biomedical name instead of labeling it as a condition, explaining the long term consequences of an infection, and how to prevent the disease by explaining the purpose of the pool.

Although Kosinski and my BBT MQP group specifically identified the student population to be the focus of our work, maybe with more time and resources we could have extended our work to reach out into the community. Women should be of particular concern as well, since they are primarily responsible for domestic chores and utilizing the river for these

tasks. There is value in recognizing a target population, but if a project can benefit and help more people maybe researchers should be cognizant of this as well.

I also wish we could have evaluated if our educational initiative was successful in raising awareness for schistosomiasis prevention. Due to time constraints, we were not able to perform pre-and post-tests, assessing the students' knowledge on schistosomiasis. But it would have been beneficial to share the results with the teachers as well and show them the direct impact of their efforts. By including different institutions to assist with controlling the disease, this increases the ability to effectively communicate and utilize different avenues for schistosomiasis prevention.

How the community responded to drug intervention

When learning about Ghana's pluralistic health care system, I found that the Adasawase community had traditional medicine more readily available to them than modern medicine. Although I do not discredit the value in practicing traditional medicine, I am not aware how effective any of these treatments were to curing an infection and know that praziquantel is the choice of drug used in the biomedical world. The closest hospital was three miles away and the medication for treating schistosomiasis was not available in their town; therefore the community had inequitable access to health. Kosinski was able to wield her "cultural capital" to obtain medication and organized to have a nurse available to distribute to distribute the medication according to Ghanaian health policies. But will the community be able to continue doing this in her absence?

Methods for assisting and empowering a community to take political action against social injustice, like having access to medication, should be practiced. This will allow public health work to be sustained for longer periods of time and hopefully make a community more dependent upon itself to seek solutions, instead of "external" researchers and public health

professionals. So instead of just educating the teachers or community leader about the disease life cycle and affects, which could motivate them for action, maybe part of the education needs to teach them where to get the drug, how to take political action, and what the process is for so. I wonder if Kosinski could have used her cultural capital to facilitate or organize meetings with higher public health and political offices. She could have assisted with establishing a position and voice in these social networks for the council of elders and the chief. I am fully aware that this is not a simple process, but this would represent adopting long term goals, instead of aspiring for short term results.

How the community responded to the pool

The community knew the pool existed and it was used initially by the children. From our KAP surveys, we found that the children could recognize that the river was supposedly a source of the problem and pool was the alternative. But they still did not know the pool's purpose. Originally, the elders and chief saw it as a tourist attraction and the novelty of it may have settled over time for the children. They chose not to use the pool because of their cultural beliefs about the river and how they depended upon this naturally sustaining resource for domestic chores, fishing, bathing, and recreating. How does one change their behavior, practice, and attitudes when the river has been integral part of their livelihood? Also, there was religious value associated with the river because it was a passage way to communicate to the gods; therefore this complicated how a sacred commodity could be harmful. There is complex interplay of culture, ideology, spiritual, and material factors that influenced how the community responded to the swimming pool and a few are listed below:

- Libations were poured in to the river to appeal to gods, so nature and the river are connected to religious practices.
- The swimming pool was potentially expediting the process of depleted the natural aquifer, so it could be filled for children to play. There was also no fine to fill the

pool, which was used for recreation. But community members needed to pay to pump water for their domestic chores.

- Economic value is associated with land and nature, since Adasawase is an agrarian society and sees the potential of advertising Tini Falls to attract visitors.
- Schistosomiasis was viewed as a condition, therefore the community could question why there was a need to change the environment or have their children use a man-made structure for swimming when the river has always been an acceptable option.

In conclusion, I hope my report will inform public health researchers and professionals of the ideological, sociopolitical and material, institutional and professional, and ethnocultural factors that are involved in designing a culturally sensitive model for communicating health. My experiences taught me invaluable lessons that study each of these factors and provide insight into what contributes to the success and failure of public health campaigns.

After further reflecting on my writing and exploring the factors that influence a culturally sensitive model for public health initiatives, the personal lessons that I have learned are listed below:

Western vs. African Views of Nature

In developed societies of the West, our lives are not fully aware of how dependent we are upon what the Earth provides; therefore we are apathetic and lack an appreciation for nature. If I need water, I usually can go to my sink and turn the faucet on. I do not have to go to the river to fetch a bucket, collect rain water, or leave my housing complex to the find the closest hand pump. But for the Adasawase community, similar to many African and developing countries, their lives are primarily sustained through the environment: they build their houses out of clay, farm as an occupation, hunt to find meat, and even rely on the sun to illuminate classrooms and buildings. The recent “green movement” in America has raised awareness to promote lifestyles and attitudes that foster protection for our natural resources. But I wonder what would happen if

we adopted the same reverence for nature that the Adasawase community displayed and how that could positively impact and combat issues such as global warming.

Traditional Medicine Offering Solutions

Traditional medicine cannot be disqualified as an alternative approach to understanding disease and sickness. Western health professionals often stigmatize traditional medicine or health practices that are not observed under the formal, biomedical construct. I believe there is value in seeking holistic treatment and trying to integrate both the modern and traditional health care systems. A debate is circulating in the scientific field about schistosomes building resistance to Praziquantel, since over the past 25 years there has been a heavy reliance on this drug for therapy and disease control (Caffery 2007, 433-439). Alternative treatment options can be further explored by potentially seeking what herbs and methods traditional healers have utilized to assist their patients who have an infection.

Health in America

Although the discrepancy in access to health care and treatment is evident between third world countries and developed nations I cannot help but question what the statistics are for minority groups or those less privilege within our own country. The disparity that I witnessed abroad is also occurring in America, which my introductory Sociology has brought to my attention. The PBS documentary series, "Unnatural causes…is inequality making us sick?" reveals the truth behind the socio-economic and racial inequalities in health for Americans. They open the first episode with the generalized statement that living in America would be a "ticket for good health," since we have the highest gross national product in the world. However, we spend two trillion dollars per year on medical care, which is nearly half of all the health dollars spent in the world! But according to the numbers, we live shorter, often sicker lives than almost every industrialized nation; we rank 30th in life expectancy (Adelman 2008). Political action,

public health initiatives, and advocacy cannot be focused solely for communities outside of our nation, but within our own boarders as well. I commend those who work on establishing social justice in global communities, but our own country cannot be neglected or overlooked.

References

Aagaard-Hansen, J., J. R. Mwanga, and B. Bruun. 2009. “Social science perspectives on schistosomiasis control in Africa: Past trends and future directions.” *Parasitology* 136: 1747-1758.

Acha, Pedro N., and Boris Szyfres. 2001. *Zoonoses and communicable diseases common to man and animals.* Volume 3, 146-157. Washington D.C.: Regional Office of the World Health Organization.

Addison, Hector. 2007. *Critical examination of Ghana’s agriculture policy under vision 2020 document.* SelectedWorks of Hector Addison, http://works.bepress.com/hector_addison/3.

Adelman, Larry. 2008. *Unnatural causes: Is inequality making us sick?* California Newsreel with Vital Pictures, Inc. California: Public Broadcasting Service.

Asabere, Paul K. 1994. “Public policy and the emergent African land tenure system: The case of Ghana.” *Journal of Black Studies* 24: pp. 281-289, http://www.jstor.org/stable/2784583.

Asomaning, Hannah. 2005. *Adasawase waterfall: A unique experience*, http://www.ghanaweb.com/GhanaHomePage/features/artikel.php?ID=92456.

Avert. “HIV and AIDS in Africa.” 2011 [cited April 22 2011]. Available from http://www.avert.org/hiv-aids-africa.htm.

Best, Allen, Daniel Stokols, Lawerence W. Green, Scott Leischow, and Bev Holmes. 2003. “An integrative framework for community partnering to translate theory into effective health promotion strategy.” *American Journal of Health Promotion* 18 (2): 168-176.

Bruce, J. C. 2002. “Marrying modern health practices and technology with traditional practices: Issues for the African continent.” *International Nursing Review* 49 (3): 161-7.

Caffery, Conor R. 2007. “Chemotherapy of schistosomiasis: Present and future.” *Current Opinion in Chemical Biology* 11: 433-439.

Central Intelligence Agency. “The world fact book: Ghana.” 2010 [cited April 16 2010]. Available from https://www.cia.gov/library/publications/the-world-factbook/geos/gh.html.

Commission on Social Determinants of Health. 2008. “Closing the gap in a generation: Health equity through action on the social determinants of health.” Geneva, Switzerland: World Health Organization.

Conover, Karalee, Carrie Ellsworth, and Victoria Mason. 2010. “A public health project in methods of *Schistosomiasis haematobium* control in Adasawase, Ghana.” Worcester, MA: Worcester Polytechnic Institute.

Coon, David R. 2005. “Schistosomiasis: Overview of the history, biology, clinicopathology, and laboratory diagnosis.” *Clinical Microbiology Newsletter* 27 (21): 163-8.

Crandall, Sonia J., Geeta George, Gail S. Marion, and Steve Davis. 2003. “Applying theory to the design of cultural competency training for medical students: A case study.” *Academic Medicine* 78 (6): 588-594.

Dunn, Frederick L. 1979. “Behavioural aspects of the control of parasitic diseases.” *Bulletin of the World Health Organization* 57 (4): 499-512.

El-Zayadi, Abdel-Rahman. 2004. “Curse of schistosomiasis on Egyptian liver.” *World Journal of Gastroenterology* 10 (8): 1079-1081.

Entman, Robert M. 2003. “Framing: Toward clarification of a fractured paradigm.” *Journal of Communication* 43 (8): 51-58.

Eyiah, Joe Kingsley. 2011. “Brief history of state-organized education in Ghana, http://www.modernghana.com/news/113894/1/brief-history-of-state-organized-education-in-ghan.html.

Fosu, Gabriel B. 1981. “Disease classification in rural Ghana: Framework and implications for health behaviour.” *Social Science & Medicine* (Part B: Medical Anthropology): 471-482.

Geist-Martin, Patricia, Eileen Berlin Ray, and Barbara F. Sharf. 2002. *Communicating health: Personal, cultural, and political complexities.* Belmont, California: Wadsworth Publishing.

Gerring, John. 1997. “Ideology: A definitional analysis.” *Political Research Quarterly* 50 (4): pp. 957-994, http://www.jstor.org/stable/448995.

Ghana News Agency. “Official raises concern over fake drugs on market.” 2007 [cited April 6 2011]. Available from http://www.modernghana.com/low/content.asp?which=1&id=VFZSTk1rMVVZM289.

Gildea, Ray Y.,Jr. 1964. “Culture and land tenure in Ghana.” *Land Economics* 40 (1): pp. 102-104, http://www.jstor.org/stable/3144468.

Gryseels, Bruno, Katja Polman, Jan Clerinx, and Luc Kestens. 2006. “Human schistosomiasis.” *The Lancet* 368 (9541): 1106-18.

Hotez, Peter J., and Meghan T. Ferris. 2006. “The antipoverty vaccines.” *Vaccine* 24 (31-32): 5787-99.

Hotez, Peter J., David H. Molyneux, Alan Fenwick, Jacob Kumaresan, Sonia Ehrlich Sachs, Jeffrey D. Sachs, and Lorenzo Savioli. 2007. “Control of neglected tropical diseases.” *New England Journal of Medicine* 357 (10): 1018-27, http://dx.doi.org/10.1056/NEJMra064142.

Institute for OneWorld Health. “Diarrheal diseases.” 2011 [cited April 18 2011]. Available from http://www.oneworldhealth.org/diarrheal_disease.

Kilson, Marion. 1969. “Libation in Ga ritual.” *Journal of Religion in Africa* 2 (2): pp. 161-178, http://www.jstor.org/stable/1594860.

King, C. H., and M. Dangerfield-Cha. 2008. “The unacknowledged impact of chronic schistosomiasis.” *Chronic Illness* 4 (1): 65-79.

Kleinman, Arthur. 1988. *The illness narratives: Suffering, healing, and the human condition.* United States of America: Basic Books, Inc.

Kloos, Helmut. 1995. “Human behavior, health education and schistosomiasis control: A review.” *Social Science & Medicine* 40 (11): 1497-511.

Kosinski, Karen. unpublished. “Evaluation of a novel primary prevention technique for the control of urinary schistosomiasis: A pilot intervention in Adasawase, Ghana.” Medford , MA: Tufts University

Lansdown, R., A. Ledward, A. Hall, W. Issae, E. Yona, J. Matulu, M. Mweta, and C. Kihamia. 2002. “Schistosomiasis, helminth infection and health education in Tanzania: Achieving behaviour change in primary schools.” *Health Education Research* 17 (4): 425-433.

Lawrence, Regina G. 2004. “Framing obesity: The evolution of news discourse on public health issue.” *The Harvard International Journal of Press/Politics* 9 (3): 56-75.

Loker, Eric S. 2005. “Research on the molluscan intermediate hosts of schistosomiasis: What are the priorities?” Paper presented at Scientific Working Group on Schistosomiasis World Health Organization Geneva, Switzerland.

Marek, Tonia, Catherine O'Farrell, Chiaki Yamamoto, and Ilyse Zable. 2005. “Trends and opportunities in public-private partnerships to improve health service delivery in Africa.” Washington, D.C.: The World Bank: Human Development Sector Africa Region.

McManus, Donald P., and Alex Loukas. 2008. “Current status of vaccines for schistosomiasis.” *Clinical Microbiology Reviews* 21 (1): 225-42.

Myers, Linda James. 1987. “The deep structure of culture: Relevance of traditional African culture in contemporary life.” *Journal of Black Studies* 18 (1): pp. 72-85, http://www.jstor.org/stable/2784611.

Omari, C. K. 1990. “Traditional African land ethics.” *Ethics of Environment and Development: Global Challenge, International Response*: 167-175.

Owusu-Ansah, Joseph. “Naming culture in Ghana.” 2000 [cited December 03 2011]. Available from http://www.angelfire.com/me4/joseph/culture.HTML.

Perloff, Richard M., Bette Bonder, George B. Ray, Eileen Ray Ray, and Laura A. Siminoff. 2006. “Doctor-patient communication, cultural competence, and minority health: Theoretical and empirical perspectives.” *American Behavioral Scientist* 49 (6): 835-852.

Republic of Ghana Ministry of Health. 2004. “Ghana essentials medicines list Accra, Ghana.” Ghana National Drugs Programme (GNDP) Ministry of Health.

Rosenberg, Charles E. 1992. *Framing disease: Studies in cultural history*. New Brunswick, New Jersey: Rutgers University Press.

Sagoe, T. E. C. Narcotics control in Ghana. 1966 [cited April 6 2011]. Available from http://www.unodc.org/unodc/en/data-and-analysis/bulletin/bulletin_1966-01-01_2_page003.html.

Science Photo Library. Theodore bilharz 2011 [cited April 4 2011]. Available from http://www.sciencephoto.com/images/download_lo_res.html?id=724020359.

Segre, Joel, and Julia Tran. 2008. "What works: CareShop Ghana improving access to basic drugs through conversion franchising." Washington DC: World Resources Institute.

Sharf, Barbara, and John Kahler. 1996. "Victims of the franchise: A culturally sensitive model of teaching patient-doctor communication in the inner city." In *Communication and disenfranchisement: Social health issues and implications.*, ed. Eileen Berlin Ray, 95-115. Mahwah, New Jersey: Lawerence Erlbaum Associates, Publishers.

Tabi, M. M., M. Powell, and D. Hodnicki. 2006. "Use of traditional healers and modern medicine in Ghana." *International Nursing Review* 53 (11): 52-58.

van den Boom, G. J. M., N. N. N. Nsowah-Nuamah, and G. B. Overbosch. 2004. "Health care provision and self-medication in Ghana." Amsterdam, Netherlands: Center for World Food Studies.

van der Geest, Sjaak. 1997. "Is there a role for traditional medicine in basis health services in Africa? A plea for community perspective." *Tropical Medicine and International Health* 2 (9): 903-911.

Watts, Susan. 2005. "The social determinants of schistosomiasis." Geneva, Switzerland: World Health Organization.

World Health Organization. "About WHO." 2011 [cited April 05 2011]. Available from http://www.who.int/about/en/.

World Health Organization. "Schistosomiasis." 2010 [cited September 06 2010]. Available from http://www.who.int/mediacentre/factsheets/fs115/en/.

World Health Organization. 2008. "Country profile on Ghana: Preventative chemotherapy and transmission control." Geneva, Switzerland: Department of Control of Neglected Tropical Diseases.

Yeboah, Theophilus. 2000. "Improving the provision of traditional health knowledge for rural communities in Ghana." *Health Libraries Review* 17 (4): 203-8.

Chapter 6: Appendix

Appendix A: Kosinski's Knowledge Attitudes and Practices Survey

Subject ID: _____ Date: _____

Age: _____ Sex: M / F _____

Occupation: _____

KAP: Water

1. Do you have a house connection for water? Y / N
2. Do you drink water from a house connection? Y / N
3. Do you drink sachet water? Y / N
4. Do you drink river water? Y / N Which river(s)?
5. Do you drink rain water? Y / N
6. Do you drink water from a public standpipe?
7. Do you drink water from a house connection? Y / N
8. Do you drink water from another source? Y / N What source(s)?
9. Do you use river water for washing, cooking, and bathing? Y / N Which river(s)?
10. Do you use rain water for washing, cooking, and bathing? Y / N
11. Do you use public standpipe water for washing, cooking, and bathing? Y / N
12. Do you use house connection water for washing, cooking, and bathing? Y / N
13. Do you use water from another source for washing, cooking, and bathing? Y / N What source(s)?
14. Do you fetch water? Y / N
15. Do women in your house fetch water? Y / N
16. Do small children in your house fetch water? Y / N
17. Does anyone else in your house fetch water? Y / N

KAP: Sanitation and Hygiene

1. Do you have a ***latrine inside*** your house compound? Y / N
2. Do you have a ***water closet inside*** your house compound? Y / N
3. Do you ***usually*** share a ***latrine*** with another family? Y / N
4. Do you ***usually*** use a ***public*** latrine? Y / N
5. Do people in your town defecate in public places? For example, in the bush, along the road, in ditches, etc.?
    a. If Yes, do you know why?
6. When at home, do you ***usually*** defecate in ***either*** a water closet or a latrine?
7. When at home, do you ***usually*** defecate on the ground or in the bush?
8. When at work or school, where do you go to defecate?
9. When at farm, where do you go to defecate?
10. Are public latrines in your town generally clean or dirty?

KAP: Knowledge of Disease

1. How would you know if a person had Malaria? What are symptoms of the disease?
2. How would you know if a person had Bilharzia? What are symptoms of the disease?
3. How would you know if a person had Worms? What are symptoms of the disease?
4. How would you know if a person had Diarrhea? What are symptoms of the disease?
5. What are the causes of Malaria?
6. What are the causes of Bilharzia?
7. What are the causes of Worms?
8. What are the causes of Diarrhea?
9. What is the best way to prevent Malaria?
10. What is the best way to prevent Bilharzia?
11. What is the best way to prevent Worms?
12. What is the best way to prevent Diarrhea?
13. Have you suffered from a fever and chills?
14. Have you ever seen blood in your urine?
15. Have you ever seen worms in your stool?
16. Have you ever had a problem with frequent defecation / stomach pains / watery stool?

KAP: Attitudes and Practices

1. Do you eat with your hands? Y / N
2. Do you wash your hands before eating? Y / N / Sometimes
3. Do you use **soap** when you wash before eating? Y / N / Sometimes
4. Do you wear shoes or sandals? Always / Sometimes / Never
5. If ***Sometimes*** or ***No***, when do you **NOT** wear shoes or sandals?
   (a) At home (b) Farm (c) Playing (d) In school (e) Other_____
6. Do you wash your hands after urinating/defecating? Always / Sometimes / Never
7. Do you wash with **soap** after urinating/defecating? Always / Sometimes / Never
8. Where do you go when you are not feeling well / ill?
   (a) Local clinic (b) Hospital (c) Traditional Healer (d) Chemical Shop
   (e) Spiritualist/Religious (f) Stay home (g) Other
9. What does your family do with **household** rubbish?
   (a) Rubbish dump (b) Bush (c) Bury it (d) Burn it (e) Other_____
10. What do you do with litter (ex. Small papers, plastic bags) when you are not home?
    (a) Drop on ground (b) Rubbish bin (c) Pocket or bag (d) Other _____
11. Where do you get information about health? From whom? _____
12. Do you know what an ***Insecticide Treated Bed Net*** is? Y / N
13. Do you swim, wash, or play in a river or pond in this town ***or any other place***? Y / N
    If ***Yes***, where? _____ How often? _____
14. Do you sometimes ***urinate*** in or near a river or pond? Y / N
15. Do you sometimes ***defecate*** in or near a river or pond? Y / N
16. Do you cook or help cook? Y / N
17. Have you ever seen your urine red? Y / N If ***Yes,*** during this past week? Y / N
18. Do you easily get tired? Y / N
19. Have you had a fever or chills in the past three days? Y / N
20. Have you taken any medicine in the past three days? Y / N

The following questions are designed for a discussion-style interview. The interview would take place between a translator and a willing participant. The translator would initiate a discussion on the following topics and then would ask appropriate follow-up questions related to the same subject.

1. Translator offers an explanation of the nature of the work being done by researchers from Tufts University with respect to water, health, and Bilharzia (schistosomiasis). Translator asks if the participant is familiar with the work, and if (s)he has any questions, comments, or thoughts about the work that (s)he would like to share.

2. Translator asks participant to talk about the types of projects that are currently underway in the town (economic, alternative livelihoods, health outreach, literacy/numeracy, etc.).

3. Translator asks participant to talk about some of the general health concerns facing the community, and to comment on how the community is addressing, or hoping to address these issues.

4. Translator asks about water use by members of the participant's household and by members of the community in general. For example, discussion topics might include: common water sources, water quality/quantity, water use in dry and wet seasons, the price of water, and recreational water use.

5. Translator asks about typical roles and responsibilities of children, women, and men in the community with respect to water.

Appendix B: Knowledge Attitudes and Practices survey with Students

Subject ID: Date:

Age: Sex: M / F

KAP: Water

#1 Which of these does your family use to bathe , wash, and cook with?

- **A.** Standpipe
- **B.** River Water
- **C.** Rain Water
- **D.** Borehole

#2 Do you know about Tini River? Where is it?

- **A.** Yes
- **B.** No

#3 What do you do at Tini River?

- **A.** Bathing
- **B.** Fetching Water
- **C.** Swimming
- **D.** Fishing
- **E.** Washing

#4 Who do you go to Tini River with?

- **A.** Friends (Neighbors or schoolmates)
- **B.** Siblings (Brothers or sisters)
- **C.** Family (Parents or cousins)
- **D.** Other

#5 When do you go to Tini River and how long do you stay?

Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, or Sunday?

- **A.** 30 minutes
- **B.** 1 hour
- **C.** 2 hours
- **D.** 3+hours

KAP: Sanitation and Hygiene

#6 Which of these places have you ever used to urinate?

- **A.** Bush (Dig a hole)
- **B.** River
- **C.** Latrine
- **D.** Ditch (Gutter)
- **E.** Road

#7 Which of these places have you ever used to defecate?

- **A.** Bush (Dig a hole)
- **B.** River
- **C.** Latrine
- **D.** Ditch (Gutter)
- **E.** Road
- **F.** Polytene bag

8 Do people in your town urinate in public places? Where?

- **A.** Bush (Dig a hole)
- **B.** River
- **C.** Latrine
- **D.** Ditch (Gutter)
- **E.** Road

#9 Do people in your town defecate in public places? Where?

- **A.** Bush (Dig a hole)
- **B.** River
- **C.** Latrine
- **D.** Ditch (Gutter)
- **E.** Road
- **F.** Polytene bag

#10 What do you see people doing in your town that you think is a health risk?

KAP: Knowledge of Disease

#11 Do you know about bloody urine?

A. Yes
B. No

#12 Do you know about Bilharzia?

- **A.** Yes
- **B.** No

#13 How does a person get bloody urine?

#14 How do you know if a person has Bilharzia? What are the symptoms?

#15 What color will the urine be if a person has Bilharzia?

Blue, Yellow, Purple, Green, or Red

#16 Has anyone in your family or anyone you know ever had Bilharzia?

- **A.** Yes
- **B.** No

#17 Who told you about Bilharzia?

- **A.** School (Teachers or Headmaster)
- **B.** Siblings (Brothers or sisters)
- **C.** Family (Parents, cousins, or relatives)
- **D.** Other

KAP: Attitudes and Practices

#18 What have you learned from your teachers at school about health and diseases?

#19 If you are sick, where do you go to get treated:

- **A.** Hospital
- **B.** Local Clinic
- **C.** Parents
- **D.** Traditional Healer
- **E.** Prayer Camp
- **F.** Drug Store

#20 If you are sick do you take:

- **A.** Medicine
- **B.** Traditional medicine
- **C.** Food
- **D.** Nothing

#21 Have you ever seen red in your urine?

- **A.** Yes
- **B.** No

#22 Have you ever seen blood in your urine?

A. Yes
B. No

KAP: Swimming Pool

#23 Do you know about the pool in town?

A. Yes
B. No

#24 Do you use the pool?

- **A.** Yes (If yes, how often?)
- **B.** No (If no, why not?)

#25 When do you go to pool and how long do you stay?

Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, or Sunday

- **A.** 30 minutes
- **B.** 1 hour
- **C.** 2 hours
- **D.** 3+ hours

#26 When do you go to the pool?

- **A.** During school
- **B.** After school
- **C.** Weekends
- **D.** Holidays

#27 Where do you prefer to swim?

- **A.** River
- **B.** Pool
- **C.** Both River and Pool
- **D.** I don't swim

#28 Who do you go swimming with?

A. Friends (Neighbors or schoolmates)
B. Siblings (Brothers or sisters)
C. Family (Parents or cousins)
D. Other

#29 What do you not like about the pool?

A. Cleanliness
B. Not open enough
C. Not fun

#30 Did you like this survey? What would you do to change it?

A. Yes
B. No

Appendix C: Knowledge Attitudes and Practices survey with Teachers

1. What topics about health and disease do you teach in class? How do you teach it?
2. What do you think is the best way of teaching about disease/health to your class? What has worked and what has not worked?
3. Do you know about Bilharzia/bloody urine?
4. How do you get Bilharzia/bloody urine?
5. What are the symptoms of Bilharzia/bloody urine?
6. How do you prevent Bilharzia/bloody urine?
7. What do you tell your students about Bilharzia?
8. Has anyone in your family had Bilharzia? If yes, how was it treated?
9. If a student tells you that they have bloody urine or that it hurts to urinate, what do you do or tell them?
10. How do you test for knowledge and understanding of health topics that you do teach?

<u>D/A JHS Teacher Survey Answers:</u>

- 6 people in attendance
- Teachers stated that they attended a workshop last week on Bilharzia in Kwabeng (1 day)
- Ghana Health Services was attempting to mass treat all the children in the district
    - Schools have not yet received PZQ to treat kids
    - Teachers asked how the rest of the kids in the community will get treatment if not in school
- Integrated Science is taught at the JHS
    - They cover many topics
    - STDs (AIDS/HIV)
    - Communicable Diseases
    - Included in Social Studies
    - Every teacher must include health topics in their lessons
    - Diseases are included on exams
    - What is the disease?
    - What are the causes?
    - How does one get the disease?
- Bilharzia (Schistosomiasis)
    - Found mainly in water
    - Causative agent is a small snail
    - Symptoms
        - Infected person urinates blood
    - Urinates in water
    - Causative agent injures urinary tract
    - Teachers must learn about this in school
    - One of the teacher's sons had it and complained of pain in his penis
- Ideas

    - Design a educational study and implement a pilot study

Methodist Primary School Teacher Survey Answers:

- 7 people in attendance (3 females and 4 males)
- Head teacher and coordinator attended meeting
- Health
    - Every teacher must teach about AIDS
    - Both in lower and upper primary classes
    - They use charts in class
    - They have a syllabus and textbooks for health topics
    - The children are tested on health topics
- Bilharzia (Schistosomiasis)
    - Water related issue
    - Contract by contact with contaminated water
        - A person can get Bilharzia just from being in the same water at the same time with another person who has Bilharzia
    - Symptoms
        - Painful urination
        - Blood in urine
        - Itching of penis and vagina
    - Don't go to contaminated water (River or stream)
    - Visit Health services for treatment
    - Students have come to teachers to self-report since Karen started her work in Adasawase
    - Where do they learn about Bilharzia?
        - Textbooks- found on own time
        - Workshops
        - Handouts
    - Environmental studies
        - Chapter in textbook is called "Building Healthy Bodies/ Individuals"

D/A KG Teacher Survey Answers:

- 4 female teachers
- What health/ disease practices are taught?
    - Malaria
    - Weed around buildings
    - Eat healthy foods
    - Wash hands (after bathroom and before eating)
    - Cholera
- Do children self-report?

    - Yes, children do self-report
    - They used to complain more but not as much recently
- Do the teachers know about Bilharzia?
    - Yes. “Bloody urine” (aka “Juso moja”)
    - Small animal- called schisto
    - Both in infested water and contract disease
    - Enter water bodies and passed through feces- enters water
    - Take “nuts”- turns urine bloody
- Swimming Pool
    - Not a topic they talk about in class
    - If cases come up they tell the children not to go to the river

Presbyterian Primary School Teacher Survey Answers:

- What health topics are taught in the school?
    - No specific topics
    - General Health
    - How to keep yourself healthy
    - Natural Science/ Integrated Science books
- Bilharzia
    - They know about it
    - When person urinates in river and then other people go in the river they become infected
    - Bloody urine
    - Painful urination
    - Teachers tell the children not to go to the river in their lessons
    - One teacher had Bilharzia and went to the hospital for it
    - After Karen started her work in Adasawase, the children self-report less
    - They learn about Bilharzia from TV, newspapers, and the Kwabeng workshop they attended

Appendix D: Pharmacy/Clinic Survey

1. What are the most common sicknesses/ailments that you prescribe medicine for or treat?
2. If a parent brings a child in that has bloody urine or painful urination what do you think is the problem? How would you treat it and what would you advise the parent to do?
3. What are common parasitic worm diseases for this area?
4. Do you know about Bilharzia?
5. What are the symptoms?
6. How does one contract it?
7. How do you treat it?
8. Do carry Praziquantel?
9. How many cases of Bilharzia have you seen/treated?
10. What do you recommend for prevention?