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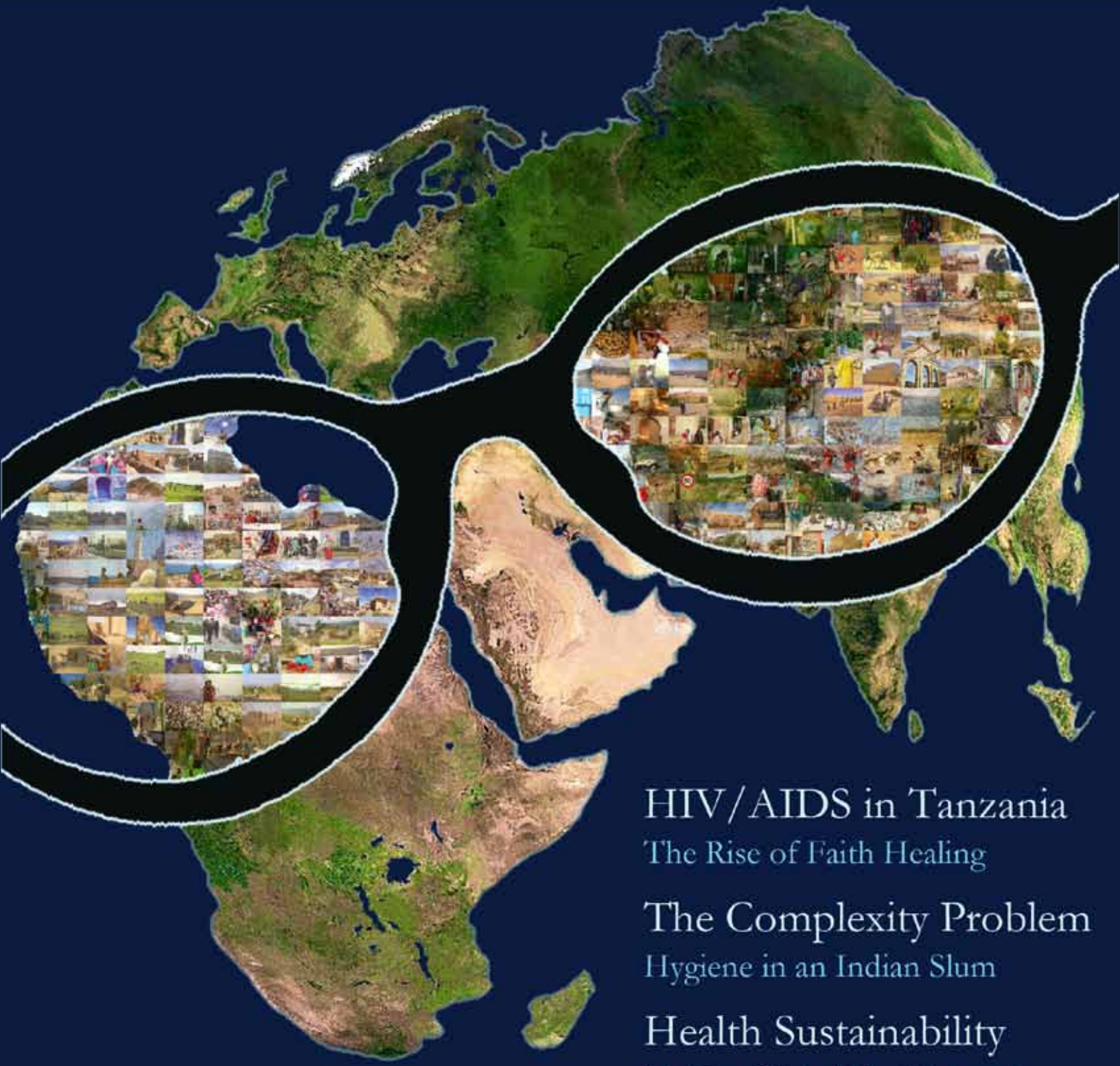


HIV/AIDS in Tanzania
The Rise of Faith Healing

The Complexity Problem
Hygiene in an Indian Slum

Health Sustainability
Making Global Health Local

Contact Information

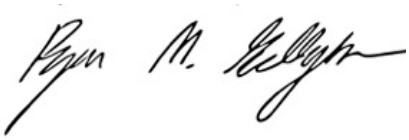
4039 Lerner Hall, Columbia University in the City of New York, 2920 Broadway, New York, NY 10027, USA, info@ghjournal.org

Global Health is Local

The Journal of Global Health aims to be an international voice for all students engaged in global health, featuring an eclectic geo-cultural blend of opinions. As the planet has become flatter, hotter and more crowded, health issues in remote regions of the world now receive greater attention than ever before. We have become more vigilant regarding the potency of diseases and infectious agents to drastically impact the health of populations, often faster than we can react to treating them. To combat this heightened threat, advances in medicine now allow physicians to diagnose and treat diseases more effectively and developments in information technology now enable public health scientists to accurately model and predict epidemiological trends. Despite these advancements, significant international disparities in the distribution of disease burden continue to persist.

Fortunately, the field of global health has seen a concomitant surge in interest from academics, politicians, medical professionals and activists. University students represent one of the fastest growing segments actively involved in global health issues, whether through academic discourse, research, fieldwork or the development of new global health technologies. In keeping with our stated mission, I am happy to announce the launch of JGH Online, our new online component featuring the debate-styled GlobalThink Forum and regular thematic pieces from columnists. This exciting new feature of ghjournal.org will go live in December 2011.

In this second issue of JGH, we chose to focus on broader global health efforts through the lens of community-based approaches. Our aim was to allow our contributors to offer new perspectives on health interventions applied at the local level. The articles in this issue address diverse topics ranging from faith healing to supervised injections and include a broad spectrum of geographies from Mongolia to post-war Sierra Leone. As you are reading these pieces, I urge you to be mindful of the deeper implications of their arguments in the context that "all health is local."



Ryan M. Gallagher
Editor-in-Chief

Front cover design by Kay Lodge and Debattama Sen
Front cover photos by Sarah Gitlin

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The Future of Global Health: Building Local Capacity

Fall 2011 Editorial

The Editorial Review Board of JGH, in conversation with
Lorna Thorpe, Ph.D, MPH (Former Deputy Commissioner of the NYC Department of Health and Mental Hygiene),
Anne Paxton, Ph.D, MPH (Director of the Global Health Track, Mailman School of Public Health, Columbia University),
and James Clarke, MD (Director of Crystal Eye Clinic, Unite for Sight)

In the last two decades, the field of global health has experienced a flood of interest and attention. During this time, international organizations, individual countries and non-governmental organizations (NGOs) have poured more money and resources than ever into disease eradication initiatives and large-scale public health interventions in the developing world. In her 2007 essay entitled "The Challenge of Global Health," Pulitzer Prize winning journalist Laurie Garrett calls this era of aid-giving the "age of generosity." She contends that "for the first time in history, the world is poised to spend enormous resources to conquer the diseases of the poor" (Garrett, 2007). Garrett's claim does not go unwarranted: consider that international developmental assistance in public health rose from US$5.6 billion in 1990 to $21.8 billion in 2007, the year Garrett published her essay (*The Lancet*, 2009). It is worth noting that only two years later, the U.S. pledged to increase its funding for global health development assistance from $460 million to $8.6 billion ("The Future of Global Health Policy," 2009).

Since 2008, however, the world has witnessed the unfolding of a global economic recession that threatens U.S. global health funding with huge budget and resource cuts that could potentially bring an end to the "era of generosity." As of October 2011, USAID (United States Agency for International Development) faces a $400 million budget cut and substantial staff layoffs (Giacomo, 2011), and international affairs and foreign assistance spending in the U.S. faces a 29% budget cut in 2012 and a 44% budget cut by 2016. Congress is currently deliberating whether to cut spending on humanitarian aid, with House Republicans proposing a $1 billion reduction to U.S. diplomacy and global development programs (*The Guardian,* 2011).

Preexisting U.S. global health funding has disproportionately targeted specific high-profile diseases. Not enough aid has gone into the development of infrastructure, and this lack of workable public health infrastructure in most of the developing world today makes the prospect of budget cuts especially ominous. For example, 62% of the entire 2009 USAID health budget was dedicated to HIV/AIDS (USAID, 2011), eclipsing the amount of resources allocated to initiatives in neglected tropical diseases and maternal/child health.

While efforts to combat HIV/AIDS have helped to reduce the burden on impacted people and governments, there is still a lack of self-sufficient local public health institutions. This will be a serious problem if American aid is reduced or cut off in the future. Money and resources urgently need to be dedicated to public health interventions that do not solely target high profile diseases but all impediments to health in a given region. If the U.S. and other international aid-givers focus their limited time and resources on building local public health capacity and infrastructure in the developing world, they may be able to establish a modicum of local health sustainability if and when the "era of generosity" comes to a halt.

Sustainable public health infrastructure cannot be established without systems of epidemiological surveillance. Surveillance allows researchers to identify disease threats and the magnitude of population health problems. From this information, public health policy and interventions can be developed (Arita, Nakane, Mojima, Yoshihara, Nakano, & El-Gohara, 2004).

Lorna Thorpe, former Deputy Commissioner of the New York City Department of Health and Mental Hygiene and current Director of the Epidemiology and Biostatistics Program at the City University of New York (CUNY), understands the challenge and importance of implementing reliable systems of epidemiological surveillance in the developing world. During her tenure at the NYC Department of Health and Mental Hygiene, Thorpe implemented the NYC HANES study, which obtained a representative sample of over 2,000 New York City adults, who completed a survey and a battery of exams and questions that assessed their state of health. In a June 2011 interview with JGH entitled "Global Health, Local Surveillance," Thorpe provided an example of the value of epidemiological surveillance in contributing to public health policy changes and educational interventions. After finding that Dominican women in the NYC HANES study had extremely high levels of urine mercury, Thorpe dispatched a team of health officials to the community where the women resided. Says Thorpe, "We found that these women were using skin-lightening cream that contained mercury, and we had the cream pulled from the shelves immediately. We then sent out targeted educational materials into the local community."

As Thorpe's experience demonstrates, local public health interventions cannot be established and maintained without critical biostatistical data gleaned from epidemiological surveillance. However, many developing countries do not have the resources needed to perform accurate surveillance of population health. As recently as 2009, an estimated 50 million births and 40 million deaths went unrecorded worldwide, mostly in the developing world (World Bank, 2011). Nev-

Mailman School of Public Health

Anne Paxton, Ph.D, MPH

Unite For Sight

James Clarke, MD

JGH

Lorna Thorpe, Ph.D, MPH

ertheless, Thorpe contends that a lack of biostatistics should not deter developing countries from performing surveillance of population health. She explains, "Even if such communities don't have infrastructure and funding to mount surveillance, resource-strapped countries, districts and communities can get around this problem creatively." Thorpe calls for the use of sentinel surveillance, which involves a representative sampling of deaths and births, and allows health officials to obtain rough estimates of health patterns and trends. Another method called dataset linkage allows epidemiologists to combine disconnected tracts of preexisting information in order to gain a general understanding of factors affecting population health and disease incidence, thus bypassing the need to fund new data collection initiatives. For example, to study the health of New York City's homeless population, Thorpe and the NYC Health Department matched the New York City homeless registry against citywide birth and death records and the citywide HIV and tuberculosis registry. "We were able to estimate, with a certain degree of accuracy, the tuberculosis incidence rates, HIV infection rates and the leading causes of mortality in the homeless population," Thorpe remarks.

Even if developing nations do implement greater epidemiological surveillance and public health policy interventions, there remains an alarming lack of emergency health services, physicians and health care facilities throughout rural areas. In a November 2011 interview with JGH, Anne Paxton, Director of the Global Health Track at Columbia University's Mailman School of Public Health, discussed a lack of emergency health services in the developing world. Says Paxton, "Even if you implement educational interventions and teach people how to recognize that there is an emergency, there needs to be a place for people to go when there is an emergency." Paxton's work at the Mailman School of Public Health focuses on maternal mortality in developing countries, the major causes of which are emergencies such as severe bleeding, infection, toxemia and obstructive labor. Treatment of these conditions requires surgical services and a functioning blood supply, resources that are often unavailable in rural hospital settings. The inaccessibility of emergency health services, even when services do exist, poses an additional challenge. In India, for example, almost 80% of physicians are located in urban centers, and only 30.5% of villages have a doctor in residence (Ministry of Health and Family Welfare, 2011). Because of this, the average Indian villager seeking health care must travel 10 kilometers, often without the use of motor transportation, as only 73.9% of villages are connected with roads, and even those villagers with access to roads often cannot afford vehicles (Ministry of Health and Family Welfare, 2011).

In addition to the challenge of building emergency health services in the developing world, local public health infrastructure cannot be implemented when there is a shortage of medical professionals. A serious challenge to the process of building workable local institutions in developing countries is the "brain drain" of health professionals, in which aspiring medical students and fully licensed physicians from the developing world go abroad and do not return to their native countries to practice medicine. In a November 2011 talk entitled "Global Health and Development: Through the Eyes of a Ghanaian Ophthalmologist," co-sponsored by Columbia University Unite for Sight and JGH, ophthalmologist James Clarke described the brain drain problem in his native country, Ghana. Between 1993 and 2002, 69% of physicians trained in Ghana left to practice in developed countries (Bernhard & Dussault, 2004). Clarke points to a lack of monetary incentives for newly licensed Ghanaian medical professionals as a barrier to these professionals' return to their native countries. He argues that, to combat brain drain, Ghanaians need not only to increase salaries for native doctors, but also to change their attitudes toward medical professionals. Clarke provided an example of this attitude change when he asked the audience to consider how Ghanaians would react to a Ghanaian medical professional who returns home to practice medicine after many years overseas. "They would say [to him], 'Why are you coming back? Why aren't you enjoying yourself overseas?' If we want to motivate medical professionals to come back home, we can't have this attitude persist," said Clarke.

A 2011 video produced by the NGO Physicians for Human Rights (PHR) entitled "More Pie" illustrates the global health funding crisis and highlights the need for more money and resources to be pooled into global health funding. The video shows five hands, representing HIV/AIDS, malaria, maternal mortality, cholera and TB, competing for a slice of pie. As the hands bump into each other in their attempts to cut uneven slices, the pie is devoured in a matter of seconds. The words, "We're still hungry! We need more pie" appear on the screen (Physicians for Human Rights, 2011).

Despite recent budget cuts to global health funding, the U.S. and other developed countries *do* have the resources to establish systems of epidemiological surveillance, emergency public health infrastructure and the training of native medical professionals who practice in their respective communities. Although Laurie Garrett speaks of an "age of generosity" since the advent of the new millennium, some argue that the "age of generosity" hasn't been particularly generous. Says Paxton, "There has been a misconception that a lot of money is being spent on humanitarian aid to help developing countries combat disease." In fact, foreign aid currently makes up a meager 2% of the U.S. federal budget, and this includes a huge amount of money that goes to American food, medicine, and weapon exports delivered abroad. The future of global health depends on the ability of industrialized nations to help the developing world build local capacity. Ultimately, it must be recognized that the global health funding pie slice needs to be bigger, but that in the meantime, aid givers and recipients must utilize meager aid funding in the most sustainable and effective means possible.

Interviews transcripts and full listing of references available at JGH Online, www.ghjournal.org

Sarah Gitlin

Faith: Friend or Foe?

The Rise of Faith Healing in Tanzania and Its Impact on Community Understanding of HIV

Anu Ramachandran

University of Southern California, Los Angeles, CA, USA

Abstract

Faith healing is the treatment of illness through religious belief or prayer rather than through modern biomedical practice (Hall, 2010). It is a well-established global phenomenon whose effect on global health initiatives in developing countries remains largely unknown. Though often dismissed by health organizations, the emergence and prevalence of faith healers in areas such as South America and East Africa has had an incomparable impact on the cultural understanding of disease and treatment. Indeed, the widespread notoriety of such figures often translates into a form of credibility, allowing their ideas to pervade popular culture (Hall, 2010).

Specifically, the recent rise to fame of Babu of Loliondo, a Tanzanian faith healer who claims to have the ability to cure HIV, has created a cultural and logistical crisis for NGOs and other health organizations working with rural communities in Tanzania, particularly in the area of education (Ibrahim, personal communication, 2011 July 9). The impact of Babu's faith healing on HIV education efforts in rural communities highlights the need for global health organizations to acknowledge faith-based phenomena. In turn, this will facilitate collaboration with these communities as how best to address the problems posed by Babu and similar faith-based figures.

This paper investigates the origin of Loliondo's faith healing movement and the factors leading to the popularization of Babu as a faith healer. Furthermore, it surveys the impact that the Loliondo phenomenon has had on a specific rural community's understanding of HIV and on the interface between biomedical and faith-based treatment interventions. Finally, it addresses potential community-based initiatives that NGOs and other health organizations can support to consistently and understandingly address this and similar situations.

Background

Approximately 1.5 million people in Tanzania are currently living with HIV/AIDS. 5.6% of Tanzanians between the ages of 15-49 are infected, and of Tanzania's 2.6 million orphans, 1.3 million were orphaned because of HIV/AIDS. Antiretroviral therapy is provided free of charge by the Tanzanian government, yet only 44% of those infected are currently receiving treatment; the majority of the untreated live in rural areas (UNAIDS, 2010). A major factor is the lack of knowledge about transmission and treatment, particularly in rural communities, which comprise 80% of Tanzania's population. Effective education programs in rural communities are a key component of any global health initiative, but they are especially important in the prevention of HIV in resource-limited environments. According to the World Health Organization, "Action on the sociocultural determinants of health is the fairest and most effective way to improve health for all people" (Labonte & Schrecker, 2007). Understanding cultural phenomena that limit or complicate education initiatives and engaging in open

discourse with rural communities should be priorities of health organizations.

Religion is a cornerstone of East African society, with approximately 35% of the Tanzanian population identifying as Christian, 35% as Muslim, and 30% as practicing indigenous religions (Central Intelligence Agency, 2011). Within the past ten years, several Christian religious movements have gained significant political and cultural momentum in East Africa, in part due to economic and infrastructural hardships that caused considerable anxiety among rural populations (Twesigye, 2010). From the Marion Movement to the Movement for the Restoration of the Ten Commandments of God, nearly all of these movements claimed the ability to cure the sick through faith and "the laying on of hands" (Twesigye, 2010). Their success and popularity were characteristic of the East African cultural traditions of faith healing but also indicative of the desperation felt by communities faced with few alternatives against the ravages of HIV, malaria, and other diseases. Indeed, the WHO estimates that 80% of people in low-income countries rely on non-allopathic healing for their primary health-care needs (UNAIDS, 2002). Given this cultural and historical context, it is not surprising that a Tanzanian faith healer could rapidly gain widespread notoriety and a legion of followers from around East Africa within a matter of months.

Ambilikile Mwasapile, a retired Evangelical Lutheran pastor from the rural village of Samunge located in Loliondo in northern Tanzania, has risen to prominence as a faith healer. According to a government-sponsored report by the National Institute of Medical Research in August of 2010, he claims to have been visited by God in a dream, in which he was told of a remedy for chronic illnesses such as diabetes, asthma, blood pressure, cancer and HIV/AIDS (Malebo & Mbwambo, 2011). The treatment involves boiling the root of the local black currant tree, known locally as Mugariga, and administering one cup of the liquid, known as kikombe. He began distributing the kikombe to locals later that year and rapidly gained notoriety when a local woman claimed that Babu had cured her of HIV, and that she had the taken the test to prove it (Malebo & Mbwambo, 2011). Although the woman was never identified and her story was never officially investigated, thousands of people from all over Tanzania traveled to Mwasa Pile in search of healing for a wide range of problems. The study estimates that in the three months after word began to spread, over 24,000 people had visited the healer, and a line of vehicles stretched over 15 kilometers along the dirt road leading to Loliondo (Malebo & Mbwambo, 2011). These numbers have since increased to nearly 1000 people a day, with followers traveling from Kenya, Uganda, and even South Africa. Reports of the benefits of his treatment (though undocumented) continued to grow, and Mwasapile came to be known simply as Babu, which means "grandfather" in Swahili.

Several factors contributed to the meteoric rise of Babu of Loliondo. First was the immediate involvement of media and the sensationalist reaction it created. Traditionally, healing is conducted at the level of local communities. However, recently media coverage has become accessible in rural areas, typically via radio broadcasts, and the combination of a newfound spread of information and the compelling language used to describe the phenomenon has greatly increased awareness and a willingness to participate. Second was the role of the Tanzanian government, particularly the Ministry of Health. While the government took immediate notice of the movement and launched an investigation of Babu and the kikombe, the report was inconclusive regarding the validity of his healing. The report further complicated the situation by outlining the possible anti-viral effects of the plant itself, based solely on descriptive accounts of those who have worked with it in the past (Malebo & Mbwambo, 2011). Furthermore, several well-known government officials, including the minister of natural resources and tourism and the mother of the president of the Democratic Republic of Congo, have themselves visited Babu, instances that were rapidly publicized by the media (Philemon, 2011). Government-issued security personnel have patrolled Loliondo to control crowds and protect Babu; in this sense, Babu has enjoyed a rare position of authority and security that most healers do not have. Together, these actions lent clear legitimacy to the healer despite the government's technically neutral position.

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Finally, Babu's strong association with monotheistic faith sets him apart from other healers working in East Africa. Most traditional healers in East Africa are strictly local, and their traditions are based on African indigenous beliefs and practices. These traditional healers are rarely linked to monotheistic religions, though many who visit these healers are Christians or Muslims (UNAIDS, 2002). The term "faith healer" refers to a different and less common group, who claim to draw their healing abilities from monotheistic religions, most often Christianity. Combining monotheistic religions with traditional healing practices to reach a wider audience (Twesigye, 2010), Christian faith healers practice worldwide but flourish in areas with a history of non-allopathic healing and limited access to medical care, both of which are present in East Africa (Twesigye, 2010). This practice has led to the success of previous Christian healing movements in East Africa (Twesigye, 2010). That Babu was a pastor, considering Tanzania's history of Christian faith healing, could have further contributed to his perceived legitimacy. This in turn could have promoted the unique response of the media and government to the Babu phenomenon, compared to their response to traditional healers. It is important to note that while Babu seems to invoke a Christian God in his descriptions of healing, the specific belief to which followers are ascribing is vague. Furthermore, in interviews and articles about his healing, Babu has emphasized that he welcomes all races and religions, expanding his appeal to non-Christians, as Yusuph Ibrahim recalls from his experiences with HIV patients (Ibrahim, personal communication, 2011 July 9).

Like many well-established faith healers, Babu employs treatment involving several strict regulations. Tanzanian employees of Support for International Change (SIC), an NGO providing HIV education, testing and support to rural Tanza-

nia, outlined the basic rules. Visitors must come with a specific ailment or problem in mind, without which they are not permitted to visit Babu. Furthermore, only Babu himself is allowed to prepare and administer the treatment – without his involvement the cure is considered worthless and may even be poisonous. The kikombe itself costs 500 Tanzanian shillings, or approximately 35 cents, but transportation by car or bus 400 kilometers along dirt roads from Arusha, the nearest city, can cost hundreds of dollars. The most important rule associated with the healing is the level of faith it demands. Babu claims that only those with complete faith will receive the full benefit of the cure, and thus the kikombe is incompatible with any other type of treatment, including anti-retroviral therapy (Ibrahim, personal communication, 2011 July 9). It is clear how such a mandate could create a significant problem from a public health standpoint – forgoing ARV therapy for as little as three days can have extremely severe repercussions including increased viral load, increased risk of transmission and overall lowered effectiveness of therapy (WHO, 2010). Considering the rate of HIV infection and the sheer number of pilgrims to Loliondo, the impact of this phenomenon is truly considerable.

The high level of uncertainty about discontinuing ARV therapy in favor of Babu also suggests that this faith is not absolute.

Indeed, organizations like SIC have already noticed an impact on their work. Yusuph Ibrahim, a field coordinator for the organization, noted that Babu had been brought up in nearly all of the recent community education presentations and often was a source of tension between educators and community members. Furthermore, dozens of the HIV-positive patients with whom SIC has been working in the past three months have gone to visit Babu, and several have chosen to stop their ARV therapy. The struggle facing public health education initiatives, then, is to successfully address the topic of faith healing from a place of understanding or risk losing the trust and cooperation of the communities with which they work. To promote the best interests of the population, health organizations must engage in an open discourse on a community level and form partnerships with community leaders, in this order.

Surveying the Impact on HIV Education

Methods:

In this study, 25 interviews were conducted in the village community of Sangaiwe, within the Mwada ward of Manyara, northern Tanzania. The study was sponsored by SIC, which had previously conducted a large-scale survey of five rural villages comprising the Mwada ward of northern Tanzania, focusing on general knowledge about HIV/AIDS transmission, prevention and treatment. This included surveying 75 heads of household over the age of 18 that were chosen randomly and distributed geographically among the ward's five villages. During the period that these interviews were conducted, SIC was preparing to organize an education and testing campaign for the Mwada ward, including the village of Sangaiwe.

The interviews in this study focused solely on the village community of Sangaiwe, randomly selecting 25 households (evenly distributed among the village's four geographic subvillages) and provided an explanation of the purpose behind the interview before soliciting for participation. This included starting from the geographical center-point of each sub-village, flipping a coin to determine which direction of the main road to walk down, and using a random-numbers chart to determine which houses were chosen for interviews. This continued until six interviews had been conducted in the subvillage, at which point the investigators would move to the next subvillage. In the last and most populous subvillage, Usole, seven interviews were conducted. Thirty-minute interviews were held with consenting men and women over the age of 18 at their households. Interview questions were initially written in English, but were translated and edited by Mr. Alex Herman, a Tanzanian teaching partner who works as a translator and HIV educator at SIC. Interviews were conducted orally in Swahili and again translated by Mr. Alex Herman. The interviews focused on knowledge of Babu and opinions on faith healing and education (Supplementary Table 1). Each of the questions was asked in a yes or no format, and for the descriptive questions (5,7), respondents were not prompted or asked to choose from a list of options but came up with responses independently. Though the data collected and presented was based on direct questions, the interview tone was informal and often included follow-up discussions or anecdotes. These were not included in the results section but were incorporated into the discussion and background.

Results:

The majority of respondents were Christian, of middle age, and had lived in Sangaiwe for their entire lives (Supplementary Table 2). 24 of the 25 respondents (96%) knew of Babu of Loliondo, and 19 (76%) said they knew someone who had gone to visit the faith healer. 92% first heard about Loliondo through some form of media, with most (72%) hearing through radio announcements. 88% also received more information about Loliondo from talking to others in the village (Supplementary Table 3).

The crucial content of the interviews, regarding belief in Babu and HIV, was contained in questions seven through ten. 20 of the respondents (80%) said they believed that Babu had some healing power, though 60% of those were unsure of the degree of healing he was capable of. For example, 17 (68%) believed he could cure or significantly improve either diabetes or asthma, but only six (24%) were as confident that he could cure or significantly improve HIV. Five respondents (20%) were confident that Babu could not cure HIV and the majority (14, 56%) were unsure. When asked why they believed or did not believe in Babu, 23 (92%) of the respondents referred to an individual they knew of whose condition either improved or deteriorated after visiting the healer as their primary reason. Of the randomly selected 25 respondents, seven (28%) had been to visit Babu themselves. Of these, five believed that it had helped their health in some way, but only two believed themselves to be completely cured.

Regarding ARV therapy vs. faith healing, respondents

were generally torn on the issue. Twenty-four (96%) claimed that, if diagnosed with HIV, they would take ARV therapy, while the other one person was unsure. However, 18 respondents (72%) felt that the efficacy of Babu's healing was based on the amount of faith a person had, and 17 (68%) said that they would go to visit Babu if they were diagnosed with HIV and had the resources to afford it. Nine (36%) claimed that they would continue ARV therapy while they went to visit Babu, three (12%) claimed they would discontinue ARVs if they visited Babu, and the rest were unsure if they would do so.

The final component of interviews was designed to identify possible targets for intervention by NGOs. When asked about the role of NGOs in educating about HIV, 24 respondents (96%) felt that NGOs should continue to educate rural communities about HIV transmission and prevention, and 23 (92%) felt that they should educate about ARV therapy as well. 23 respondents (92%) felt that NGOs should address the issue of Babu within their education programs, and 17 (68%) felt that Babu's healing should be incorporated into discussion of HIV treatment options.

Discussion:

In considering these results, there are several important trends of interest. Clearly, knowledge of Babu is highly prevalent in this rural community, even with limited access to media and communication technology. This is of particular interest considering the relative recency of the phenomenon, indicating the pervasiveness of this emergent faith healer. The number of people who first heard of Babu over the radio suggests that radio is one of the most powerful means of mass communication, and that the way information is presented over the radio can have a profound impact on the popular view of a cultural figure such as Babu. However, while the media may first introduce individuals to this phenomenon, it is by no means the deciding factor of public opinion. Every person who had formed an opinion on the legitimacy of Babu had done so by communicating with other members of their community: specifically, from hearing accounts of the experiences of others and sharing their own experiences. Based on these responses, it seems that these are not just isolated individuals and opinions but are indicative of a larger, community-level understanding in Sangaiwe. Therefore, engaging with this issue at the community level could be an effective means of both understanding and addressing the phenomenon.

Another trend among the responses is the level of uncertainty about the specific nature of faith healing. While the vast majority do believe that Babu can heal, there is nearly no established consensus regarding the specific diseases that are treatable, the importance of adhering to treatment guidelines or the possibility of combining Babu's method with traditional biomedical therapy. Each person interviewed had his or her uncertainties in different areas, and most were especially conflicted on the topic of HIV. Though many had heard rumors of people being cured of HIV, none of the respondents directly knew the individuals involved. The fact that the majority of respondents would travel to Liliondo if given an HIV diagnosis suggests a belief in a connection between Babu and well-being, but the high level of uncertainty about discontinuing ARV therapy in favor of Babu also suggests that this faith is not absolute. This uncertainty reflects an important opportunity for education programs to intervene in promoting safe lifestyle choices for rural communities.

While working in Mwada, SIC conducted a widespread household survey of general HIV knowledge among the five villages in the Mwada district. They found a generally high level of awareness of HIV – 100% knew what it was and 41% ranked it as a big or very big problem for their community (SIC, 2011). However, 18.5% of those surveyed claimed they did not know of any way to prevent HIV transmission, and 79.5% had never attended an HIV education activity (SIC, 2011). Given the previous insights on how the phenomenon of Babu of Loliondo has affected a community's understanding of HIV, the ultimate goal becomes incorporating cultural understanding of prominent figures like Babu into sustainable community education initiatives. It is essential to involve communities in discussions of culturally-based phenomena to promote an ethos of understanding and cooperation.

The results shown in this paper are based on interviews with a small subset of individuals from one community in rural northern Tanzania. The responses gathered were evaluated on a qualitative basis, lacking finite quantitative analysis because of the small sample size. Their general characteristics are typical for those living in rural east Africa – agrarian and herding lifestyles, Christianity, tribal identity and language, etc. But it is important to note that the information from these interviews does not necessarily represent true Tanzanians, or even those in the Mwada ward. The information does, however, provide an important set of insights that, along with other resources, can be used to better understand the Babu phenomenon. Furthering this work would include addressing these limitations by creating a wider-scale survey, incorporating increased religious diversity among participants, and performing quantitative analysis of the results. Taking this set of interviews as a case study on the impact of faith healing on rural understanding of HIV, we can explore the broader implications of this work for incorporating local belief into community education initiatives.

A large-scale means of addressing the phenomenon would be at a national level – working to change the way Babu is portrayed in the media and by the government of Tanzania. This would include working with the Department of Health and prominent media organizations to create and enforce stricter guidelines on Babu's portrayal and especially the Tanzanian government's stance on the issue. It could also involve establishing (or enforcing previously established) laws on practicing medicine without a license. Though potentially far-reaching, the feasibility of these tactics is doubtful. Given the popularity and widespread notoriety Babu has achieved, and the instrumental role that both media and government played in elevating him to such a position, it is unlikely that such momentum could be halted, let alone turned against such a culturally prominent figure.

A potentially more successful way to address the issue would be to create a middle ground with rural communities. Immediately and unequivocally dismissing Babu as ineffective, the initial tactic of many NGOs like SIC, created distrust among their rural audiences. This distrust often affected the way communities viewed the entire education curriculum, according to Ibrahim. Fostering this community involvement, then, is not just important in encouraging proper treatment of HIV, but it can have far-reaching effects on every component of an education campaign, including education on prevention.

Acknowledging that visiting Babu can be a beneficial experience for those struggling with chronic disease while maintaining that traditional biomedical therapy is the proven method of treatment ought to be a standard for education programs. Furthermore, having time allocated to specifically discuss this phenomenon and providing an open forum for discourse with community members about the topic will make important strides towards reaching a true understanding, which is the best platform on which to build sustainable behavior of change.

Part of this discourse should concern the nature of HIV, itself a highly contentious topic in rural areas of East Africa (Ibrahim, personal communication, 2011 July 9). The widespread notion that HIV is a "disease caused by sin" persists in rural communities to rationalize the spread of the disease and dismiss personal risk. A faith-based treatment goes hand-in-hand with this view, allowing those infected to absolve themselves of responsibility through a one-time miraculous panacea rather than accepting the long-term commitment to treatment that comes with a diagnosis of HIV. Indeed, Yusuph Ibrahim noted the prevalence of this moralistic view of HIV in the areas in which SIC works and its role in pushing HIV patients towards Babu's treatment (Ibrahim, personal communication, 2011 July 9). Addressing and providing information about HIV from a biological perspective could balance out this "disease of sin" view, and would likely make significant strides in bridging this gap in understanding.

The ultimate success could be achieved working with communities and affected individuals to construct a treatment regime that is more holistic in its outlook while adhering to the guidelines recommended by the WHO, such as a specific education campaign led by NGO-trained community health workers to widely address this issue and answer questions in community settings. Another option is working with community clinics to provide their HIV-positive patients with a holistic treatment program – ARV therapy, education, and open discussion about faith healing. Such a regimen would find its place among the biomedical regulations that are foreign to most rural Tanzanians. The next steps for such a project would be to expand the interviews to other villages and use village-specific information to address this issue uniquely according to the needs of each community. A past UNAIDS case study investigated the benefits of collaborating with traditional healers in East Africa through training and education programs to increase rural access to HIV testing and treatment. The study found a significant increase in both the number of patients gaining access to care and the overall satisfaction of those receiving care, proving to be a testament to the power of combinative practices (UNAIDS, 2002). Though faith healing and traditional healing are different phenomena, it is crucial to keep in mind the potential benefits of collaboration and to explore partnerships among the traditional healers in this and other communities. Given the cultural impact of a disease such as HIV, it would be wise to incorporate cultural understanding and mechanisms into any model of treatment and prevention.

Conclusion

This paper has sought to explore the phenomenon of Babu of Loliondo from several perspectives in order to come to a fuller understanding of how such events have affected one community's understanding of HIV. More specifically, it addresses the repercussions for community-based global health initiatives. Faith healing movements, particularly in the developing world, have long flown under the radar of global health organizations, but to allow these organizations to ignore such phenomena is a severe disservice to the communities and individuals of the area. Understanding the roots of such phenomena would allow organizations to address them appropriately and even utilize them in their community outreach initiatives.

To allow these global health organizations to ignore faith healing movements is a severe disservice to the communities and individuals of the area.

By doing so, traditional healers and faith healers would no longer be an enemy of global health initiatives but rather become an ally in reducing the impact of HIV/AIDS on the Tanzanian people.

Supplementary tables and figures for this article are available at JGH Online, www.ghjournal.org

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Expanding the Definition of Infectious Disease

A Review of HIV & Schistosomiasis

Irfan Nizarali Kherani

Princeton University, Princeton, NJ, USA

Abstract

Over the past century, as the field of public health adopted new actors and new priorities, the definition of infectious disease expanded, yielding new ideas on controlling and treating disease. In its primary form, infectious disease referred to a collection of symptoms resulting from infection by a single pathogen. As this definition expanded, it incorporated upstream causes such as poverty, access to health infrastructure and stigma. However, we must now adopt an even more expansive definition of infectious disease that integrates symptoms stemming from a collection of pathogens and a collection of upstream factors. Human immunodeficiency virus (HIV) and schistosomiasis illustrate the importance of recognizing the interactions that exist between different infections. In this specific case, as upstream factors lead to infection by one pathogen, the risk of transmission of the other diseases increases almost three-fold. As we move into the future and develop new interventions, control mechanisms are needed to combat specific pathogens, their upstream factors, *and* their interactions with each other. Once we accept that illness is affected by a combination of different infections, we can develop more effective treatments and public interventions to: 1) further prevent disease, 2) prolong life, and 3) promote health.

Introduction

In the Acheson Report of 1988, the United Kingdom Health Department defined public health as "the science and art of preventing disease, prolonging life and promoting health through the organized efforts of society." This definition, also adopted by the World Health Organization (WHO) in their Health Promotion Glossary, illustrates how the field seeks to improve the lives of not only individuals but also populations across the world through the prevention of disease (1998). One key aspect of this idea of public health is defining "disease" and using that definition to determine how to best treat and decrease the burden of infectious disease on populations. The definition of infectious disease has progressed through two stages as public health has developed. By analyzing these two stages of public health and examining their shortcomings, using schistosomiasis and HIV as case studies, it is clear that a third, all-encompassing definition must be adopted to increase the impact of public health interventions.

Background of Schistosomiasis

Schistosomiasis, once called bilharzia, is a chronic disease caused by one of three different blood fluke trematodes, or parasitic *Schistosoma* worms (National Center for Health Marketing [NHCM], 2010). *S. mansoni* and *S. japonicum* cause the intestinal disease, and *S. haematobium* causes the urogenital one (Wu & Halim, 2000). Schistosomiasis is found across the globe in over 70 countries, but it is most commonly seen in impoverished tropical and sub-tropical locations (NHCM, 2010). While the disease was initially concentrated in rural areas, as the result of migration and insufficient sanitation schistosomiasis now affects urban environments as well, particularly those with populations of low socio-economic status (WHO, 2011). An estimated 700 million people worldwide are at risk of contracting schistosomiasis, and more than 207 million are already infected (WHO, 2011).

Transmission of schistosomiasis occurs when a human's skin comes in contact with freshwater contaminated with schistosome-carrying snails (Ross et al., 2007). In the early stages of infection, a rash or slight itch develops followed by coughing and muscle aches (Wu & Halim, 2000). The intestinal version typically results in abdominal pain, diarrhea, blood in the stool and an enlarged liver. It is diagnosed by testing for the presence of *Schistoma* eggs in feces (Ross et al., 2007). The urogenital version often presents itself with fibrosis of the bladder, kidney damage and even bladder cancer; it is diagnosed by analyzing blood in urine, or hematuria (Poggensee & Feldmeier, 2001). In women, the urogenital type may result in genital lesions, vaginal bleeding, pain during intercourse and nodules in the vulva (Poggensee et al., 2000). In men, this type may also cause damage in seminal vesicles and the prostate, though this remains unproven (Poggensee, Kiwelu, Saria, Richter, Krantz, & Feldmeier, 1998). The symptoms listed above often incapacitate individuals, preventing them from fulfilling their social and financial responsibilities. While schistosomiasis can easily be treated by praziquantel, an effective low cost method with few side effects, less than 10% of those in need of the drug presently have access to it (End the Neglect, 2011).

Although transmission is restricted to areas with contaminated water, it is difficult to stop at-risk populations from carrying out basic domestic tasks such as bathing and wash-

ing clothes in contaminated areas. These tasks put women and children especially at risk (NCHM, 2010). Schistosomiasis, like many neglected tropical diseases (NTDs), historically has received little international attention, limiting both scientific research and funding for treatment. While schistosomiasis has a burden of 4.6 million disability adjusted life-years (DALYs), the disease is often forgotten because of its relatively low mortality rate (280,000 people per year). Fortunately, metrics such as the DALY have helped place schistosomiasis and other NTDs on the list of global priorities in recent years (King & Dangerfield-Cha, 2008).

Background of Human Imunnodeficiency Virus (HIV)

Acquired Immunodeficiency Syndrome (AIDS) is a group of symptoms caused by the human immunodeficiency virus (HIV) that limits the body's ability to combat disease (Mayo Clinic Staff [MCS], 2008). Normally, white blood cells and antibodies—coordinated by CD4 lymphocytes, or helper T-cells—attack foreign particles in order to protect the body (Roederer, 1998). Upon infection with HIV, the virus attaches to CD4 lymphocytes, enters the cells and begins reproducing (Autran et al., 1997). After a period of replication, the large amount of HIV virus cause the CD4 lymphocytes to burst, killing the cells and releasing the multiplied virus into the bloodstream (MCS, 2008). As these newly created virus particles attack other CD4 lymphocytes, the immune system begins to shut down. If left untreated, billions of HIV-particles can be produced every day, giving the patient a life expectancy of less than ten years (MCS, 2008).

In 2008, 33.4 million people were living with HIV; 2.1 million were children under the age of 15 years (UNAIDS, 2010). 2008 saw 2.7 million new infections with 2.0 million deaths caused by AIDS, almost 300,000 of which were children under the age of 15 (UNAIDS, 2010). HIV is not distributed evenly across the globe. An estimated 22.5 million people are living with HIV in sub-Saharan Africa, accounting for roughly 67% of the global HIV presence (UNAIDS, 2010). In 2009, 1.3 million people died from AIDS, and 1.8 million new infections were transmitted in sub-Saharan Africa alone (UNAIDS, 2010). Because of its widespread effects, HIV is a priority for research and treatment across the globe.

HIV is transmitted via the mixing of bodily fluids such as blood, semen, or vaginal excretions (Bouvet, Grésenguet & Bélec, 1997; Fiore et al., 1995). It is most commonly passed on through unsafe sexual contact, transfusions with infected blood, needle sharing or mother-child interaction during pregnancy (Santmyire, 2001; Davis & Weller, 1999; Romanelli, Smith, & Pomeroy, 2000). While available diagnostic tests have high specificity once the virus has initiated an immune response, a diagnosis within the first twelve weeks is rare (MCS, 2008). Indeed, some infected patients do not test positive for HIV until six months after infection, complicating control mechanisms (MCS, 2008).

While new treatments for HIV are being researched constantly, highly active anti-retroviral therapy (HAART) is the main treatment in use today. HAART reduces the amount of virus in one's blood to very low or even undetectable levels (Roederer, 1998). This therapy, or cocktail of therapies, is typically comprised of three drugs from at least two different classes of treatment (MCS, 2008).

Many populations across the globe still lack access to both HIV diagnosis and treatment due to high costs (Cheng, Landay, & Miller, 2008). Furthermore, when diagnosis and treatment are available, access is often unreliable and favors some sub-communities over others (Cheng et al., 2008). The stigma associated with HIV as a sexually-transmitted infection (STI) often prevents individuals from getting tested for HIV and, if they are tested, from disclosing the results (Alonzo & Reynolds, 1995; Chan, Yang, Zhang, & Reidpath, 2007; Sambisa, Curtis, & Mishra, 2010). This lack of personal knowledge and disclosure heightens the harmful effects of the disease across the globe by increasing infection rates, particularly in high-risk areas such as sub-Saharan Africa (Sambisa et al., 2010).

Model #1: One Disease, One Pathogen

Stedman's Medical Dictionary, one of the most trusted sources for medical definitions, defines infectious disease as "an interruption, cessation, or disorder of a body, system or organ structure or function resulting from the presence and activity of a microbial agent" (2000). Using this definition, the combination of symptoms associated with the body's response to infection by one of *schistoma* worms and its eggs is known as schistosomiasis. By the same token, the body's symptomatic response to infection by HIV is known as AIDS. Such a definition assumes that for every infectious disease there exists only one cause: the pathogen. With one cause, there can be only one type of intervention: removal of the pathogen. Such treatment entails administration of a medication that somehow inhibits this pathogen's biological function.

Such a mentality, as Joseph Lederberg and Adel Mahmoud argue, creates a war-like mindset in which humans must build up arsenals and ammunition against infections in order to inhibit pathogens' function and thus cure disease (Lederberg 2008; Mahmoud, 2010). Indeed, as illustrated in Marcos Cueto's description of malaria treatment in Mexico, such an approach is less than adequate; *magic bullet solutions* or interventions based on administration of medication have rarely seen success (Cueto, 2008). Scientifically, *magic bullet solutions* create a war, as Ledererburg introduces, between "our [humans'] wit and their [pathogens'] genes" (Lederberg 2000). While humans may be able to successfully combat pathogenic genes in their stagnant form, the introduction of the added variable of mutation complicates the story. Furthermore, dependence on treatment to cure disease is incredibly expensive. Mahmoud argues that even after a drug has been discovered, pharmaceutical companies such as Merck and GlaxoSmithKline can still spend a further $1 billion on specific analysis and product testing (Mahmoud, 2010).

Much of the challenge in *magic bullet solutions* is social. Simply administering medications to populations does not take into account the patients' perceptions of the disease or of the medication itself. There may be underlying prejudices toward the medication or its administration; side-effects could also elicit major social responses, inhibiting the effectiveness of a medication-based solution. Finally, using drugs to combat disease is truly nothing more than a "band-aid solution." Not only can a second exposure renew the infection and thus the disease, but pharmaceutical treatment does little to remove the cause of the infection.

Interventions against schistosomiasis, while effective to

some degree, have been entirely dependent on public-private partnerships (PPP) that distribute the drug praziquantel, with little to no focus on prevention. In 2007, Merck Pharmaceuticals Inc. partnered with the WHO to help combat schistosomiasis in African school children, providing 200 million tablets of Cesol® worth roughly $80 billion for the treatment of 27 million children (The Merck Group, 2011). The Schistosomiasis Control Initiative, a joint program of the Bill and Melinda Gates Foundation, MedPharm, Imperial College London, the Harvard Center for Population & Development Studies and the WHO also provided 13.7 million tablets of praziquantel to three countries in East Africa and three countries in West Africa (MedPharm, 2011).

While it would be unfair to argue that the aforementioned treatment-based intervention had no effect in reducing the burden of schistosomiasis, the long-term potential of programs like this is certainly limited. Even with treatment available, over 700 million people across the globe are still at risk of contracting the disease. So long as clean water is inaccessible, schistosome larvae will still infect individuals (WHO, 2011). Furthermore, Smits et al. argue that the risk of creating resistance is particularly high when treating diseases such as schistosomiasis with only one known treatment (2009). Reports of resistance to praziquantel have already been published, indicating that the long term-potential for dependence on this treatment is limited (Botros & Bennett, 2007).

Stedman's definition of infectious disease, based solely on a microbial agent infection, is problematic. Such a definition implies that the sole method of reducing mortality and morbidity is through treatment. However, dependence on *magic bullet solutions* is not only expensive, but also has little potential for long-term success. These limitations, found not only in the case of schistosomiasis but also in other diseases, have led to the establishment of a new, more expansive, generally accepted definition of infectious disease.

Model #2: One Disease, One Pathogen, Multiple Upstream Factors

Between 1900 and 1999, the average lifespan of Americans increased by more than 30 years; of that increase, 25 years have been directly attributed to advances in public health preventative measures (NCHM, 2010). Improvements in water purification and sanitation led to decreases in typhoid and cholera infections, which were major causes of illness and death in the early 20th century (NCHM, 2010). The importance of successful public health programs implies a more expansive definition of infectious disease than that discussed in Model #1. The success that preventative measures such as water sanitation and increased hygiene have had in decreasing transmission of disease pathogens shows that infectious disease is not solely "an interruption, cessation, or disorder of a body, system or organ structure or function resulting from the presence and activity of a microbial agent" as described by Stedman, but also a result of a series of upstream factors and social determinants.

Unlike the first model, in which infection by a pathogen was the only cause of disease, this definition recognizes other, indirect causes. This definition accepts both downstream causes (which directly catalyze the infection) and upstream ones (indirect causes of infection, such as water sanitation, hygiene and stigma). By accepting that a series of different factors may result in disease, we can construct a better strategy of combating disease.

While this definition is better than the first, it still limits the maximum effect that public health interventions can have on reducing mortality and morbidity. This definition does not address the effects of interaction between multiple diseases. Preventative interventions are rooted in inhibiting the actual infection and the causes that may lead to that infection. However, they do not deal with the interaction between different pathogens. Analysis of HIV control mechanisms in South Africa reveals that even with this more expansive definition of disease, mortality and morbidity are still unacceptably high.

Following almost five years of direct AIDS denialism (the view that HIV does not lead to AIDS) led by South African President Thabo Mbeki in 2004, full HAART treatment was finally offered to all South Africans in need, free of charge (AVERT, 2010). Furthermore, South Africa has introduced primary prevention by distributing information on *Abstinence, Being Faithful and Condom Usage* (ABCs) (South African Department of Health [SADH], 2007), and has created nation-wide Volunteer Counseling and Testing (VCT) centers that, in theory, reach every citizen of the country. A bureaucracy composed of a National AIDS Council, Provincial AIDS Council, and even Local AIDS Councils, has been established in order to integrate the efforts of government, non-profit non-governmental organizations (NGOs), faith-based organizations and the private sector (SADH, 2007).

In 2009, 1.3 million people died from AIDS, and 1.8 million new infections were transmitted in sub-Saharan Africa alone.

When discussing the case of HIV in South Africa, recognizing the harmful impact of President Mbeki's denialism is important. When forming his Presidential AIDS Advisory Panel in 2000, Mbeki appointed a number of AIDS denialists, which greatly impacted his government's approach to the infection (Schoofs, 2000). In response, the global scientific community formed the Durban Declaration in 2000, which confirmed that HIV in fact leads to AIDS, and was signed by over 5,000 research scientists (Durban Declaration, 2000). Two independent research studies from University of Cape Town and Harvard University concluded that Mbeki's denialist policies led to the premature death of more than 330,000 South Africans (Chigwedere, Seage, Gruskin, Lee, & Essex, 2008; Nattrass, 2008). Without question, the single largest hindrance to HIV treatment and prevention in South Africa was Mbeki's denialist policies. Fortunately, the Treatment Action Campaign, led by Zachie Achmat, became the unified pro-HAART voice for South Africans, and through significant domestic and global lobbying, finally persuaded the South African government to recognize the connection between HIV and AIDS (AVERT, 2010).

Despite the ongoing efforts to treat both downstream and upstream causes with full governmental support, an estimated 5.7 million people still live with HIV in South Africa, where an estimated 250,000 citizens died of AIDS in 2008 (AVERT, 2010). Almost one in every three women between the ages of 24 and 29 and over a quarter of men between the ages of 30 and 34 are HIV positive (AVERT, 2010). Even after inhibitory governmental policies were reversed, HIV incidence and AIDS-related mortality has still not been significantly reduced in South Africa.

Even in areas where infection rates have decreased, such as Brazil, we must be critical of these apparent successes, as Joao Biehl argues in *Will to Live* (2007). Rather than judging success solely on epidemiological prevalence and incidence data, Biehl uses anthropological narratives to show a different view of HIV in Brazil (Biehl, 2007). In his anthropological study, Biehl illustrates how individuals are still suffering greatly in Brazil from HIV, despite what has been named as one of the most successful HIV-control efforts in history (Biehl, 2007).

Because the present definition of infectious disease and resulting interventions are not doing enough to fight disease, a broader definition should be employed. The new definition should result in interventions that target how a number of infections deleteriously interact with one another, in addition to downstream and upstream factors.

Model #3: One Disease, Multiple Pathogens, Multiple Upstream Factors

This third model defines disease as an interruption, cessation or disorder of a body, system or organ structure, or a function resulting from the presence and activity of a number of microbial agents that could be the result of a series of upstream factors. This definition implies that infectious disease may not be caused solely by one infection, or even just the upstream factors that lead to that infection; rather, this new definition also takes into account how infection by one pathogen increases the susceptibility to another.

In a cross-sectional study of rural women in Zimbabwe, a multivariate analysis concluded that infection with *S. haematobium*, the urogenital version of schistosomiasis, increased a woman's risk of contracting HIV by 190% (Kjetland et al., 2008). This initial study and conclusion started a whole new sub-field of HIV research: analyzing the interaction between schistosomiasis and HIV.

There is significant overlap between upstream causes of both infections. Indeed, impoverished populations that lack access to clean water, sanitation and basic health infrastructure are at the highest risk of contracting both diseases (WHO, 2011). In terms of distribution, Sub-Saharan Africa and the tropical parts of South America have the highest rates of both infections (NCHM, 2010). While HIV and schistosomiasis carry different specific stigmas, they both have many social repercussions. If untreated, both pathogens can be fatal and can incapacitate a person to the point of inhibiting them from fulfilling their social, familial and financial responsibilities.

Beyond these upstream comparisons, a biological connection directly links the two. As introduced earlier, *S. haematobium*, the urogenital version of schistosomiasis, accounts for approximately two-thirds of all cases of schistosomiasis (WHO, 2011). Of the estimated 112 million cases of *S. haematobium* infection in sub-Saharan Africa, 70 million result in hematuria, or blood in the urine (King & Dangerfield-Cha, 2008). Between 33% and 75% of females infected with this urogenital form of schistosomiasis will also suffer from a sub-form of the disease, female genital schistosomiasis (FGS) (Fenwick et al., 2009). FGS is caused by the deposition of *schistoma* eggs in the uterus, cervix, vagina or vulva; deposition typically results in inflammation comprised of granulomas, fibrosis and angiogenesis (Van Der Werf et al., 2003; Poggensee & Feldmeier, 2001). This inflammation often leads to a buildup of genital pathognomonic genital lesions, or wounds of the genital region (Poggensee & Feldmeier, 2001). These lesions in turn manifest themselves as mucosal grainy sandy patches typically accompanied by bleeding and abnormal vascularization (Kjetland et al., 2008).

These sandy-patches, likely due to increased friction on already degraded cervical and vaginal tissues, increase the likelihood of HIV transmission during sexual intercourse (Ndhlovu et al., 2007). Genital schistosomiasis can also induce chronic inflammation of the pelvic region in men. Drawing parallels with bacterial urethritis, it can be hypothesized that there will be increased viral shedding in the semen of co-infected males, further increasing the probability of transmission (Harms & Feldmeier, 2002). Therefore, infection with schistosomiasis biologically increases the risk of transmission of HIV in both men and women. While dissemination of condoms and other HIV-specific interventions may have a larger impact on reducing the transmission of HIV, treating schistosomiasis decreases the risk of transmission of HIV, thereby having a dual impact.

A prospective cohort study was conducted in Zambia that tested the effect of HIV infection on the effectiveness of praziquantel, the drug used to treat schistosomiasis. The study demonstrated that the presence of HIV had no effect on the effectiveness of praziquantel at targeting schistosomiasis (Mwanakasale et al., 2003). That being said, schistosomiasis treatment does have an effect on HIV treatment. In an immunological study in Europe, results showed that schistosomiasis treatment attenuates HIV replication by decreasing systemic inflammation (Erikstrup et al., 2008). This finding implies that treating schistosomiasis in HIV patients has a more expansive impact – the treatment not only helps cure schistosomiasis, but it also helps treat HIV by inhibiting its replication (Erikstrup et al., 2008).

At the community level, educational interventions that describe how different pathogens interact with each other should be offered to children. In communities where health education is already offered, curricula should be adapted to emphasize how infectious disease is caused by a multitude of pathogens and social determinants. In communities where health education is not yet offered, awareness campaigns that currently disseminate information specific to one pathogen should be replaced by campaigns that illustrate how pathogens endemic in that area interact with each other. Specific to the interaction between schistosomiasis and HIV and in addition to other public health measures such as water sanitation, mass-prophylactic praziquantel treatment should be provided to young girls in school (Lillerud, Stuestoel, Hoel, Rukeba, & Kjetland, 2010). By inhibiting infection of all girls with schistosomiasis and thus FGS, the risk of increased HIV transmission due to genital legions is inhibited. In this case, the treat-

ment acts as a preventative therapy for both schistosomiasis and HIV. In their editorial entitled "Africa's 32 Cents Solution for HIV/AIDS" in *PLoS*, Hotez et al. argue that the funding ear-marked for use in combating diseases such as HIV, malaria and TB, should be used to pay for mass-treatment of all young girls in co-endemic areas (Hotez, Fenwick, & Kjetland, 2009).

Schistosomiasis and HIV, like many other infections, should be treated and discussed together. More expansive treatment and education can be developed only if we adopt a definition in which disease is a group of symptoms caused by multiple pathogens and upstream factors.

Conclusion

In the ever-changing world of public health, the focus on improving population health has remained constant. Part of the growing complexity has involved the expansion of the definitions of disease control and treatment. In its earliest form, infectious disease referred to an illness that stemmed from infection by a single pathogen. This definition limited the scope of public health interventions and thus was later expanded to include upstream causes. As we move into the future, we must accept an even more expansive definition of infectious disease: one in which illness is characterized by symptoms that stem from a collection of pathogens and a collection of upstream factors. HIV and schistosomiasis illustrate the importance of recognizing the interactions between different pathogens.

This study, however, showcases just one of the many interactions that exist between different disease pathogens. As a disease that directly inhibits the immune system, HIV and the resulting CD4 inhibition directly increase one's susceptibility not only to other high burden infections such as tuberculosis and malaria, but also to more opportunistic infections (Gladwin & Trattler, 2011). Those with HIV are between 20 and 37 times more likely to be co-infected with TB than the baseline population (WHO, 2010). Furthermore, HIV predisposes one to complications associated with other viral infections such as cytomegalovirus, bacterial infections including cryptococcosis, as well as fungal infections caused by *Microsporum*, *Trichophyton*, and *Epidermophyton* genera (Gladwin & Trattler, 2011).

As we develop new interventions, control mechanisms need to combat specific pathogens, their upstream factors, *and* their interactions with each other. Only by accepting that illness stems from a collection of external agents and pathogens can society further 1) prevent disease, 2) promote health, and 3) prolong life.

A full listing of references for this article is available at JGH Online, www.ghjournal.org

Prospecting Infectious Disease Prevention through Water, Sanitation and Hygiene in a Dominican Batey

Sigrid Collier[1], Natalie Cobb[1,2], Christine Cortelyou[1,2],

[1] University of Texas Health Science Center at San Antonio School of Medicine, San Antonio, TX, USA
[2] University of Texas School of Public Health, Houston, TX, USA

Abstract

Diarrheal illness is a major contributor to the mortality of children under the age of five worldwide, as well as a significant burden on adult health and productivity in developing countries. Improvements in water, sanitation and hygiene (WASH) practices and infrastructure are important for decreasing the burden of infectious diseases, including diarrheal illness. The purpose of this study was to measure WASH knowledge and practices in a particularly vulnerable batey—a rural settlement of Haitian migrant workers along the Dominican-Haitian border—and to determine whether a WASH-based participatory health and hygiene education (PHHE) program would be beneficial to the community. A cross-sectional household survey of 88 homes out of an estimated 200 in Batey Altagracia was conducted to measure perceptions, knowledge and practice of WASH principles. Composite knowledge scores were calculated and analyzed for associations with demographics, social factors and WASH practices. Overall, participants demonstrated low knowledge of WASH principles. In particular, respondents lacked knowledge regarding parasitic worm prevention, skin disease prevention, protected water sources and how to make a homemade oral rehydration solution. Though water treatment and handling practices in the community were generally good, insufficient hygiene and sanitation may contribute to an increased risk of infectious disease transmission in an already economically and socially disadvantaged community. From our findings, we concluded that a PHHE program would be beneficial to improving WASH practices in the community and disrupting the cycle of poverty and disease.

Introduction

Improvements in water, sanitation and hygiene (WASH) practices and infrastructure may be one of the most important and cost-effective methods for decreasing the burden of infectious diseases worldwide (Jamieson, Bremen, Measham, Alleyne, & Claeson, 2006). Insufficient hygiene and sanitation practices and infrastructure are associated with a multitude of diseases, including acute respiratory tract infections, skin diseases such as scabies and ringworm, intestinal parasites and diarrheal illness (Bartram & Cairncross, 2010; Luby, Agboatwalla, Feikin, Painter, Billhimer, Altaf, & Hoekstra, 2005). Diarrheal illness alone is the second leading cause of death globally in children under the age of five, and subsequent malnutrition exacerbates children's vulnerability to many other illnesses (*Diarrhoeal disease*, 2009; Schmidt, Cairncross, Barreto, Clasen, & Genser, 2009). However, this burden of disease is not just in children; "every year across the globe around two million people die of diarrheal illness" *(Diarrhoeal disease*, 2009). Furthermore, diseases associated with insufficient WASH likely contribute to 82,196,000 disability-adjusted life years (DALYs) of lost productivity, which in 2002 was estimated to account for 5.7% of total world DALYs (Rosen & Vincent, 2001; Pruss, Kay, Fewtrell, Bartram, 2002).

Fortunately, most of these diseases are preventable with improvements in WASH practices and infrastructure. Increases in hand washing alone decrease the prevalence of diarrheal disease by 42%, while improvements in hygiene cause a 33% reduction and sanitation a 36% reduction, according to rigorous studies in developing countries (Fewtrell et al., 2005). In particular, educational interventions that integrate clean water, sanitation and hygiene topics were shown to result in sustained decreases in diarrheal diseases, as assessed five years post-intervention (Hoque, Juncker, Sack, Ali, & Aziz, 1996).

The Dominican Republic is particularly vulnerable to endemic and epidemic diarrheal illnesses due to decreased rates of access to improved drinking water sources along its border with Haiti, a nation with an ongoing cholera epidemic (Dominican Republic, 2007). This reduced water access has documented associations with population growth, but our observations also implicate an inconsistent and/or non-existent supply of public services, which is a problem that extends to sewage and solid waste disposal (Dominican Republic, 2007).

Since the 2010 earthquake in Haiti, incidence rates of cholera have increased in Dominican provinces closest to the Haitian border ("Cholera and post-earthquake response in Haiti", 2011); similarly, this heightens the risk of diarrheal illness and mortality. The infant mortality rate in the Dominican Republic

is 33/1000, well above the World Health Organization's regional (Region of the Americas) average of 18/1000 live births for children under the age of five ("Demographic health survey 2007", 2008). The major causes of under-five mortality include acute respiratory infections (70%), isolated fever as a proxy for Malaria (68%) and diarrhea (55%) ("Demographic health survey 2007", 2008). Notably, acute respiratory infections and diarrhea are associated with inadequate WASH practices.

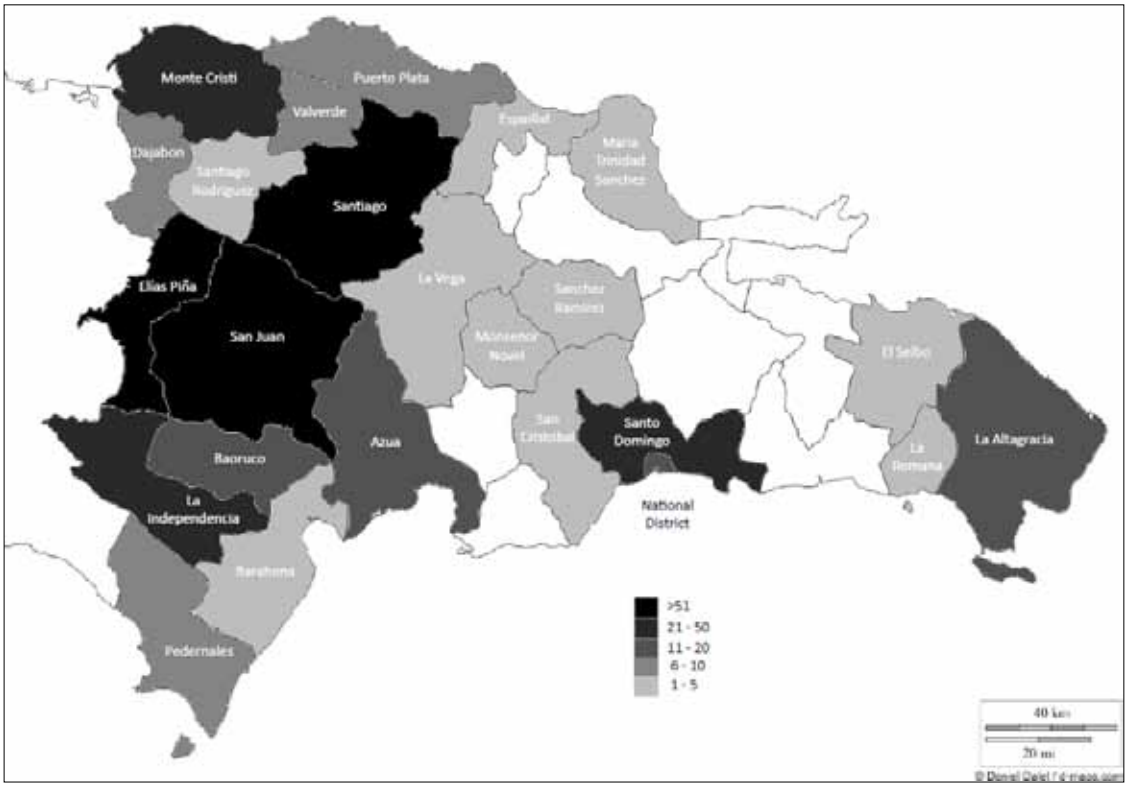

Figure 1: Cumulative Incidence of Confirmed Cholera Cases, by Province, Oct 2010 - Feb 2011. Batey Altagracia is in the Barahona Province. Map created by J. Rosenfeld

Those populations in the Dominican Republic who are most likely to be exposed to cholera are those who are already most vulnerable to WASH illnesses. Bateyes are rural communities formed by both permanently displaced Haitians and migrant Haitian workers who do seasonal agricultural work. In the Dominican Republic, 68.7% of rural residents, including bateyes, are in the lowest two wealth quintiles; this is the best available estimate of wealth for bateyes, since research on bateyes is scant and public health statistics are inconsistently documented in the Dominican Republic ("Demographic health survey 2007", 2008). Additionally, bateyes have a higher infant mortality rate (41/1000) than the rest of the country ("Demographic health survey 2007", 2008). Importantly, the seasonal migration, emergency/evacuation associated migration and permanent relocation patterns between Haiti and the Dominican Republic place these communities at higher risk for spread of cholera and any epidemic illness originating in Haiti. Socioeconomic status contributes to increased risk of diarrheal illness mediated by factors such as sanitation and infrastructure. In one study, 25% percent of this risk was accounted for by WASH practices (Genser et al., 2008). WASH practices are part of the link between poverty and disease. Disrupting this link in a batey could help mitigate the health disparities and the impact of the burden of WASH-related disease in the community.

It is the social and economic vulnerability of these communities as well as the threat of cholera that led us to conduct an assessment of the WASH knowledge and practices in one Dominican batey along the Dominican-Haitian border, Batey Altagracia. Our goal was to determine whether a WASH education program would be an appropriate infectious disease prevention strategy for bateyes in the region. Batey Altagracia is in the Barahona province of the Dominican Republic, which is adjacent to the current centers of the cholera epidemic in the Dominican Republic (See Figure 1). The incidence of diarrheal illness in this region (24%) is significantly higher than the national average of 14% ("Demographic health survey 2007", 2008). We hypothesize that this community will be a good site to pilot a participatory health and hygiene education (PHHE) program originally developed in Africa called the Community Health Club approach (Waterkeyn & Cairncross, 2005). The Community Health Club approach integrates principles of participatory hygiene and sanitation transformation (PHAST) like community mobilization into the framework of a community group dedicated to promoting health knowledge and good health practices (Waterkeyn et al., 2005). This methodology builds on existing social capital and also strengthens social ties by creating a new framework and forum for community involvement.

At present, there is a lack of data and peer-reviewed literature on WASH practices and interventions in the Dominican Republic and bateyes, specifically. The national demographic and health survey of the Dominican Republic, which focused on behaviors related to HIV transmission, is the only published survey of disease prevention in the country. There have been no published surveys focused on WASH practices in bateyes; there are two published WASH surveys in peri-urban and rural areas (Belcher, 1978; McLennan, 2000; McLennan, 2002). Additionally, although there are published evaluations of bio-sand filter interventions in the Dominican Republic (Stauber, Ortiz, Loomis & Sobsey, 2009), there are no published evaluations of WASH education interventions.

Methods

Study Area and Population

Using a modified cluster sampling technique, we conducted a cross-sectional household survey of 88 homes in Batey Altagracia, a small community located within the Fundación Municipality of the Barahona Province. We conducted our work

Table 1: General demographics of needs assessment respondents in Batey Altagracia, 2011

Characteristic	N (%)
Gender	
Male	24 (27.3)
Female	64 (72.7)
Age (year)	
18-25	24 (27.3)
26-35	25 (28.4)
36-45	10 (11.4)
46-55	10 (11.4)
56-65	6 (6.8)
65+	13 (14.8)
Marital Status	
Married , living with spouse	19 (21.6)
Married, living without spouse	3 (3.4)
Unmarried, living with partner	26 (29.5)
Single with children	25 (28.4)
Single without Children	11 (12.5)
Widowed	4 (4.5)
Literacy	
Both read and write	36 (40.9)
Only read	3 (3.4)
Neither read nor write	49 (55.7)
Education	
None	33 (37.5)
Primary School	36 (40.9)
High School	15 (17.0)
University	4 (4.5)
Work	
Both Full-Time and Part-Time	4 (4.5)
Full-Time	9 (10.2)
Part-Time	64 (72.7)
None	11 (12.5)
Type of Part-Time Work	
Unskilled Manual Labor	45 (66.2)
Skilled or Trade Worker	6 (8.8)
Farming/Agriculture	8 (11.8)
Informal Trader	13 (19.1)
Home Crafts	
Domestic Worker	2 (2.9)

Table 2: Water sources, storage, protection, and treatment

Water Practice Categories	N (%)
Drinking Water Source	
Tap	51 (58.0)
Bottled Water	37 (42.0)
Type of Storage	
Bucket	47 (56.0)
Drum	26 (31.0)
Jerican	2 (2.4)
World Vision Container	32 (36.8)
Water Cover	
Well Sealed	66 (82.5)
Poorly Sealed	8 (10.0)
No Cover	6 (7.5)
Drinking Water Source	
Tap	51 (58.0)

during the summer of 2011 between June 6 and June 17.

Tools: Survey and Measures/Scales

The survey utilized in our study was adapted from a Household Interview Survey (HIS) previously used in Sub-Saharan Africa to gather baseline data. The original survey was designed to assess levels of social capital and to evaluate perceptions, knowledge and practices of WASH principles in rural community settings (Rosenfeld & Waterkeyn 2009; Rosenfeld 2010 citations). In particular, the survey was aimed at measuring the current levels of knowledge and behaviors in the community that prevent the transmission of diarrhea, skin diseases, parasitic worms, mosquito-borne diseases, such as malaria and dengue fever, and respiratory conditions. Our team piloted the translated Spanish survey for four days in the neighboring communities of Barahona and Batey Algodón. This ensured that the survey was linguistically and culturally appropriate for Batey Altagracia. A specific example of a linguistic adaptation was the use of

Table 3: Human and solid waste disposal practices

Sanitation Categories	N (%)
Latrine Type	
Donor/Government VIP	32 (38.6)
Home-made VIP outside	5 (6.0)
Home-made pit latrine	2 (2.4)
No latrine/bush	44 (53.0)
Waste Disposal Method	
Household Pit/Dump/Drum	59 (67.0)
Community Pit/Dump/ Drum	30 (34.1)
Plastic Bag	37 (42.0)
Anywhere	1 (1.1)
Canal	2 (2.3)

Table 4: Personal and kitchen hygeine

Hygeine Categories	N (%)
Hand Washing Method	
Common bowl method	19 (22.4)
Pouring water over hands	43 (50.6)
Using a tap outside	21 (24.7)
Hand washing facility	2 (2.4)
Flies in Kitchen	
No flies	15 (17.2)
A few flies	38 (43.7)
Many flies	34 (39.1)
Kitchen Surfaces	
Clean	18 (21.4)
Medium or quite clean	34 (40.5)
Dirty	32 (38.1)
Dish Cleanliness	
All washed	24 (27.9)
Some clean, some unclean	54 (62.8)
All left unwashed	8 (9.3)
Covering of Leftover Food	
All covered	14 (15.9)
Some food covered	25 (28.4)
All uncovered	6 (6.8)
No visible food	43 (48.9)

the more colloquial phrase *suero casero* rather than *rehidratación oral* when referring to an oral rehydration solution. As for the cultural aspects of the survey, we confirmed that questions like "Do all your children have the same father?" were not offensive to respondents in the Dominican Republic.

Pre-testing of the survey allowed our team to train our translators, standardize the interview process and accurately define the categories and guidelines for the observations. Through 74 open- and close-ended questions and 32 observations, our survey measured the following:

Demographics

Demographic data was collected from each respondent, including information on marital status, literacy, education level and vaccination card status of the children in the household. Marital status was defined as having an official marriage certificate. Seven responses were provided to determine the current marital status of individuals (1 = Married, living with spouse, 2 = Married, living without spouse, 3 = Unmarrried, living with partner, 4 = Divorced, 5 = Single without children, 6 = Single mother/father, 7 = Widowed). Self-reported information about the respondent's education level and literacy was obtained by asking individuals "What was the last level of schooling that you completed?" and "Do you know how to read and write, to read only, or neither to read nor to write?" Education level was based on the educational system in the Dominican Republic (1 = Primary School, 2 = High School, 3 = University, 4 = Licensed, 5 = Doctorate, 6 = None). Information about the children living in the household was also obtained, including the reported number of children who had a vaccination card.

Social Capital

Respondents were asked about their friends and acquaintances to understand the social networks within the community. One question we used to measure this was, "How many of your neighbors within the surrounding 20 houses do you know by name (first name, last name or nickname)?" Participant responses were based on whether they knew the name of at least one member of each household and were recorded in the number of households from 0-20.

WASH Perceptions

Perceptions of the sanitation of the community were measured by asking respondents about how they felt about specific issues within the community. Participants were asked, "Is the disposal of garbage a problem in your community?" Respondents were offered three options to these questions (1=Yes, it is an important problem, 2=Yes, it is a minor problem, or 3=No, not at all).

WASH Knowledge

Respondents were asked a series of five knowledge questions, each with a possible five correct answers. These questions included: five ways diarrhea is transmitted, five times to wash hands, five ways parasitic worms are prevented, five ways skin diseases are prevented and five sources of safe/protected water. Correct answers to these knowledge questions were predetermined and participants were later scored. A point was given for each correct response, with a maximum of five possible points per question. Respondents were also asked for the recipe for a homemade oral rehydration solution (ORS), an important tool for combating the dehydration associated with diarrheal illness. Knowledge of ORS can help prevent deaths due to dehydration secondary to diarrhea. Correct responses needed to include the exact proportions (8 level teaspoons of sugar plus ½ level teaspoon of salt to 1 liter of clean water) of the proper ingredients.

WASH Practices

Determining WASH practices was accomplished through survey questions as well as direct observations of the household, including the kitchen area, which were made by the enumerators after asking permission to view the home. Questions such as "Do you have access to a latrine?" and "Do you store water inside (or outside) of your home?" provided information about sanitation and water practices, respectively. These variables were dichotomous (1=Yes and 2=No). Observations aimed at measuring WASH practices included, "Is all leftover food protected from flies?"(0=Not applicable, 1=Yes, all covered, 2=No, some food protected, 3=No, all left uncovered) and "How well is the drinking water covered?" (0=Not applicable, 1=Well sealed, 2=Poorly sealed, 3=No cover at all). For the observation related to hand washing method, the team member asked to wash his or her hands, and then observed whether soap was given and how water was provided (1=Pouring water over hands, 2=Bowl method, 3=Hand washing facility, 4=Other, 5=Outside tap). This is a more accurate representation of practice than the self-reported hand washing method.

Data Collection Procedures

All interviews were conducted over a five-day period. We used a modified cluster random sampling technique to assure that the interviews were conducted randomly. We accomplished this by geographically dividing the community into three comprehensive and mutually exclusive clusters or divisions according to an aerial map provided by a community member. Each member of the team was then assigned a cluster and used a random number for the household selection. Each team interviewed households in their cluster from one edge to the other according to their drawn number. If a team member encountered a household that was unwilling to participate or not available, he or she continued to the next immediate house until a participant was identified. Every possible effort was made to ensure that households were not duplicated. During data collection, each team member worked individually as an enumerator along with two bilingual translators. One translator spoke English and Spanish and the other translator spoke Spanish and Haitian Creole. The surveys were conducted in the language identified by the enumerators as the preferred language of the individual. The average interview took 30-45 minutes to complete.

Data Management and Analysis

All data was double-entered by two team members and compared in order to eliminate data entry errors. Data was then analyzed using IBM SPSS Statistics 19. Duplicates were confirmed within the data set by comparing the variables for "Gender," "Age," "Birthplace" and "Years in the batey." If duplicates occurred, the data was withheld from the analyzed data set. Averages were calculated for demographic information such as "Household size" and "Number of children in the household." Averages were also calculated for measures of social capital including "Number of neighbors known by name" and "Number of close friends." Numerical modes were determined for the number of correct responses to each knowledge question to represent the knowledge of most respondents.

In order to determine associations between demographics/social factors and knowledge as well as behavior

and knowledge, a composite knowledge score was calculated for each participant. This was done by adding the scores of each knowledge question except the question about clean water sources. Exclusion of the clean water sources question was necessary as it was not an accurate measure of knowledge—respondents who listed tap water as a clean water source along with bottled water received a higher score than those who only listed bottled water, despite the fact that in this setting tap water is often contaminated. Composite knowledge was then binned based on lower (<=4), middle (5-6), and upper thirds of all the scores (7+), so that we could examine any associations with demographic factors, literacy, education, social capital, news sources and behaviors in this batey. Once a composite knowledge score was obtained, Pearson's Chi-square test was utilized to determine associations.

Ethical Considerations

Our study qualified for exemption from the Institutional Review Board (IRB) at the University of Texas Health Science Center at San Antonio (IRB HSC20110374E) because our research involved minimal risk to participants and did not include individuals under 18 years of age. To ensure that our respondents were fully informed, we read aloud an informed consent in Spanish. Although the vast majority of respondents were born in the Dominican Republic and spoke Spanish, for those individuals who did not speak Spanish, the informed consent was translated into Creole and the interview was conducted by a Creole translator. Participation in our study was strictly voluntary, and participants did not have to answer questions if they felt uncomfortable. Participants were permitted to stop the survey at any time. To protect the identity of our participants, we did not collect personal information, such as name, address or telephone number. When data was not in use by team members, it was stored behind a locked door or password protected on a computer.

Results

Demographics of Study Population

The demographic characteristics of the study population are outlined in Table 1. The majority of respondents were not legally married but were living in a free union with their partner (29.5%), and many had no formal education (37.5%) or only had primary education (40.9%). The average household size was 5 (SD=2.78; 1-13), and there were an average of 3 (SD=2.37) children per household. In those households with children, there were an average of 2 vaccination cards per household (N=74). Most respondents were born in the Dominican Republic (83.9%, N=73) and were raised in Batey Altagracia (72.3%, N=60).

Community Involvement, Social Capital and Sources of Information

Measures of community involvement indicated that 39.8% of interviewees participated in volunteer activities such as cleaning and improving the unpaved streets within the community (N=35), and 32.2% attended at least one meeting to discuss the betterment of the community in the last year (N=28).

The average respondent knew the names of 18 (SD=4.29) out of 20 of their nearest neighbors and reported having 6 (SD=7.88) good friends in the community, to whom they can go to for help and advice in times of need. In addition to connections within the community, a majority of respondents reported having a source of news or current events. Only 10.2% of respondents had no news source (N=9). Of the available news sources, the most common were television (69.3%, N=61) and radio (54.5%, N=48).

Self-confidence and self-efficacy were measured using shyness and capacity to change one's own life as proxies. Of those interviewed, 23.9% reported feeling shy in public meetings or gatherings (N=21) and 77.3% felt that they had the capacity to change their life in whatever way they wanted (N=68).

Measures of Behaviors

Water

In investigating the community's water sources, we found that the majority of those interviewed used tap water for drinking (58.0%, N=51), with the remainder drinking bottled water (42.0%, N=37). For both those who did and did not buy bottled water, chlorine was the most common drinking water treatment method (89.2%, N=58). Most households stored water (98.8%, N=81) in well-sealed containers (82.5%, N=66). The most commonly used storage methods are shown in Table 3. Most households had a vessel for serving water visible in their kitchen, such as a ladle, cup or pitcher (56.5%, N=48), and the majority had enough visible cups for everyone in the household (71.6%, N=63).

Sanitation

Sanitation practices were measured through questions about human waste (latrine access), solid waste (trash disposal) and grey water management. In this sample, 49.4% reported access to a latrine (N=43), and of those with access, 51.2% owned the latrine they used (N=22). See Table 3 for latrine types. On average, each latrine was shared by 10 people, with a minimum of 1 person and a maximum of 30 people per latrine. Fifty-four percent of latrines were observed to be clean, with no visible fecal mater, urine or trash inside (N=20), but only 21.6% were well-sealed, with a lid or cover over the opening so no flies could enter or exit the vault (N=8). The majority of respondents did not find trash disposal to be a problem (55.7%, N=49); however, trash was seen within five paces of 89.8% of homes (N=79). Most of the respondents reported disposing of solid waste in either household or community dumps (See Table 3) with the waste subsequently being burned (41.4%, N=36) or removed by a garbage truck (47.1%, N=41). About two-thirds of participants recognized rodents as a big problem in the community (68.2%, N=60).

Hygiene

Hygiene was assessed through demonstrations of hand washing and observed kitchen hygiene. The principle methods of hand washing were pouring water over hands (50.6%, N=43) and using a tap outside the house (24.7%, N=21). 47.1% of participants did not provide soap for hand washing. Kitchens were generally partially clean: most cooking surfaces in kitchens were medium clean or quite clean, defined as having little to no visible dirt, food or remnants (40.5%, N=34), some food but not all was covered if visible (55.6%, N=25), some but not all dishes were clean (62.8%, N=64) and most kitchens had a few flies—one or two but not a continuous buzzing (43.7%, N=38, See Table 4).

The use of shoes and mosquito nets are direct ways of preventing exposure to disease vectors and fomites. At each home, an average of 29.2% of the household members were

barefoot (N=87, Range 0-7), while most households had at least one mosquito net (64.8%, N=57).

Knowledge

There were two respondents (2.3%) to the survey who could give an oral rehydration solution recipe, though the proportions were incorrect. The rest of respondents had no knowledge about homemade oral rehydration solutions (97.7%, N=86).

The following are the numerical modes followed by the ranges for correct responses to the knowledge questions (the maximum score was 5): diarrhea (2, 0-3, N=28), hand washing (3, 1-5, N=37), parasitic worm prevention (0, 0-4, N=60), skin disease prevention (0, 0-4, N=46) and protected water sources (1, 0-3, N=51).

Associations of Demographics/Social Factors and Knowledge

We did not find significant associations between the binned composite knowledge score and birthplace (p=0.18), number of close friends in community (p=0.11) or self-reported literacy (p=0.14). Those with low education (p=0.002) and those who did **not** attend meetings (p=0.010) were more likely than expected to have low overall knowledge (See Supplementary Table 5). Additionally, respondents with television as a news source were more likely than expected to have high levels of knowledge (p<0.001, See Supplementary Table 5).

Associations with Knowledge and Behaviors

We did not find significant associations between binned composite knowledge and use of soap (p=0.076), observed latrine type (p=0.60), trash near home (p=0.41), covering of drinking water (p=0.45) and animal feces (p=0.18). Those with higher knowledge tended to have more vaccination cards than expected (p=0.017); likewise, those with less knowledge were less likely than expected to have a vessel for serving water (p=0.026). Those with higher knowledge more often than expected had fewer visible cups than people in the household (p=0.032, See Supplementary Table 5).

Migration patterns between Haiti and the Dominican Republic place these communities at higher risk for spread of cholera and any epidemic illness originating in Haiti.

Discussion

With the ongoing cholera epidemic in Haiti and now in the Dominican Republic, WASH practices and interventions are especially relevant on the island of Hispaniola. We found that overall knowledge of WASH practices within this community were low, especially with regards to parasitic worm prevention, skin disease prevention and protected sources of water. We also found that, overall, hygiene and sanitation were insufficient and could contribute to an increased risk for diarrheal illness in the community.

Scores for individual knowledge questions indicated that the community had more knowledge of correct hand washing practices and causes of diarrheal illness. Despite this, there were few correlations within our data that would suggest that higher overall knowledge is contributing to better WASH practices within individual households. Although there was a correlation between composite WASH knowledge scores and having a water-serving vessel, there were no associations with important practices like the use of soap for hand washing and covering stored water. This could be because knowledge scores are quite low, with all but one respondent receiving a composite score of 10 points or fewer out of a 20-point scale. Alternatively, knowledge alone may not be sufficient to alter behavior in settings where non-knowledge barriers, such as a lack of financial or material resources, exist, as has been previously suggested (McLennan, 2000).

Good water treatment and handling practices have been shown to decrease the incidence of diarrheal diseases (Fewtrell et al., 2005), and adequate water storage and treatment practices had already been implemented in a majority of households—including water chlorination (self-reported), proper sealing of storage containers and the use of a serving vessel. However, poor sanitation and hygiene practices still place community members at great risk of contracting infectious diseases, including parasitic worms, respiratory, skin and diarrheal illnesses (Bartram & Cairncross, 2010).

Open defecation and unsealed latrines in particular pose a high risk of fecal-oral disease transmission, since 53% of households had no access to a latrine and 78.4% of latrines were not well-sealed. Anecdotal evidence suggested that many of the respondents lacking latrines would defecate in the nearby sugarcane fields, and that burial of fecal mater was uncommon, which exposes field workers to fecal matter. On average, ten persons shared a latrine. Those sharing latrines were probably immediate and extended family members, since there were often several generations of one family living in the same area of the community. Latrines likely filled more quickly due to the practice of sharing, and once full, latrines were abandoned and community members returned to open defecation. The large number of full or disused latrines within the community raises concerns about the utility and sustainability of current sanitation technologies, which are dependent on donor or government funding and demonstrate a reduced life span due to the high number of persons sharing a single latrine.

Hand washing is one of the most important practices for interrupting the cycle of fecal-oral transmission (Fewtrell et al., 2005). Although only a few of the households (22.4%) used the common bowl method for hand washing, its use in the local elementary school contributes to increased risk for bacterial cross-contamination. The lack of soap use in almost half of the households also increases the risk of diarrheal and upper respiratory illnesses (Bartram & Cairncross, 2010).

Solid waste management practices also appear to be inadequate. Although most participants reported disposing of solid waste either in a household or community dump, pit or drum, littered trash was observed to be present near 89.8% of homes in the community. Poorly managed solid waste can serve as a breeding ground for rodents and other disease vectors, as evidenced by the findings that rodents were perceived to be a problem in 80.7% of households. In contrast, the majority of

respondents, 55.7%, did not view the littered and accumulated waste in the community as a problem. The lack of concern about waste management in the face of abundant litter and rodent problems could be due to differences in the perception of solid waste management or insufficient knowledge of the chain of disease transmission.

Despite some knowledge of appropriate WASH practices, there seems to be little knowledge of how to respond to acute diarrheal illness. No one surveyed could provide a correct recipe for a homemade ORS. A large number of participants instead noted that packets of ORS could be purchased and mixed with 1 liter of boiled water. A previous study of a peri-urban Dominican community showed that 90% of respondents could describe how to prepare a premade packet of ORS, but only 21% had ever used a homemade ORS (McLennan, 2002). Reliance on prepackaged satchels of ORS creates undesirable financial obstacles to oral rehydration therapy in low-income communities (McLennan, 2002) and reduces access to a life saving remedy for severe diarrheal diseases.

Strong social networks within the community, moderate levels of involvement, and high belief in self-efficacy could be beneficial for adopting and diffusing improved behaviors.

There were several demographic and social factors associated with WASH knowledge that may help explain the primary sources of WASH information for this community. As expected, higher education levels were correlated with higher WASH knowledge. Additionally, it seems likely that public service announcements on television targeting cholera prevention contribute to the correlation between television as a news source and knowledge scores, by increasing knowledge about diarrhea and hand washing. Interestingly, the correlation between knowledge and attending meetings to better the community may be due to non-governmental organizations (NGOs) periodically including health education components in their community meetings. Several participants noted that community meetings were usually sponsored by NGOs. This periodic rather than long-term health-related intervention could also explain the increase in knowledge without subsequent behavior change. While we expected that social networking within the community might be an influential means of information dissemination, no such correlations were found. One reason for this could be that there are no vocal sources of WASH information in the community and no forum in the community in which to discuss health and hygiene. Currently, sources from outside of the community seem to be the primary determinants of WASH knowledge in Batey Altagracia.

There are several limitations inherent in the methods of this study, including ineffective sampling and compromised internal and external validity. Though we used a modified cluster sampling technique, the layout of the community and inaccuracy of the map used posed challenges to ensuring that clusters did not overlap. In some cases households were visited twice, but all data was checked to ensure duplicates were removed from the data set. The disproportionate number of females and adults under the age of 35 may decrease the applicability of these results to older and/or male members of this batey. Also, enumerator biases for subjective observations, such as those for evaluating cooking surface cleanliness, were likely and may have contributed to the lack of significant associations between knowledge and these variables. Finally, while living conditions in many bateyes throughout the Barahona Province are similar, the results of this survey cannot be generalized to populations outside of Batey Altagracia.

Despite the limitations of our study, we believe that the work conducted contributes to the evaluation of WASH knowledge and practices in Dominican bateyes, a topic on which there is little published research (McLennan, 2000; McLennan, 2002; Stauber et al., 2009). Moreover, our findings are potentially very important for designing interventions to disrupt the disease transmission between Haiti and the Dominican Republic. Additionally, through pre-testing our survey to ensure cultural and linguistic appropriateness in differing communities, we believe that we have developed a valuable tool for baseline assessment as well as monitoring of WASH interventions in the Dominican Republic.

Conclusion

Batey Altagracia, with its low levels of WASH knowledge and varying degrees of implementation of good practices, would benefit from a WASH-focused PHHE program. Strong social networks within the community, moderate levels of involvement and high belief in self-efficacy could be beneficial for adopting and diffusing improved behaviors through a Community Health Club, which would serve as a forum for addressing health and hygiene concerns and for creating demand for improved WASH infrastructure, such as latrines and point of use water treatment techniques. The results of our survey showed that sanitation practices in particular may be an area to focus on, including the exploration of appropriate and sustainable means of human and solid waste disposal to reduce fecal-oral disease transmission and vector-borne diseases. The baseline data collected will be valuable in guiding future interventions in Batey Altagracia and ensuring that WASH programming is appropriate for the community, including considerations of education levels and social structure. Finally, the survey tool we developed will be valuable in assessing WASH practices in similar rural settings within the Dominican Republic and evaluating post-intervention improvements.

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Supplementary tables and figures for this article are available at JGH Online, www.ghjournal.org

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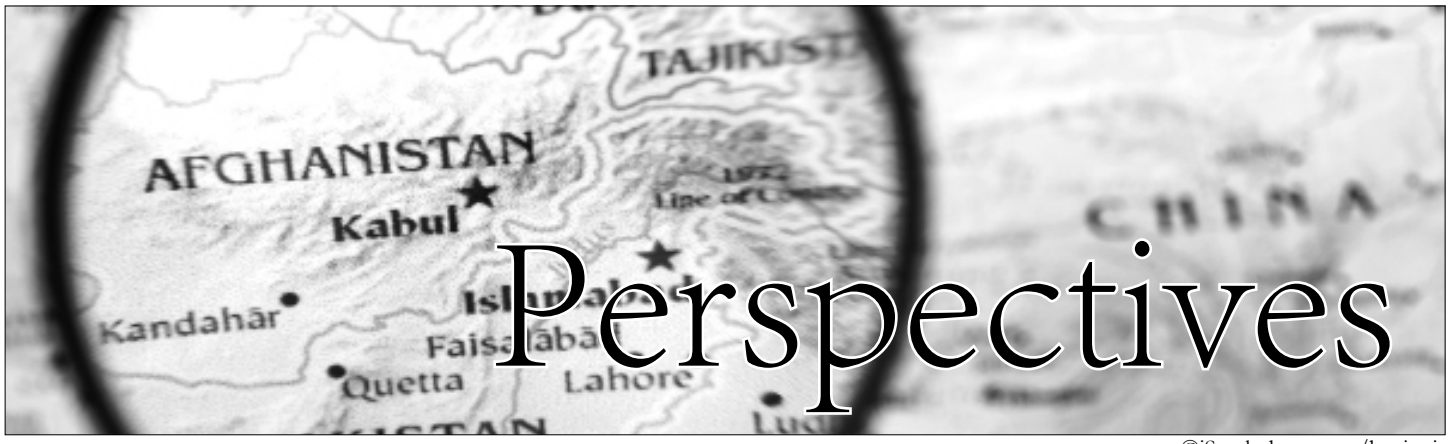

Challenging the Quantity vs. Quality Mentality

A Critique of Skilled Birth Attendant Management in Afghanistan

Cristina Flores

Princeton University, Princeton, NJ, USA

Abstract

The health infrastructure of Afghanistan has been severely damaged by years of war and political instability, leading to inadequate provision of basic maternal health services to Afghan women. Skilled birth attendance has risen from an estimated 13% in 2003 to 14% in 2011, but this rate remains low from a global perspective (Sundarem, 2009; UNFPA, 2011). In developed countries, skilled birth attendants (SBAs) assist 99% of births, and only five countries, including Afghanistan, have rates that fall below 20% (World Health Organization, 2008). Currently, Afghanistan's Ministry of Public Health and other international actors have various policy recommendations for improving skilled birth attendance for Afghan women. In past literature, policy recommendations have focused primarily or even entirely on increasing the accessibility of these attendants. Less attention has been given to improving the quality of skilled maternal care delivery. If addressed at all, issues of quality of care have been in large part viewed as secondary in urgency to issues of access in Afghanistan (Koblinsky, 2006). In this paper, I analyze SBA management in Afghanistan using a framework outlined in Kim and Porter's "Redefining Global Health Care Delivery" (2010) to challenge the prevailing rhetoric that increasing patient care value necessarily compromises coverage of pregnant Afghan women. This framework leads to policy suggestions that are in line with an innovative "diagonal approach" that works to increase value of care in conjunction with access, even in resource-poor settings (Kim & Porter, 2010).

A new framework for SBA management

Despite years of health system reconstruction following the fall of the Taliban in 2001, maternal health in Afghanistan remains one of the poorest in the world. While recent actions have been taken by the Afghan Ministry of Public Health in coordination with the United Nations Population Fund (UNFPA) and United Nations Children's Fund (UNICEF) to improve health care services, maternal mortality rates remain problematic. UNFPA reports a maternal mortality ratio of 1,400 deaths per 100,000 live births in 2011—a statistic that falls short of the 2015 Millennium Development Goal 5 to make substantial improvements in maternal health (UNFPA, 2011).

A wide range of actors involved in the reconstruction of Afghanistan's health care system, including global health advocate Lynn Freedman, UNICEF, partnered universities and the Afghan Ministry of Public Health, tend to support an approach to decreasing maternal mortality rates that places great emphasis on volume expansion of skilled birth attendants (SBAs). This familiar strategy for decreasing maternal mortality in Afghanistan follows Koblinsky's vision for increasing skilled attendance rates in her article "Going to Scale with Skilled Birth

Attendance" (2006). Koblinsky makes a distinction between countries characterized by "massive deprivation," where access to skilled care is largely limited to the rich, and those characterized by "marginal exclusion," where access to skilled care is essentially widespread. Koblinsky reserves a focus on quality improvement to those of "marginal exclusion": "The poor quality and underuse of existing services, where they are available, is of secondary importance to the absence of supply and management capability in these contexts" (Koblinsky, 2006). Afghanistan fits the "massive deprivation" label and therefore would be exempt from focusing on immediate quality improvement under this policy framework.

Koblinsky's argument implies that delivering value of care to pregnant Afghan women in conjunction with increasing coverage of skilled care is overly ambitious. An issue with this assumption is that it views SBAs as a technological fix. A technical solution to maternal mortality in Afghanistan overlooks the external contexts that affect care delivery. This interventionist mindset can be seen through UNICEF's calculated numbers of midwives needed to increase skilled attendance in Afghanistan: "Afghanistan currently requires 4,546 midwives to cover 90 per cent of pregnancies. In contrast, it only had 467 trained midwives in 2002 [....]" (UNICEF, 2008).

The formulaic nature of this approach undermines the significance of midwives' interaction with the health infrastructure and assumes that a certain number of SBAs will result in almost universal skilled birth attendance. Since technologies are interventions that exist independent of their local context, they cannot be improved as they are distributed. Thus, in contrast to Koblinsky's "intervention centered" perspective, an "overall care cycle" perspective that integrates SBAs into the delivery system could possibly improve the value of maternal health care without compromising volume (Kim & Porter, 2010). The remainder of this paper will adapt Kim and Porter's theoretical framework to analyze the role of SBAs within the "overall care cycle" of maternal mortality reduction. This analysis aims to open up possible future policies for delivering high value without necessarily compromising volume through the efficient management of SBAs.

Kim and Porter's theory suggests that improving the value of care, defined as "the patient health outcomes actually achieved per dollar spent," without necessarily compromising volume is possible through several integrated levels rather than through self-contained interventions. These levels include: 1) care over the full disease cycle; 2) coordinated care across these disease cycles; 3) incorporation of the external context in the care delivery system; and 4) maximization of local economic development through care delivery (Kim & Porter, 2010). I will address each of these levels in the following analysis of SBA management in Afghanistan.

Delivering care over the full maternal health cycle

Optimizing skilled attendance at birth first requires attendants to have a clear understanding of their role before, during and after the pregnancy of a woman. Kim and Porter's "care delivery value chain" (CDVC) delineates the full care cycle for medical conditions or diseases and has the potential to make SBAs' roles in decreasing maternal mortality more explicit. Standardizing the activities to be performed in the maternal care cycle would prove extremely valuable in Afghanistan, given that the delivery of health services since the fall of the Taliban in 2002 has been mainly conducted by various NGOs rather than the public health sector, which is severely underfunded (Sabri, 2007). A CDVC would reduce maternal mortality rates by setting quality standards and creating greater uniformity and coordination among skilled workers employed by the various NGOs.

Thus, a CDVC tailored specifically to addressing high maternal mortality in Afghanistan would be the first step to gaining insight into SBAs' roles in the care cycle. Kim and Porter designed a basic CDVC to serve as a template for other diseases, and this template would need to be adapted. The Basic Package of Health Services (BPHS), a plan designed by the Afghan Ministry of Public Health in 2003 that outlines the health services that are free for all Afghans (Ministry of Health, 2003), could provide the foundation for the maternal mortality CDVC. This program breaks down maternal services into the following categories: antenatal care, delivery care, postpartum care, family planning and care of the newborn. While services and essential drugs have been identified by the Ministry of Public Health for each category, the value of treating these activities as interrelated medical conditions for the progression of a single disease has been overlooked (Kim & Porter, 2010). The terminology used to describe the current BPHS delivery system is a "Ladder of Care" in which individual rungs represent different health facilities, services and workers that are available to a certain geographic area based on population density. However, referral systems are poorly developed (Ahmad, 2004), and many health facilities, especially those in rural areas, are not provided with sufficiently skilled staff or proper equipment to deliver services for the entire cycle of maternal care (Ministry of Health, 2003). The integration of these activities would allow for improvements in certain categories of activities and would benefit the value of the care cycle as a whole (Kim & Porter, 2010). For example, services such as providing contraception and educating women on family planning would increase overall value for the patient in the maternal care cycle by reducing unsafe abortions and the spread of sexually transmitted infections (STIs) such as HIV/AIDS. STIs and unsafe abortions are major contributors to maternal mortality (UNFPA, 2010).

Access to skilled care is largely limited to the rich.

The bottom "rung" of Afghanistan's health services operates at the community or village level out of the homes of the least skilled health staff, community health workers (CHWs). These health posts serve rural populations under the BPHS delivery system and provide only the most basic health services, such as treating common conditions, delivering normal pregnancies and distributing contraceptives. Compared to the health facilities that serve more populated regions, health posts lag far behind in terms of patient care quality—they lack skilled health workers and offer limited services. For example, health posts do not provide initial injections of Depo-Provera®, a contraceptive that the Reproductive Health Taskforce of the Ministry of Public Health deems to be most effective, given the cultural barriers to utilizing other means of contraception

(Ministry of Health, 2003). Staffing health posts with a small number of skilled midwives with the proper training to administer the injections is just one example of how the CDVC can help identify neglected activities that can improve overall care value. This kind of change in health systems delivery, though not as direct as simply scaling up on skilled birth attendance, may prove more effective in decreasing maternal mortality, as it targets certain root causes of complications during pregnancy (e.g. hemorrhages, obstructed labor, sepsis and induced hypertension) and might minimize the need for expensive treatments later in the care cycle (Kim & Porter, 2010; Mayhew, 2008).

Coordinated care across disease cycles

Just as important as identifying the roles of SBAs in each maternal health care activity is identifying which tasks can be passed on to other maternal health workers until greater numbers of midwives become available. Kim and Porter's framework emphasizes the efficiency of making use of overlapping investments by creating a shared infrastructure that links related aspects of various CDVCs (Kim & Porter, 2010). An integrated infrastructure would 1) incorporate the wide range of health workers and facilities in the maternal care delivery system and 2) jointly address aspects of maternal health and other medical conditions that are interrelated, such as maternal health and HIV/AIDS.

Currently in Afghanistan, three main categories of health workers are dealing with maternal services—SBAs, traditional birth assistants (TBAs) and community health workers (CHWs). These health workers work in four types of health facilities, namely health posts, basic health centers, comprehensive health centers and district hospitals. These health facilities are distinguished by the population level at which they operate. The facilities also vary in terms of the availability of services, staffing, equipment and essential drugs (Ministry of Health, 2003). Attendants are classified based on skill level; SBAs meet the WHO definition of "an accredited health professional—such as a midwife, doctor or nurse—who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns" (World Health Organization, 2011). In contrast, TBAs and CHWs represent a heterogeneous group with a range of skill levels and no formal, standardized training (UNFPA 2011). They possess at most a limited set of obstetrical skills for normal pregnancies (Ministry of Health, 2003).

Cooperation between these workers has proven less than ideal especially given the poorly developed referral system in Afghanistan. Several studies have shown that transportation barriers, such as poor roads in rural areas, as well as gender-based restrictions that prohibit women from traveling without the permission or accompaniment of a man (Tunbridge, 2009), make emergency obstetric referrals futile, especially for those women living more than an hour away from an urban health facility staffed with midwives (Mayhew, 2008).

Therefore, TBAs and CHWs must be better incorporated into a delivery system focused on skilled attendants. Despite the BPHS system's support of TBA training, the Afghan Ministry of Public Health declared in a 2003 Safe Motherhood policy statement that TBA training is unsustainable as a long term goal due to their limited capabilities in dealing with obstetric complications (Ministry of Health, 2003). Terminating TBA training and instead gradually recruiting TBAs to the recently established midwifery schools would make better use of already knowledgeable health workers. Cross-training other skilled health workers such as HIV personnel or vaccinators in the technical skills of birth care is another possibility for utilizing scarce staff more efficiently (Kim & Porter, 2010). This cross-training would capture "synergies across diseases," thereby integrating CDVCs for multiple conditions (Kim & Porter, 2010).

For example, an SBA with previous training in HIV/AIDS care may be able to more easily diagnose and treat an HIV-related cerebral complication, a condition that is often times confused with puerperal psychosis or cerebral malaria, in the postnatal stage (World Health Organization, 1998). Cerebral malaria obstructs microcirculation of blood in the brain and can result in unusual behavior that resembles signs of puerperal psychosis, including irritability and extreme aggression (White, 2004). Cognitive complications associated with HIV/AIDS can have similar clinical manifestations; these include irritability, loss of inhibition, depression and impaired concentration (Pryse-Phillips, 2003). An SBA trained in recognizing less obvious symptoms and conducting proper blood tests would be crucial for distinguishing between clinically similar conditions. Educational responsibilities requiring no training in technical skills could be delegated solely to CHWs, who would serve as advocates for SBAs.

Gender-based formalities that prohibit women from traveling without the permission or accompaniment of a man make emergency obstetric referrals futile.

Instead of allocating SBAs only to health facilities that serve 15,000 or more, as recommended in the current BPHS plan, mixed teams of CHWs, TBAs undergoing in-service training and SBAs could be established at every health facility, including the rurally located health posts. Temporarily "task shifting," or decentralizing care delivery responsibilities, until TBAs are entirely incorporated into an SBA-based system would maximize care value while making full use of scarce staff (Kim & Porter, 2010). These policy suggestions demonstrate that quality of care can be addressed even in areas that Koblinsky would call "massively deprived" by identifying potential overlaps in health infrastructures and disease cycles, thereby increasing overall efficiency in care delivery.

Incorporating local realities into maternal care delivery

In creating CDVCs and determining SBAs' roles in each care cycle activity, the local realities of Afghanistan must be taken into account. Treating SBAs as an intervention that can be merely scaled up rather than an integral part of the maternal

health cycle runs the risk of advocating a magic bullet approach that fails to incorporate external factors that inevitably affect care delivery. While Koblinsky prioritizes volume expansion over cultural considerations in areas of "massive deprivation" such as Afghanistan (Koblinsky, 2006), Kim and Porter's framework advocates incorporating local realities into SBA management without exception (Kim & Porter, 2010). Several studies conducted in Afghanistan (Mayhew, 2008) have found a variety of external influences that constrain access to and effectiveness of care (Kim & Porter, 2010). Afghanistan's turbulent history of war and conflict, as well as the country's cultural aspects that can prove incompatible with current Western medical practices, point to some local realities affecting accessibility and effectiveness of care. A detailed review of specific gender-based, religious, geographical, financial, educational and war-ridden barriers requires more space than this analysis allows (Mayhew et al, 2008); the goal of this part of my analysis is to demonstrate that incorporating local realities into SBA management could contribute to higher value patient care under the Kim and Porter framework. Although a multitude of initiatives could be taken to incorporate external influences into CDVCs, I expand on a few examples below.

One example involves using religious rhetoric to promote family planning and break down gender-based barriers to effective care. Within the past few years the Ministry of Haj and Religious Affairs has worked with the Ministry of Public Health to promote public awareness on maternal health, particularly in encouraging imams to demonstrate that Islamic teaching permits safe contraception and that preventing women from consulting with male health workers is morally wrong (Tunbridge, 2009). Especially in rural areas governed by deeply ingrained conservative Islamic traditions, this integration of Islamic teaching into public health awareness campaigns proves highly effective in changing behaviors that restrict fundamental activities within the maternal care cycle.

Distance from health facilities presents another barrier to receiving effective maternal care. 77% of Afghans live in rural areas characterized by mountainous terrain and poorly developed infrastructure, making transportation to health facilities staffed with SBAs especially challenging. Reaching these facilities requires two weeks of travel time for some women living in these remote communities, and weather conditions during the winter season can block access to care entirely (Tunbridge, 2009). Until health posts are more adequately staffed, SBAs can be incorporated into mobile teams of health workers that can travel to rural areas (Mayhew et al, 2008).

Literacy is another crucial barrier to skilled birth attendance, as suggested by Mayhew et al's 2008 study on determinants of SBA use in Afghanistan. Only 6% of the country's women are literate, which severely limits knowledge of maternal care and reproductive services (Mayhew et al, 2008). This lack of knowledge may in part explain why 90% of health facilities are supplied with free contraceptives, but only 14-15% of women in the remote areas make use of them (Tunbridge, 2009). Until literacy rates and overall education levels of women in Afghanistan improve, task shifting (as noted earlier) could alleviate the situation. CHWs, who are more easily recruited and require no formal training, could focus entirely on these community outreach responsibilities. Passing on educational and advocacy duties of SBAs to CHWs could more efficiently promote healthy habits among Afghan women, particularly concerning issues like family planning, nutrition and infant immunization (Ministry of Health, 2003).

Policies geared towards increasing skilled birth attendance must address issues existing beyond the attendants themselves if they are to deliver effective outcomes. By addressing these barriers within the actual care delivery system, SBAs may cover greater numbers of pregnancies (Kim & Porter, 2010). Again, high value maternal care appears possible even in the face of "massive deprivation"; reducing external influences such as geographical, financial and cultural barriers can increase skilled care coverage and effectiveness even without volume expansion of SBAs. Because most of these external influences contribute to an unstable environment, policy implementation could prove challenging in Afghanistan. Such difficulties imply that the collaboration of government officials with a variety of domestic and international actors—from religious leaders to outside donors to community outreach educators—might be necessary in order to effectively restructure SBA management.

Maximizing economic development in maternal care delivery

Kim and Porter's final level of high quality care delivery integrates economic development with quality assurance of maternal health care. Assuring long term SBA sustainability requires that SBAs themselves contribute to this mutually beneficial relationship. Community development initiatives are linked with health system development through a positive feedback loop in which each component benefits from value improvement and subsequently contributes to the other. Yet, there are concerns that improving care delivery systems detracts resources from potentially more economically beneficial investments, especially in the case of SBA utilization in Afghanistan. These concerns stem from the observed brain drain effect resulting from years of war and conflict under Taliban control that left the public health sector unable to sustain the country's skilled health workers.

Donor agencies contracted NGOs to provide the most basic health services to Afghans until 2002, when the Ministry of Health initiated a new policy of health care delivery. This current system involves a partnership between national and international NGOs and the Ministry of Health in delivering BPHS services. The collaboration between the public and non-governmental sectors has allowed for optimal coverage of BPHS services across Afghanistan, but it has drawn attention away from quality of care. Long lines, disrespectful treatment of patients and drug shortages have led many Afghans to seek health services in the private sector. However, these private health facilities require fees that are too costly for many Afghans and tend to be concentrated in urban areas. (Sabri, 2007).

Thus, under the current system, SBA training may simply lead to further inequalities in maternal health care, restricting birth attendance to only those who can afford to pay for it. However, recent developments indicate that this does not necessarily have to be the case and that the future of SBA training can lead to community development; the World Bank has begun to finance public sector recruitment of skilled health workers by providing competitive pay (Sabri, 2007). Additionally, alternative community-based midwifery training programs, which recruit students from rural areas with the stipulation that they seek work in their rural communities upon graduation, have be-

come available (Farooqi, 2009). The *State of the World's Midwifery 2011 Report* mentions several incentives used globally for midwives to decentralize, including housing and transportation (used in Liberia, Malawi, Mozambique, Uganda), midwifery kits (used in Sudan), midwifery tutors (used in Zambia) and performance-based monetary incentives (used in Rwanda and Tanzania) (UNFPA, 2011). Focus on providing greater monetary or non-monetary incentives for SBAs to geographically decentralize and balance the role of the public sector in delivering care could help to establish greater equity in quality maternal health services and contribute to community development in Afghanistan as a whole.

Literacy is one other crucial barrier to skilled birth attendance, as suggested in a 2008 study conducted by Mayhew et al.

The financial costs of SBA training and new policy implementation also require consideration. Three main donors in Afghanistan – the World Bank, the European Commission, and USAID – finance the NGOs to maintain the vast majority of the SBA training schools. The financing of these schools comes at a high price for the donors, and so its sustainability for the future is of particular concern. In Afghanistan, the cost of training each student per year is $8,000-$9,000 for a two year program (UNFPA, 2011). To ensure sustainability, the Afghan Ministry of Health would need to continue to gradually assume financial responsibility for these training schools. Although financing these training schools along with developing an efficient maternal health care system would require a sizeable investment on the part of the Afghan government, the UNFPA 2011 report confirms that the overall returns far exceed the economic input. Priority should be given to these investments since they secure officially trained cohorts of health workers that can be incorporated into the country's work force (UNFPA, 2011). These investments are also important since evidence has shown that the maternal health of a country tends to reflect the status of the health system as a whole (Bartlett, 2011). The role of SBAs in maintaining maternal health in Afghanistan is costly but critical (UNFPA, 2011). Thus, an efficient system of management that integrates SBA tasks across and within CDVCs would simultaneously reduce expenses and improve the health system as a whole in the long run.

The future of SBA management and monitoring its progress

While much of the Kim and Porter theory for care delivery remains "ill-defined" (Kim & Porter, 2010), a direct application of their terminology and concepts to the situation in Afghanistan contributes to a growing body of knowledge on the best practices drawn from case studies. Real progress in ensuring high quality maternal care and, more specifically, optimal management of SBAs in Afghanistan's health infrastructure can only be reached through continued evaluation of care delivery systems. Should Kim and Porter's value-centered perspective shape future policies in SBA management, new methods for assessing effective care will need to supplement Afghanistan's current "balance scorecard" system (Sabri, 2007). This current system monitored primarily by the Bloomberg School of Public Health at Johns Hopkins University focuses on assessment of availability (Sabri, 2007) and accessibility (Sundaram, 2009) over quality of care provided by health facilities. However, assessment of patient health outcomes and the cost of achieving these outcomes will be necessary to accurately evaluate patient value in maternal health services and the role of SBAs in delivering high-quality care.

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Detecting Intimate Partner Violence and Postpartum Depression

Neglected Issues in Pregnancy and Women's Health

Jean Marie Place, MSW, MPH

Arnold School of Public Health, Department of Health Promotion, Education, and Behavior; Women and Gender Studies, University of South Carolina, Columbia, SC, USA

Abstract

Postpartum depression (PPD) is a pressing public health concern because of the negative effects on women's psychological well-being and infant-mother attachment, yet few health providers screen for the condition or have protocols in place for its management. Intimate partner violence (IPV) during pregnancy is strongly associated with PPD, as well as other health conditions, yet it also is generally undetected in perinatal care visits. Early screenings for IPV during pregnancy and PPD after delivery by healthcare providers are important strategies for ensuring these health issues are detected and awareness is raised about their importance to the health of women and children. Action is needed to ensure the inclusion of training for IPV and PPD screenings during health professional training and professional association involvement, as well as the support of healthcare policies directed at prioritizing IPV and PPD screenings throughout the perinatal period.

Introduction

During pregnancy and up to one year postpartum, many women experience brief emotional lability as they adjust to new roles and routines. The persistence and severity of these distressing feelings raise concern and characterize a host of perinatal mood disorders, with symptoms spanning sadness, confusion, frustration, obsessions and panic (Postpartum Support International [PSI], 2006). Experts from the World Health Organization (WHO) and the United Nations Population Fund (UNFPA) acknowledge perinatal mood disorders as under-identified and under-treated mental health conditions, especially in low and middle income countries (WHO, 2008). Postpartum depression (PPD), in particular, is one of the most common and severe complications of childbirth worldwide, with an estimated 13% of women giving birth experiencing the disorder (WHO, 2009; O'Hara & Swain, 1996). The depressive episode generally arises within four weeks after delivery, induces feelings of worthlessness, agitation, anxiety or despondency, and often results in the disruption of a woman's ability to bond with or care for her baby (WHO, 2009).

Intimate partner violence (IPV) is the physical, sexual or emotional abuse or threats of abuse perpetrated by a current or former partner (Centers for Disease Control [CDC], 2011). PPD is associated with a number of risk factors, including IPV, during pregnancy. Like PPD, IPV during pregnancy affects women throughout the world. The WHO estimates the incidence of women physically abused during at least one pregnancy exceeded 5% in 11 of 15 settings studied (WHO, 2005).

Early identification of IPV during pregnancy and of depression after delivery is a gateway to detecting, preventing and ameliorating negative health conditions (Antoniou, Vivilaki, and Daglas, 2008), but both IPV during pregnancy and PPD remain issues marked by stigma, silence and dismissal. To leverage perinatal healthcare's preventive power, policy makers, healthcare providers and patients should resist treating women in a vacuum and recognize the dynamic interactions between physical and mental health.

Intimate Partner Violence during Pregnancy and Postpartum Depression: An Opportunity to Intervene

Given assertions that a strong, trusting partner relationship may be vital for a woman's psychological health during the perinatal period (Mezey, Bacchus, Bewley, & White, 2005; Dennis & Ross, 2006), it makes sense that IPV during pregnancy may have a strong detrimental effect on women's mental health (Antoniou et al., 2008). Until recently, IPV had not specifically been assessed in investigations as a risk factor for the development of PPD (WHO, 2009). However, recent studies indicate that IPV during pregnancy may be a top predictor of PPD (Valentine, Rodriguez, Lapeyrouse, & Zhang, 2011; Bacchus, 2004; Antoniou et al., 2008; Ludermir, Lewis, Valongueiro, Barreto, and Araya, 2010), among other psychosocial variables such as prenatal depression, social support, childcare stress and socioeconomic status that contribute to high rates of mental health problems after giving birth (Beck,

2001). In a report on maternal mental health published in 2009, the WHO stated that the assessment of risk factors for PPD, including current exposure to IPV, should be routine in perinatal health care (WHO, 2009).

Many health care providers are aware of the corollary risk factors of PPD. Lloyd & Hawe (2003) conducted interviews with health professionals familiar with PPD to evaluate how possible solutions are viewed. One health professional viewed the screening of risk factors for PPD as a preventive approach: "[If] you're going to have a depressive illness the chances are that you've got other things happening in your life which make you vulnerable. So we should be able to pick out the people who are going to have the illness, if we're very careful" (Lloyd & Hawe, 2003, p. 1786). However, evidence suggests screening for PPD is rare in health systems throughout the world (Gjerdingen & Yawn, 2007). In addition, although the prevalence of IPV during pregnancy may be higher than the prevalence of commonly screened conditions such as gestational diabetes and preeclampsia (Gazmararian et al., 2000), rates of screening for IPV remain low (Waalen, Goodwin, Spitz, Petersen, & Saltzman, 2000). Both IPV during pregnancy and PPD are associated with a host of other health issues, including increased substance abuse, preterm delivery, low birth weight infants and maternal suicide (Campbell, 1998; Shadigian & Bauer, 2005; Sharps, Laughon, & Giangrande, 2007). Unfortunately, screenings for IPV during pregnancy and for depression after delivery are infrequent, jeopardizing the physical and mental health of the woman and child decades into the future (O'Reilly, Beale, & Gillies, 2010).

Building a Case for the Association between IPV and PPD

Burgeoning evidence supports the case for the association between IPV during pregnancy and an increased risk for PPD (Bacchus, 2004; Ludermir et al., 2010; Tiwari et al., 2008; Gomez-Beloz, Williams, Sanchez, & Lam, 2009; Valentine et al., 2011). Although the relationship between IPV during pregnancy and PPD is not yet proven to be causal, studies conducted in various countries, including Brazil, Peru, Hong Kong and the United States, support the association (Ludermir et al., 2010; Tiwari et al., 2008; Gomez-Beloz et al., 2009; Valentine et al., 2011).

Ludermir et al. (2010) found that over half of women in a Brazilian study who experienced physical or sexual violence plus psychological violence from an intimate partner during pregnancy experienced elevated rates of PPD. Similar results were found in a study conducted in Hong Kong, in which exposure to psychological violence during pregnancy was associated with a greater risk of PPD (Tiwari et al., 2008). A sample of Peruvian women who recently gave birth and were exposed to IPV during pregnancy had higher levels of severity of depression than women not exposed to violence during pregnancy. Women experiencing IPV during pregnancy were 1.4 times more likely to experience mild depression (95% confidence interval (CI) 1.9-2.3), 2.9 times more likely to experience moderate depression (CI 1.8-4.5), 5.5 times more likely to experience moderately severe depression (CI 3.4-9.2) and 9.9 times more likely to experience severe depression (CI 5.1-19.9) (Gomez-Beloz et al., 2009). Among a sample of Latina women in the United States, exposure to IPV in the 12 months prior to delivery was shown to be a stronger prenatal predictor than prenatal depression of PPD, and prenatal depression has been implicated as a strong prenatal predictor of PPD (Beck, 2001; O'Hara & Swain, 1996). Thus, results suggesting that the likelihood of developing PPD is greater with recent exposure to IPV than with a history of prenatal depression among a sample of Latina women are especially significant (Valentine et al., 2011).

Working Toward Prevention of Postpartum Depression

Prevention efforts are aimed at assessing women for risk factors and intervening early to reduce the threat of PPD and other negative health outcomes (Miller & LaRusso, 2011). The American Congress of Obstetricians and Gynecologists (ACOG) recommends screening for IPV as part of routine care, and ACOG's Committee on Health Care for Underserved Women issued a statement in 2006 endorsing screening of IPV as part of comprehensive prenatal care because of the high prevalence and adverse health outcomes of violence (ACOG, 2006). The ACOG also suggests the use of validated screening tools for PPD in perinatal health care visits, and the American Academy of Pediatrics (AAP) recommends universal screening of PPD after delivery.

Screenings in perinatal care visits for IPV during pregnancy and PPD can be simple, convenient, rapid, effective and performed by primary care providers. Several instruments exist to assess risk. For example, the Abuse Assessment Screen (AAS) is a brief validated screening instrument for use among diverse populations that assesses exposure to lifetime abuse, recent abuse, abuse during pregnancy and fear of partner. The Edinburgh Perinatal Depression Scale (EPDS) can be self-administered, is available without a fee, takes less than 10 minutes, is validated for use in many countries and is a reliable means to detect clinically significant depressive symptoms while avoiding the detection of somatic complaints that are routine in the normal postpartum period (Seehusen, Baldwin, Runkle, & Clark, 2005).

Neither screening for IPV during pregnancy nor screening for PPD is a panacea. They are, however, starting points, especially for women whose profiles indicate a need for increased support. Highlighting the importance of engaging in PPD screenings, one health professional said, "One of the things that we've found out by taking the [PPD] screening approach was that there [are] higher levels of domestic violence than expected" (Lloyd & Hawe, 2003, p. 1788). Thus, screening women for PPD could be the "prelude to the provision of strategies" (O'Reilly et al., 2010, p. 200) to prevent and protect women from additional mental health difficulties, violence or other harmful situations.

The Role and Reservations of Screenings

Evidence suggests that providers are not routinely screening for PPD or IPV. Although studies indicate that over 80% of women surveyed are comfortable with the idea of being screened for PPD and 96% of another sample of women are comfortable with being screened for IPV, rates of screenings remain paradoxically low (Buist et al., 2006; Genmill, Leigh, Ericksen, & Milgrom, 2006; Eiseman et al., 2009). In a meta-analysis of the literature based on research conducted in high income countries, Gjerdingen & Yawn (2007) reported that the

rate of current screening for PPD in primary care practices varies but in general is low. One U.S.-based study of 508 pediatricians indicates that only 4% used formal diagnostic criteria to detect depression based on their last recalled case of maternal depression or PPD and none used a validated screening questionnaire (Olson, 2002). In another study among a sample of 298 family physicians in the northwest United States, only 18% reported using a screening instrument specifically designed to detect PPD, such as the EPDS, in postpartum gynecologic or well-child visits (Seehusen, et al., 2005). Likewise, results from several studies showed only 22-39% of pregnant women were screened for violence in prenatal care visits (Anderson et al., 2002; Johnson et al., 2003). Among a sample of pregnant Latina women recruited from two perinatal clinics in Los Angeles, California, 68% had not been screened for IPV (Rodriguez, Shoultz, & Richardson, 2009) even though there is evidence suggesting that low-income minority populations are high risk groups (Tjaden & Thoennes, 2000). The use of formal screening instruments is crucial because reliance on observation or informal questions alone to assess symptoms has not been shown to effectively identify women with PPD or exposure to IPV (Klinkman, Schwenk, & Coyne, 1997; Gjerdingen & Yawn, 2007; O'Reilly et al., 2010).

Both IPV during pregnancy and PPD remain issues marked by stigma, silence and dismissal.

Among a nationwide sample of pediatricians in the US, the most significant barriers to screening for PPD were inadequate time to provide patient education, insufficient appointment time to collect patient history and incomplete training to diagnosis maternal depression or PPD (Olson et al., 2002). Likewise, providers cited the lack of time, inexperience and the uncertainty of what to do once a woman had disclosed violence, as reasons for inattention to IPV screening (Bacchus, Mezey, & Bewley, 2002; O'Reilly et al., 2010).

These concerns are not unfounded. Screenings without appropriate follow-up and referral have little effect (Moracco & Cole, 2009, Gjerdingen & Yawn, 2007). Studies suggest that a sense of apathy among providers about PPD and IPV is not the problem, but rather that providers harbor concerns that the screening and referral process is cumbersome and requires too much effort (Seehusen, Baldwin, Runkle, & Clark, 2005; Borowsky & Ireland, 2002). Having an office protocol that promotes and prioritizes screenings and establishing a referral system has been shown to increase the chances that a given provider will screen for IPV (Holtrop et al., 2004; Waalen et al., 2000). Results are similar for PPD (Gjerdingen & Yawn, 2007; Pignone et al., 2002). One pilot program enhanced provider abilities to effectively utilize the EPDS and link women to services for PPD in a timely manner; 98% of women reported being satisfied with the program assistance (Baker-Ericzen, Mueggenborg, Hartigan, Howard, and Wilke, 2008). In order to increase screenings for IPV during pregnancy and depression in the postpartum, office protocols that facilitate screenings and support a coordinated system of referrals to appropriate service providers are recommended (Eiseman et al., 2009; Waalen et al., 2000). Clinics that include screenings plus enhanced follow-up care show more positive patient outcomes (Gjerdingen & Yawn, 2007; Pignone et al., 2002; Baker-Ericzen et al., 2008).

Admittedly, formal agencies with appropriate service providers for women exposed to IPV or experiencing mental health problems are limited in low- and middle-income countries. Even in sites where services are available, cost, shame, self-blame, fear, dismissal, stigmatizing attitudes on the part of service providers and other barriers may prevent women from accessing follow-up care (WHO, 2005). The WHO recommends a comprehensive approach to service provision by training healthcare providers in non-stigmatizing responses and coordinating cooperation between the healthcare setting and other service sectors (WHO, 2005). In resource-poor settings, the WHO recommends strengthening women's ability to access informal sources of support, such as religious leaders, relatives, neighbors and friends. Findings from Coker et al. (2002) indicate that the risk of negative mental health outcomes declines significantly among abused women who report receiving social support. These informal sources may be a starting point for interventions seeking to reduce stigma and offer substantive support to women (WHO, 2005). The goal of the community mental health model, relevant in low- and middle-income countries, is to mobilize community resources so individuals can seek and receive help within the community and among its members (Mehryar & Khajavi, 1975). Utilizing community health workers, otherwise known as *promotores* or paraprofessional caregivers, is a cost-effective means to engage community members in awareness-raising activities, link women to services and strengthen social networks (Mehryar & Khajavi, 1975).

Perspectives on Steps Forward

Addressing the intersections between physical and mental health in the perinatal period requires a multisectoral approach in countries around the world. Because IPV during pregnancy and PPD are so highly correlated, screenings for IPV during pregnancy can and should occur in conjunction with screenings for depression after delivery. A system of referrals to appropriate service providers, if problems are detected, can be integrated into office protocol (Logsdon, Wisner, Billings, & Shanahan, 2006). Health professional education programs and professional credentialing bodies play key roles in ensuring that PPD and IPV screening are included in training curriculum (Sharps et al., 2007; Seehusen, et al., 2005; Logsdon et al., 2006). Professional associations can focus on calls for health care institutions to develop policies that promote screening and sanctions against those providers who fail to do so (Sharps et al., 2007; Seehusen, et al., 2005; Logsdon et al., 2004), particularly in low- and middle-income countries where perinatal mood disorders are under-diagnosed and IPV during pregnancy is especially prevalent (WHO, 2008; WHO, 2005).

As Antoniou et al. states, "A good clinical practice, confirmed by international data, is to ask pregnant women the necessary questions regarding abuse and postnatal depression, during pregnancy and also after birth. In this way, the documented and effective care for the women in need is secured,

prior to and after birth" (2008). As the case is built for the association between IPV during pregnancy and PPD, it is important and timely to develop strategies at various levels in the health system to address these issues. Early screenings for IPV during pregnancy and PPD after delivery by healthcare providers are strategies to detect and address these issues. To accomplish systematized screenings for IPV and PPD in perinatal healthcare settings, training for screenings needs to be included in health professional educational curricula. Professional associations need to advocate for healthcare policies directed at prioritizing IPV and PPD screenings throughout the perinatal period. Ancillary efforts to support women who are identified as experiencing IPV or at-risk for PPD include development of a coordinated and comprehensive system of referrals and helping women to activate informal support systems. These activities are not only feasible but also lay the groundwork for integrating physical and mental health more effectively in perinatal care.

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Supervised Injection

An Evidence-Based Policy

Bob Sun

Columbia University, New York, NY, USA

Introduction

Drug addiction in modern society is by its very nature a global problem. Since President Nixon announced a "War on Drugs" in 1971, the United States has spearheaded efforts around the world to reduce and punish illicit drug production, trafficking and use. President Clinton, for instance, gave $1.3 billion to Colombia in 2000 to support coca plant defoliation and military training ("Timeline: America's War on Drugs," 2007). Last year, Afghanistan received $107 million from the United States (USAID) to fund alternatives to opium poppy cultivation (Office of National Drug Control Policy, 2011a). Furthermore, the 2012 federal budget will increase total spending on drug control, from $25.9 billion in 2011 to $26.2 billion (Office of National Drug Control Policy, 2011b). From these expenditures, it is obvious that Americans, at the very least, see controlling the production, trade and consumption of illicit drugs as a global priority. Other developed nations, including the members of the European Union, are also committed to international approaches in addition to comprehensive, national drug strategies (European Monitoring Centre for Drugs and Drug Addiction, 2010). And it is common knowledge that in many developing countries, the "War on Drugs" is both real and bloody – indeed, an estimated 40,000 people in Mexico alone have died in the five years since incumbent President Calderon initiated a "crackdown on the drug cartels" ("Q&A: Mexico's drug-related violence," 2011).

However, not all American funding goes abroad, nor does it go solely towards shutting down production sites; the U.S. Department of Justice alone spent $87.9 million on imprisonment of offenders for drug-related crimes in 2009 (Office of National Drug Control Policy, 2011a), and over 1.35 million people in the U.S. were arrested for possession of illicit drugs in 2010 (United States Department of Justice, 2009). Such patterns of incarceration, both in the U.S. and elsewhere, largely originated from the Anti-Drug Abuse Act, signed into law by President Reagan in 1986, which created minimum sentences for drug abuse and possession ("Timeline: America's War on Drugs," 2007).

With regard to U.S. drug control policy, the U.S. Drug Control Strategy has described how it has led to a "revolving door" between crime, incarceration and drug use. Indeed, expenses associated with imprisonment and doubts regarding its effectiveness in controlling drug abuse have driven policy makers to seek alternative solutions that reduce drug abuse, including controversial measures that diametrically oppose the philosophy of punishment represented by mandatory incarceration (Office of National Drug Control Policy, 2011c). The debate over the ethics of these non-traditional methods is fraught with such disparate issues as human rights and allocation of taxpayers' funds. However, in considering any approach to drug control, one must not forget that the ultimate goal should be to limit the harm that drugs do to individuals and society, since the reason for their prohibition is that they are unduly harmful. Politicians and commentators would thus do well to consider the evidence for how effective a proposed drug policy would be at reducing harm. Unfortunately, this consideration has not always been given, which has paved the way for counterproductive policies. Examination of the implementation of one such controversial measure, a supervised injection site (SIF), reveals the difficulty of adjusting a policy even in the face of overwhelming evidence.

Insite: A Case Study

In 2003, Insite, the first supervised injection facility in North America, opened in Vancouver, British Columbia, Canada (Buxton, 2005). Insite operates as a facility where nurses and other health care professionals monitor drug users, or "clients," as they shoot up. It is designed to be a safe space for addicts to inject illicit drugs: syringes, filters and other medical supplies are provided to ensure clean injections, in contrast to the infected needles often used outside Insite's doors ("Services," n.d.). The facility is located in Vancouver's Downtown Eastside (DTES), one of the poorest neighborhoods in Canada. It is home to more than 3,000 injection drug users out of a population of only about 17,000 (*Downtown Eastside*, 2006). In this neighborhood, prostitution, drug deals and drug use are conducted in the open, and needles are procured in any way possible, often by picking them off the ground or using them directly after another drug user (McNeil, 2011). Though Insite does not supply any illicit drugs, it does provide a legal and monitored space in which users can inject, thereby lessening many of the immediate dangers associated with illicit drug use, such as risks of overdose or cross-infection. In addition, long-term health improvements in individuals' health can begin at Insite, as the health care staff at the site have access to a population that is generally marginalized and underserved, even within Canada's single-payer universal health care system.

While it began as a temporary pilot project, Insite has

been so successful in its objectives that it is now fighting in court to become a permanent part of health care delivery in Vancouver. The federal government in 2003, headed by the centrist Liberal Party, granted Insite an exemption from Canada's narcotics laws so it could operate and conduct comprehensive research on the efficacy of SIFs. Since the election of the right-wing Conservative Party in 2006, the Attorney General of Canada has sought to remove the exemption on the grounds that Insite is ineffective at reducing harm to individuals, increasing the safety of the community and lessening addiction. Based on the evidence gathered at Insite, however, this argument is simply false.

Harm Reduction

On the contrary, there has been no dearth of scientific evidence supporting the effectiveness of SIFs. Insite has had more than 1.8 million visits from over 12,000 individuals since it opened its doors. In that time, there has not been a single death at the facility, despite hundreds of overdoses at Insite each year ("User Statistics," n.d.). Additionally, a retrospective population-based study of overdose rates in Vancouver before and after the opening of Insite found that, within the immediate 500 meter radius of the SIF, fatal overdoses decreased by 35.0% ($p=0.048$); contrarily, in the rest of the DTES these deaths decreased by a statistically insignificant 9.3% ($p=0.490$) (Marshall, Milloy, Wood, Montaner, & Kerr, 2011). While this study was not a randomized controlled trial, it nevertheless provides compelling support for Insite's success in reducing overdose deaths in the community. Estimates therefore put the number of lives Insite has directly saved by preventing overdose fatalities at 1.9 to 11.7 people per year, representing between 6% and 37% of the total overdose mortality in the DTES (Milloy, Kerr, Tyndall, Montaner, & Wood, 2008).

SIFs such as Insite offer an opportunity to conduct further research into the nature of drug addiction and the effectiveness of various interventions.

In addition, there is no evidence that SIFs encourage illicit drug use or facilitate addiction. Thomas Kerr and colleagues (2006) measured rates of relapse and rates of stopping drug use among former and current addicts in the DTES; there was no increase in the former rate or decrease in the latter after Insite's opening. Thus, all the major objections to SIFs—including the oft-heard accusation that they encourage drug use—are shown to be false. Simply preventing overdose deaths, with no discernible adverse impact on public or individuals' health, is already substantial support in favour of the facility's operation.

Moreover, there are further health benefits to clients. By providing clean needles, SIFs such as Insite, and those operating in Europe reduced needle sharing by an estimated 69% among clients, in comparison to non-clients (M. J. Milloy & Wood, 2009). Thus, SIFs reduce the risk of transmission of disease through contaminated needles; indeed, injection drug users account for a quarter of all new cases of HIV in North America and four out of five new cases in Eastern Europe and Central Asia. Insite also provides injection drug users, especially vulnerable groups such as women, with a safe environment that is a refuge from violence, promoting "enhanced agency at the point of drug consumption" (Fairbairn, Small, Shannon, Wood, & Kerr, 2008). For instance, on the street, women are often forced to exchange sexual favors for drugs, which again increases the risk of transmitting disease, as well as increasing the potential for abuse and assault.

Client access to health care professionals at SIFs also allows for a host of health interventions to be conducted. Compared to the population of injection drug users at large, SIF clients have increased use of condoms, are more likely to use safer injection practices such as disinfecting the injection site, receive more treatment for urgent medical problems such as skin infections, and are referred to other health professionals more often (British Columbia Centre for Excellence in HIV/AIDS, 2009). Most important, perhaps, is the potential for SIFs to enroll clients in rehabilitation programs to wean them off illicit drugs altogether. This capability reduces harm to the individual drug user directly and to communities around the world that meet the demand of illicit drug users through trafficking and production.

Further Research

Additionally, the continued operation of SIFs such as Insite offers an opportunity to conduct further research into the nature of drug addiction and the effectiveness of various interventions. John Strang and colleagues (2010) used the access provided by an SIF in the UK to compare the efficacy of supervised injectable heroin with injected methadone for reduction of street heroin use in addicts who had been on but were not responding to oral methadone treatment for over six months. In their landmark randomized controlled trial, Strang et al. introduced a laboratory technique for distinguishing between prescribed and street heroin, enabling them to measure their primary outcome of 50% or more weekly urinalysis samples over 26 weeks being negative for street heroin. They found that the group that use prescribed heroin was significantly less likely to use street heroin[1]; 72% compared to 27% in the oral methadone group achieved the primary outcome of being off street heroin for over half the study. The group prescribed heroin also was significantly more likely to abstain completely from street heroin.

The trial's results, which could only have been obtained through an SIF, controversially suggest that prescribing medicinal heroin might be a viable intervention to lessen use of illicit heroin and put addicts on the road to recovery. For the users, such an intervention might help them avoid "the all too common outcomes of untreated heroin addiction, including HIV infection or death from overdose" (Kerr, Montaner, & Wood, 2010). More research is needed before prescribed

1—Adjusted odds ratio with oral methadone, 8.17 (95% CI: 2.88–23.16). Adjusted odds ratio with injectable methadone, 4.57 (95% CI: 1.71–12.19).

heroin can become an accepted method of drug control, but the fact remains that the SIF, by allowing consistent access to the very group most directly affected by drugs, gives researchers a unique opportunity to develop interventions. At a time when governments are actively seeking novel approaches to drug control, the SIF is a powerful tool for constructing policy innovations.

Conclusion

The arguments against allowing interventions such as SIFs are not grounded in evidence. They are, instead, based on the mentality of the "War on Drugs," an ideology that has stigmatized and punished users even in its very language of a "war." One must ask why a government would attempt to oppose a policy intervention that has been shown to be effective at saving lives; the explanation is that governments advocate a punitive ideology that focuses on penalizing users rather than helping them. However, resistance to SIFs is disrespectful to the scientists who have generated the evidence in support of them and to the clinicians who wish to deliver the best care to their patients based on such evidence. It also interferes with the individual's right to life and security by denying him or her access to life-saving interventions that will improve his or her health. Canada, at least, has recognized the importance of evidence in preventing counterproductive policies. On September 30, 2011, The Supreme Court of Canada, in a unanimous 9-0 decision, ruled that putting a limit on access to the health services provided by Insite is not in accordance with the principles of fundamental justice. Closing Insite would be arbitrary regardless of which test for arbitrariness is used because it would undermine the very purposes of the CDSA [Controlled Drugs and Substances Act]—the protection of health and public safety. It would be also extremely disproportionate: during its eight years of operation, Insite has saved lives with no discernable negative impact on the public safety or health objectives of Canada. The effect of denying the services of Insite to the population it serves and the correlative increase in the risk of death and disease to injection drug users is grossly disproportionate to any benefit that Canada might derive from presenting a uniform stance on the possession of narcotics (*Canada (Attorney General) v. PHS Community Services Society*, 2011). Insite will stay open.

While DTES and other similarly impoverished, dangerous communities in Canada will benefit from the health and safety improvements brought about by SIFs, the U.S. continues to lead the so-called "War on Drugs." One can easily imagine the benefits that SIFs would bring to inner-city neighborhoods across the United States, from New York to Chicago to Los Angeles. At the same time, it is hard to imagine a SIF opening in the United States, given the nature of the American political atmosphere. The legal struggle would be at least as protracted as it was in Canada. Yet Chief Justice McLaughlin, citing the well-known medical fact that drug addiction is a disease and not a choice (Leshner, 1997), also writes that "the morality of the activity the law regulates is irrelevant at the initial stage of determining whether the law engages a [section 7] right[2]" (*Canada (Attorney General) v. PHS Community Services Society*, 2011). That is, we should not let opinion get in the way of saving individuals' lives. Ideology should not interfere with health.

Introducing SIFs to the U.S. is by no means impossible. Leo Beletsky and colleagues (2008) describe in detail a variety of possible approaches towards legalization, concluding that it can succeed with "the necessary public health and political leadership." The results of doing so would go beyond the already significant benefits to the immediate communities of the SIFs. The adoption of interventions such as SIFs in the U.S. would signal a significant shift in ideology in the nation that is the command center of the "War on Drugs." Beletsky et al. (2008) note that "the possibility that evidence and advocacy can produce legal change" is promising for the "effort to minimize the harms of illegal drug use." A change in American policy would almost certainly echo across the world; the adoption of harm-reducing interventions such as SIFs would be a welcome endorsement of empirical evidence over ideology.

Bob Sun is also an Associate Editor for The Journal of Global Health.

2—Section 7 of the Canadian Charter of Rights and Freedoms reads, "Everyone has the right to life, liberty and security of the person and the right not to be deprived thereof except in accordance with the principles of fundamental justice."

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Sofia Melograno

Community Health Work and Diagnostic Mobile Software in Mobile Communities

Field Notes from Kono, Sierra Leone

Elizabeth Liu

Princeton University, Princeton, NJ, USA

Introduction

Wellbody Amputee Clinic lies on the outskirts of Koidu Town in Kono, Sierra Leone. It's been a decade since the end of Sierra Leone's devastating Civil War, but the infrastructure here—electricity, sanitation, education, healthcare—has yet to recover. Finda sits on a long bench with her feverish infant son on her lap, waiting for the only doctor at the clinic. There are more young women, old men and children from neighboring villages waiting beside her under the intense afternoon sun. They have come to the clinic because community health workers had visited their homes, performed a field diagnosis and referred them to the clinic for further testing and treatment.

However, there are many more people who do not seek help when they are ill. The Wellbody Clinic, which complements the Government-run hospital healthcare delivery system in the Kono District, focuses on primary care and community health work. Despite incentives at the clinic, such as free health care for pregnant women and children under five, many locals are reluctant to visit the clinic or the hospital. Some do not have the money to pay for check-ups and treatments. Others consider it a waste of time to take a day off from working in the fields and travel over long distances to the Government Hospital, only to be given no diagnosis or a single pill for their troubles. Still others fear the stigma of visiting a clinic and place their trust in superstitions or traditional healers in their own villages instead.

Classified by the U.N. as one of the least developed countries in the world, Sierra Leone's health statistics are also some of the worst. The infant mortality rate is 89 out of 1,000 live births, while 140 out of 1,000 children die before their fifth birthday. The maternal mortality rate stands at 857 per 100,000 births (SLDHS, 2009). In addition to prenatal and postnatal health issues, the leading causes of death in Sierra Leone are malaria, tuberculosis, pneumonia, anemia, nutritional deficiencies and now HIV/AIDS. Most deaths and illnesses in Sierra Leone are preventable and treatable.

The community health work Wellbody does in Kono is especially effective given that there is a shortage of trained physicians in Sierra Leone. According to the Sierra Leone Ministry of Health and Sanitation, there are only 75 medical officers in the country where 534 are needed, creating a gap of 459 medical professionals (2009). Even more troubling for a country with one of the highest infant mortality rates is that there is only one pediatrician in all of Sierra Leone, who incidentally works at Wellbody. With few monetary incentives for doctors to stay, most who graduate medical school leave the country to work in the U.S. or U.K. Since there are few social or political indications that this exodus of medical professions will be ending anytime soon, training more community health workers would simultaneously alleviate some of the burden on local doctors and nurses and increase the reach of health initiatives.

Goals and Objectives

I visited Wellbody with a team of four other undergraduate students to pilot a program that would train local Community Health Workers (CHWs) on diagnosing patients with the aid of smart phone technology. Employing CHWs not only creates jobs locally, but also helps ensure the sustainability of the project by helping locals help themselves. Our goal was three-pronged: (1) To keep a comprehensive health record and history of all inhabitants in the rural communities; (2) To screen for sick patients during home visits and to provide triage or one free referral to the clinic; (3) To follow-up on HIV, TB or malaria treatment management and side effects, as well as provide pre- and post-natal screenings. Additionally we would be providing standardization and accountability in the screening and follow-up process for CHWs when they did house visits. We used Sana, an open-source Android-based medical diagnostic and documentation platform, to design a smart phone logic that would be able to distill a diagnosis from a list of symptoms, thus emulating a doctor's decision-making process.

Prep Work: Training the Community Health Workers and Rewriting Software Protocols

After undergoing a community health training program with Dr. Mohamed Bailor Barrie, co-founder and director of Wellbody Alliance, which is modeled after Dr. Paul Farmer's Partners in Health, 11 CHWs were selected and hired by the clinic. Most of the CHWs hired had been traditional birth attendants or healers in their villages and were already trusted in their villages to dispense medical advice. Each CHW had an area of expertise, whether it was a disease specialty such as TB, or a geographical region they were familiar with. There was an even mix of men and women, and most were middle-aged adults, with the exception of a few young men. The clinic paid for their transportation to Kono's district capital (some were coming from as far away as a day's ride) and covered their meals during their training, with the promise of a steady salary at the end of the sessions. In contrast to UNICEF and some other NGOs in the region that maintain a policy of only supporting voluntary community health work, Wellbody views CHW salaries as necessary monetary incentives that increase the longevity of the program.

Although all the CHWs owned cell phones, most had never been exposed to smart phones with touch screens before. They only had a couple of days to familiarize themselves with the logistics of the phones and the health software protocols. Aside from some of the young men, who picked up the technology quickly, we had to start from the basics of teaching how to gently and lightly touch a screen, as well as how to scroll and type on the keyboard. Although all CHWs hired were proficient in English, due to our differences in accents and diction, we always had a clinic staff member translating our instructions into Krio, the local language. Among various teaching methods, we found hands-on demonstrations and role-playing to be the most effective. One particularly effective method involved splitting the CHWs into small groups after a powerpoint lecture, then verbally guiding the more tech-savvy ones through the testing protocols while others watched. When it came to their turn, not only would the non-tech-savvy CHWs have seen the process demonstrated multiple times, but there would also be a collaborative support group. This method generated a high level of engagement and initiative, since during breaks, many of the CHWs would take out a phone and practice on their own. At the end of the sessions, we also designed a picture-based training manual for the phones and software that the CHWs could refer to when they were making house visits without us.

Based on the input from the CHWs during these sessions, we worked closely with Dr. Barrie and a graduate fellow in computer science at Wellbody to tailor the software to our diagnostic purposes, and to adjust for socio-cultural sensitivities. The template for the software was quite straightforward: a CHW enters the patient's identification information (name, age, gender), uses the camera on the phone to take a picture of the patient and close-ups of any rashes or wounds, and checks off symptoms to reach a diagnosis. However, Sana's testing protocols and setup was targeted towards a locale with greater medical resources and urban infrastructure than the one we found ourselves in. Many of the hard-coded screens asked for addresses, phone numbers and birthdates, which were not applicable in Kono, since there were no house numbers or streets, few villagers had phones and only the year of birth was known. As a result, we spent a substantial amount of time re-writing protocols. We also recoded the software logic to use symptoms to come up with recommendations, such as testing in the field (i.e. perform a rapid diagnostic malaria test), administering treatment (i.e. give the first dose of ACT, emergency malaria treatment) or referring to a clinic for further testing. Since the interface needed to be easy for the CHWs to use, we translated the medical terms into Krio, the most widely spoken language in Sierra Leone. We also had to account for cultural and linguistic differences. For example, the question of "how many months ago," was a difficult concept to express in Krio. There was also a stigma surrounding HIV in Sierra Leone, where HIV is considered a death sentence and those who have HIV are ostracized. Under these circumstances, not knowing their own HIV status is preferred over the stigma of going to the clinic for tests. CHWs had to be discreet when asking HIV-related questions on sexual partners and condom usage, which was reflected in the code.

Field Testing: Results

We accompanied the CHWs into the field as they did home visits in four nearby communities, testing the HIV and malaria protocols only. There were two CHWs to one volunteer. On the first day we split up to Dorma Amputee Camp and Sinatown, where we brought malaria kits and screened everybody. But due to the overwhelming number of false positives with malaria, the cause of which will be addressed later, we ran out of malaria kits early on. Thus, in the days that followed, we revised our strategy: we selectively screened individuals that had noticeable symptoms and gave them paper referrals to the clinic.

Following the screening protocol recommendations, the CHWs used rapid malaria tests to confirm on average seven to eight patients (mostly young children) who were infected in each community. Since this was a pilot program that was partially aimed at the early detection of diseases, we were encouraged that 100 percent of our referred patients came to the clinic for further testing. The referral slips the CHWs gave patients, which included which illnesses they were being referred for, were useful to the doctors and nurses. They sped up the initial survey process since the patient's entire basic medical history and symptoms were already on record.

Field Testing: Implications

There were unexpected gains in training CHWs to use smart phones in these rural communities in the areas of accountability, maximizing use of medical staff and creating comprehensive records. Since CHWs were asked to document all home visits on the phones and keep detailed records, the CHWs could be held accountable for actually visiting the patients. Furthermore, with the tests recommended for each patient already on record, the clinic processing speed increased while the strain on clinic staff resources was mitigated. There were things, such as prescribing medication, which only doctors and medical professionals could do, but the CHWs could help take the blood pressure or perform a malaria test out in the field before the patient even visited the clinic. This alleviates the burden placed on the limited medical staff.

Lastly, the CHWs took the first steps toward generating comprehensive records with patient histories, which will eventually be compiled into an electronic medical database. Considering the staff's frustration with keeping consistent and comprehensive records in nothing more than flimsy notebooks, such a system will be greatly useful.

Challenges: Changing Attitudes and Limits on Power and Authority

One of the goals of our original project was to encourage people to seek out professional treatment when sick, and the phones as a diagnostic tool did bring a sense of legitimacy and excitement in visiting the clinic. But we had to ensure that we did not overwhelm the clinic staff with an excess number of unnecessary referrals, since consultation at the clinic was free. Therefore, one of the biggest problems we faced initially involved patients falsely claiming to have symptoms. Moreover, since the output from the algorithm was only as good as the data input given, there were many problems that arose from incorrect self-reporting by the patients to the CHWs.

We attributed this phenomenon to a number of possible reasons. There might have been a communication problem—many of the rural inhabitants spoke only Kono, the language of the Kono tribe in that district. As stated earlier, the concept of time, particularly in questions such as "how much time ago," was difficult to translate. Additionally, since we were visibly foreigners, we were confronted with the expectation of aid. The calls of "white man, white man!" as well as kids asking for money follow ed us wherever we went. We were seen as the white man handing out free referrals indiscriminately (ironically, there was not a single Caucasian male in our group). Nevertheless, the novelty of technology brought in by the "white man" can be harnessed to change villagers' mindsets towards going to the clinic.

To counter these obstacles, we suggested CHWs to actively use their hands-on first aid training, such as feeling for fevers, and clarifying that mild symptoms were not just a result of the normal tear and wear of working in the fields. Two successful methods for obtaining accurate information were to ask follow-up questions and to build rapport when asking sensitive questions. One of the younger CHWs found it useful to ask, in a more joking, off-hand manner, about the number of boyfriends and girlfriends one had, during the HIV testing protocol. Another CHW took on the role of a matronly protector to gain a young girl's confidence in finding out more about condom use.

Since CHWs are not doctors, one issue we tackled was preventing the intentional or unintentional misuse of power. Unveiling ceremonies were performed in each community to introduce the CHWs as a trained authority in triage and referrals. This also served to set the limits of what CHWs can and cannot do. When initiating dialogue in screening, the language used is always centered around "helping"—and never "curing " or "treating"—the person being screened, because the latter is the domain of doctors.

Since cellphones were seen as a wealth and status symbol, CHWs and patients could have attributed a false sense of authority to them. Seen as a coveted personal item, many cellphones had elaborate phone covers, and some youths even carried around fake iPhones as mere showpieces. On one hand, this generated excitement and enthusiasm for clinic visits referred by a smartphone. On the other hand, technical or human errors that occurred in the field could have been amplified by placing blind trust in the phones. We discovered a need to place more emphasis on the human component in CHW use of the technology.

Sustainability and Future of the Project

In order to ensure the sustainability of our project, the security of the phones was crucial. Due to the prestige that comes with phone ownership and the financial gains of selling phones on the black market, we needed a system to ensure that the phones did not get stolen. To deter people from stealing the phones, we also used only phones that were incompatible for use with African SIM cards. Anti-theft strategy is still an aspect of the project that we are working on.

There are still issues with bringing smartphones into such an infrastructure-poor country, but the clinic has its own electrical generators, which was ideal for phone charging. Although power surges are common, surge protectors and other devices protect the phones.

In addition to integrating HIV, malaria and TB screening for reaching sick patients in rural communities early, we also plan on implementing a treatment follow-up protocol especially for treatments that consist of pill regimens that last for multiple months (TB) or treatments that have potential side effects (HIV). Additionally, due to the high rate of maternal mortality, prenatal and postnatal screenings will be added.

Currently, an electronic record system is being created at the clinic, which can be linked to our smartphones to upload patient histories from house visits. There is potential for GPS and cellular data usage in the future, since even in remote areas, newly built cell towers are everywhere. The running joke was that reception in rural Sierra Leone is better than it is in the U.S. Activating cellular data would allow for immediate doctor feedback and consultations; this is certainly a direction that this project may eventually take.

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Health Care in Mongolia

Field Notes from *Batnorov*

Ga Hye (Caroline) Kim

Princeton University, Princeton, NJ, USA

Introduction

Once familiar to me only as the birth land of the great Genghis Khan (and as a place where babies learn to ride horses before they walk), Mongolia struck me with a kind of surreal beauty. Tall, dry grass covered the expansive plains that steeped into gently rolling hills. Overhead, cartoon-shaped clouds bobbed along peacefully, hanging so low it seemed that if I reached out my hand and jumped, I could touch them. Spread out on the plains like drops of paint were flimsy wooden houses and *gehrs*, the traditional lodging of Mongolians. The scenery was so picturesque that when I first arrived in Batnorov this past August, I almost forgot why I had come to Mongolia in the first place.

I was accompanying the Korean Open Doctors Society as a student volunteer on their annual trip to Mongolia. Korean Open Doctors Society is a secular, non-governmental organization committed to providing health care both in Korea and abroad. Since its modest inception in 1997, the humanitarian-based organization has made over 140 international and countless domestic medical aid trips. Although its countries of target are numerous, Open Doctors has a special connection to Mongolia in that the organization first started from an informal volunteer trip made to Mongolia by its founding members. Since then, they have returned every year—often more than once to different parts of the country—and have built a strong connection with the local population. This particular trip to the Batnorov district was their 25th Mongolian mission.

In a village of dirt roads and no running water, where the grandest building resembled a run-down convenience store from rural Alabama in the 1940s, there was one structure that was rather sturdy and seemingly permanent—the Batnorov *sum* Hospital. Set off from the rest of the village by white fences and topped with a bright cherry red roof, the hospital stood towering over all other buildings (although "towering" is a relative term–it only had two floors). The interior of the hospital was even more impressive: clean, white floors with freshly painted walls and fluorescent ceiling lights that screamed "STERILE." However, the impressive exterior belied the truth, for the hospital was barren—quite literally, empty. No beds, no equipment, no furniture, not even a medicine cabinet.

The Batnorov *sum* Hospital is not very different from other hospitals in poor *sums* (translated as rural districts in Mongolian). A *sum* is the second level administrative subdivision of Mongolia after *aimag*, the first level division. The nation of Mongolia is divided into 21 *aimags,* which are subsequently divided into 329 *sums*. A *sum* has 4,200 km^2 of territory on average and is home to about 5000 inhabitants, mostly nomadic herders.

Since the discontinuation of aid from the former Soviet Union in the 1990s, a lack of funding has resulted in a shortage of medical supplies, fuel and other resources in Mongolia (Manaseki, 1993). However, as the edifice of the Batnorov hospital suggests, Mongolia should in no way be simply written off as another destitute Third World country. Being a centrally-planned economy that was suddenly plunged into a market economy without guidance, Mongolia has struggled with complex issues of "Soviet-ized" health care infrastructure and is currently still in transition.

History of Health Care in Mongolia

After Genghis Khan's legendary Eurasian empire disintegrated in the 14th century, Mongolians gradually retreated to their original homeland, which closely coincides with the current national territory. They came under the rule of the neighboring Chinese in the 17th century. However, in 1920, the Russian Civil War spilled over the national border into Mongolia and subsequently drove out the Chinese forces that then occupied Ulanbaatar. This event catalyzed Mongolia's close alignment with the Soviet Union over the next 70 or so years, and with the USSR's help, Mongolia gained independence in 1921 and established the Mongolian People's Republic (Central Intelligence Agency [CIA], 2011).

Mongolia, as a communist nation, accepted public sector responsibility for the health of the nation's population at the time of its independence. Public health in Mongolia therefore saw its birth in the early 1920s, and after the launching of the first civil hospital in 1925, various specialized hospitals soon emerged. Provincial and rural facilities followed between 1925 and 1930. In the next ten years, Soviet medical care research and development teams were sent to Mongolia to provide medical services and guide the country in establishing a public health network. Such expeditions introduced Western medical knowledge extensively to the impoverished country (Korea Foundation for International Healthcare [KOFIH], 2011). Projects in the field of health care flourished, and by 1960, almost 25% of *sum* districts had medical facilities. In 1978, a national health law, designed to further improve the nationwide system of standardized services established between 1940 and 1960, was passed (Neupert, 1995). Under Soviet administrative support, this law provided the stepping stone for the current

referral health care system: the patient is referred from rural posts to *sum, inter-sum,* provincial and finally national hospitals (Neupert, 1995).

The advancement of Western medicine in Mongolia ran parallel with the decline of the practice of traditional Mongolian medicine. As the country became more Westernized, traditional medicine was inevitably rejected as part of the pre-modern past. Until 1921, traditional Buddhist-Tibetan medicine had been the sole basis for health care. The indigenous traditional medicine had been incorporated under the overarching framework of Tibetan Buddhism and was mainly practiced by Buddhist monks. Thus, it met its end when Stalinist purges of Mongolian religions took place in the 1930s (Baabar, 1999).

The socialist regime was entirely responsible for the country's health budget and directly provided public health service, leading to a centralized, bureaucratic public health sector (KOFIH, 2011). More importantly, the Soviet Union made an indispensable financial contribution to Mongolia's health care (Soviet assistance at its height was one-third of Mongolia's GDP). The USSR's decline in 1990 resulted in an abrupt cessation of financial assistance, and Mongolia was thrown into a deep and long economic recession over the next decade, under which the health sector suffered. After the break from the Soviet Union, Mongolia turned abruptly toward a free-market economy and extensive privatization. The country continues to struggle as a result of this sudden change from a formerly state-run economy (CIA, 2011).

The hospital was barren: quite literally, empty. No beds, no equipment, no furniture, not even the common home-remedy medicine cabinet.

The Current Situation

There are two issues at hand with the current Mongolian health care system: a lack of funding and marginal preventive medicine. While the USSR provided aid, Mongolia never reached a level of socioeconomic development high enough to sustain a health care system modeled after those of modern Western countries (Neupert, 1995). Although not hopelessly destitute, Mongolia remains far from standing on its own feet. According to the Organization for Economic Co-operation and Development (OECD), Mongolia is one of the countries receiving official development assistance (OECD, 2011). With a GDP per capita of $3,522 (2009), Mongolia is classified as a Lower Middle Income Country/Territory. Its total expenditure on health was 4.7% of GDP as of 2009, compared to the United States' 16.2% (World Health Organization, 2009). As the United States' GDP per capita equaled $45,989 (2009), roughly 13 times that of Mongolia, it is quite easy to see that the health care available to Mongolians is incomparable to what we take for granted.

To make matters worse, the abrupt induction into capitalism in 1990 meant that the health sector became market-based as well. Health care service previously available to Mongolian citizens—all expenses paid by the government—has become, in large part, "off limits" to the poor. The few resources Mongolian hospitals do manage to procure, such as drugs, equipment, ambulances, instruments and personnel, are accessible only to those with the means to pay for them, and, oftentimes, "unofficially" to the hospital faculty (KOFIH, 2011). The country's health system continues to struggle with structural transformations necessitated by the policies and realities of a capitalist economy (O'Rourke & Hindle, 2001).

Another issue is that the current health delivery system emphasizes clinical treatment but significantly neglects preventive medicine. As mentioned above, the Mongolian system is fundamentally rooted in the Soviet model, and while Soviet influence has had a largely positive impact in centralizing and modernizing the system, its major shortcoming—the neglect of preventive medicine—has also carried over. In fact, the concept of preventive medicine has not firmly settled into public awareness (KOFIH, 2011). The dominant preventive medical approach adopted in modern Mongolia has been mandatory examinations by mobile medical teams. This medical "policing" system, which imposes health care on the population, has hindered public awareness of the fact that health care is a responsibility that applies at the individual and community level. As a consequence, primary health care initiatives including "hygiene and nutrition education [and] improvement of local sanitation and environments" have historically been underdeveloped (McMurray & Smith, 2001). Today, although some basic interventions such as vaccinations are carried out, campaigns or programs to expand the population's overall knowledge in primary care are severely deficient and inadequate.

Furthermore, with the loss of traditional medicine in the 1930s, Mongolia eradicated two thousand years' worth of accumulated self-care knowledge. Traditional Mongolian medicine centers on a biopsychosocial balance, which fosters self-care and helps keep ailments at bay through changes in behavior and lifestyle in conjunction with herbal infusions and other treatments. Although Western society has questioned the scientific basis of some aspects of indigenous medicine (e.g. religious prayers and rituals), preventive traditional medicine is authentic to the extent that practitioners instill appropriate long-term behavior patterns in response to compromising environmental factors. For instance, people with obsessive personalities who tend to be restless and thin are "generally taught to avoid running, exposure and distracting stimuli, especially in cold, clear and dry seasons or climates, because these make them prone to disorders…like arthritis or insomnia" (Loizzo et al., 2009). It is thus probable that a public health care model structurally lacking in preventive medicine coupled with the loss of traditional self-care knowledge may have increased Mongolians' susceptibility to illnesses (Neupert, 1995).

Batnorov

My observations will perhaps elucidate the stark reality of health care in Mongolia., although they are only a snapshot of the myriad challenges that the country currently faces. During our five days in Batnorov, an average of 430 locals per day came to be examined and treated. Many traveled from distant villages, and fights broke out among villagers pushing each

other to obtain patient number tags. For many of them, the annual or biannual trips the Korean Open Doctors Society made were their only exposure to proper modern medicine.

Villagers came from far and wide to have their immediate injuries and aches cured, but an observation of their diet, lifestyle and housing showed that any treatment would provide only temporary relief; most villagers had neither the concept of nor the access to basic natural resources needed for healthy nutrition and hygiene. The dry climate and terrain contribute to the lack of vegetation in the villages; thus, vegetables and fruits are extremely limited in the daily diet. Instead, a typical diet consists of red meat, animal fat and dairy products. As for personal hygiene, locals live in communal outhouses (often just one for many families) and toilets are fashioned simply from wooden planks placed side-by-side with a gap in the middle over a deep hole. The arid climate brings little rain, and the lack of plumbing means that most locals have no running water. Washing frequently, or even regularly, is not an affordable option.

The Future

Mongolia faces a difficult challenge in improving its medical system. Overall, the country is economically underdeveloped, which limits resources and the ability to provide quality medical services and coverage to the poor. The low socioeconomic status also makes it difficult for the country to solidify its health care infrastructure. These financial problems are long-term issues that Mongolian officials must address. Although these problems are extremely pervasive, there are short-term goals that can be met.

The second issue may have a more achievable short-term solution: the limited-to-nonexistent knowledge of the Mongolian population regarding preventive and promotional health. This problem can be alleviated by simple efforts to increase public awareness. While attempting to reform the larger health care system, a revival of traditional medicine should also be incorporated as part of a broader effort to entrench preventive care into the Mongolian health care system. Such projects are in progress. For example, in 2004, the Nippon Method was implemented in Mongolia, the purpose of which was to enhance primary health care. The project supplied participating families with a family pharmacy kit of traditional medicines and gave an accompanying health education. The Mongolian people and physicians who had forgotten the use of traditional medicines were trained via broadcast on national television, which also proved to be an effective general health promotion strategy. The results showed that 64% of the participants noticed a general improvement in their health, and an increased understanding and use of traditional medicine enhanced the confidence of Mongolian physicians (WHO, 2007).

Traditional medicine, which actually only began to be revitalized in the 1990s after the break from the Soviet Union, represents not only a wealth of self-care knowledge but also a wealth of Mongolian culture. Its foundation in Tibetan Buddhism has ensured a firm place in the cultural realm, and its incorporation into public health care would benefit the country both in terms of optimal use of available resources and in preserving its national identity. In moving forward, global health experts should focus on improving Mongolians' quality of life by disseminating modern Western medical practices. However, in doing so, they should pay careful attention to respecting and reemphasizing the traditional culture.

The image of the Batnorov *sum* hospital serves as a symbol for the critical issues at hand. Initially built during the time of Soviet aid, its aim was to provide continuing Western medical care to the locals. However, a severe lack of funding following Soviet decline left its medical faculty with bare minimum supplies and resources. The excessively high number of patients with festering sores, illnesses and cavities that could have been moderated by basic self-care suggests a lack of preventive medicine—or at the very least, a lack of public health awareness.

Health care service previously available to Mongolian citizens had become "off limits" to the poor.

Watching the most beautiful sunrise over endless plains of gold from the hospital and turning around only to come face-to-face with twiglike, thinly clothed children smiling at me with blackened teeth was tragically ironic to the point of physical agony. I hope and pray that in the near future, those same children will be relieved of all their pain and be granted the physical and psychological health that would allow them to appreciate simple things like the sun rising over their village.

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"Are You Incapable of Complexity?"

Field Notes from a Slum in Northern India

Raamis Khwaja

Southern Methodist University, Dallas, TX, USA

Introduction

In July, 2011, I went to Aligarh, India, a town of 3,673,849 people about 80 miles southeast of the capital, New Delhi. I had the idea of starting a vaccination program in a slum called Jeevangarh. Soon after my arrival, my ambitious plans quickly gave way to confusion and cold disappointment. Having lived the first eight years of my life in Aligarh, I had thought that I understood both the slum culture and the nature of the problems confronting it. The reality proved much more complex.

As I walked through the slum, I remembered a quotation from *Mountains Beyond Mountains*, a biography written by Tracy Kidder about Dr. Paul Farmer. Kidder describes an incident where a Haitian woman confronts Dr. Paul Farmer and asks, "Honey, are you incapable of complexity?" I too went to Aligarh with an oversimplified idea of how to achieve my goals, believing I could organize a vaccination drive that would allow me to gather data about the prevalence of disease, document the role of water in occurrence of disease and raise awareness among the people of the slum about hygienic living practices.

My uncle, an associate professor at the Medical College in Aligarh, related how illness flares up in months during and following the monsoons (June, July, August, and September). For these months, the emergency wards overflow and have to accommodate twice the number of patients. Monsoons facilitate water contamination and spread of disease, allowing malaria, cholera and dengue fever to be contracted in large numbers. For example, the number of patients in the emergency ward of the Aligarh Medical College in the month of July is approximately 3,400 as compared to 7,600 in September .

In addition to speaking with my uncle, I collaborated closely with the principal of a small, 1,000 square foot school located in the heart of the slum. Having worked in the same school before, I was able to interact with the students and learn from their unique stories. During my stay, I kept field notes documenting interviews with the children and the principal of the school. I also drew diagrams of water pipelines and hand pumps in the slum.

Diary Observations

Naseem, my grandfather's driver, warned me that the car could not take me inside the slum. The streets were simply too narrow, and much of the remaining space was taken up by wooden cots placed outside shanty homes. There were also roaming pigs, roosters, stray dogs and trash. Sure enough, Naseem parked the car by a small clearing blocked off by a broken brick wall on one side, and motioned to a dirt path that led to the slum. I climbed out of the car with my journal and pen.

I could see no visible changes from last year's visit as I made my way around puddles that had formed from the previous night's rain. Sewage flowed in open canals along both sides of the street, and small children wearing short colored knickers ran and shouted at each other. The stench of human feces began to fill my nostrils, along with the smell of swine, cow manure and other garbage. My sensibilities protested at every step. However out of place I may have felt, no-one stopped to watch me walk past. Middle-aged men sat in clusters talking excitedly around a single wooden cot as women in colorful saris poured water from a hand pump.

As we neared the school, I saw a group of nine and ten year olds playing cricket with bricks and a makeshift wooden bat. The ball often went inside the sewage, followed by a collective groan from the children. One person would dig around with his hands, fetch the ball out, and they would begin playing again.

I finally arrived at the school—the main portion was simply an open space with stone flooring and a makeshift tin roof. On one side there are 3 adjunct rooms—one for the principal, one for the smallest children and one for the students who had left the school but still came back to lend a hand or work on their homework.

Interview with the Principal of the Slum School, Mr. Shoaib Khan

"Raamis," he said warmly as he appeared at the door to his small office. We hugged.

[For the sake of convenience, the conversation is translated from Hindi.]

Me: "How are you?"

Mr. Khan: "I am perfectly fine, and how are you?"

Me: "I'm doing very well, though the temperature is unbearably hot, and it has been extremely humid over the past few days. But what has really bothered me is that every time I come, the situation seems to worsen. Last year, when the slum school shifted to this new building, I had hoped that the condition of the slum would slowly improve. However, the living conditions are just the same…the sewage water still floods the slum every monsoon season, the streets are too narrow for anything except

a bicycle. After all this time and correspondence, I feel like I have done nothing practical—I, I just don't see any concrete changes."

Mr. Khan: "You must realize that these things cannot happen so quickly. Progress is being made. When you shipped supplies here last year, it was a big lift for the students. We have more students now compared to last year, and if you look at the condition of the school, we have a larger square footage."

Me: "But even then, there is a huge dump of trash right across the school. It was not there last year. I'm not just talking about the school. My biggest hope, the reason why we are working here, is so that we can improve the conditions in the slum. The improvements in the school have to translate to improvements in the slum."

Mr. Khan: "Of course. But there is a methodology to this. What are you suggesting?"

Me: "I'm suggesting that we must make practical changes before I leave. I want to do a vaccination drive for the students. I want to set up trash bins across the slum with signs. I want every student to have a basic hygienic checkup every other week. Most of all, how can people live like this, and not be bothered? On my walk here, I seemed to be the only one bothered that there were dirty pigs everywhere, roosters all over my feet, trash at every walking step, stench from the sewage…Are these not areas in which we can make immediate changes? I know that I don't have medical expertise; I didn't come here to provide that. I simply wanted to research the basic causes of disease in this area, and one doesn't have to look far. I just saw some children playing cricket and digging the ball out of the sewage. People drink from government pipelines that run barely an inch above the sewage and are often cracked. Just to enter a shanty, one has to jump over the sewage."

Mr. Khan: "Listen. Your ideas cannot work like this. You are thinking at your level, like an outsider. First, you must understand the psychology of the slum. Let me tell you a story. Every few months, a government collector comes to inspect the area. For the most part, these inspectors are not bothered by the atrocious living conditions and don't perform their work satisfactorily. But every time they come, the people here clean the streets, they hide the trash, they put their best clothes on. Why? They are scared of the inspector, and they do not want to be interfered with. The moment he leaves, everything goes back to the way it is. The pigs come back on the street, the trash is thrown carelessly again.

The truth is that change is exotic…here, it just isn't common. You can put trash cans out if you want, but a month later, the slum will look as it did ten years ago, just with even more people. Your grandfather lives in one of the most educated areas in the city. Even there, trash is all over the place. I visit him, and I see trash all around the can and very little inside. People just toss it in that direction. So you see, the mentality is the problem. It is a sad truth to face here, and you have to go by that. I can understand your outrage.

Tell me one thing—why do people in other parts of the world keep order? Either they have a desire to keep clean and tidy, or they are pushed to do so by the law or someone else. That is the point. How do you bring that to the slum? I have already given you the example of the government inspector. There is no one here to instill fear into the people living in the slum. How will you scare them—no one is watching, and very few people outside care. This is a university town, and do you know how many professors or courses have tried to help the children in the slum besides your grandfather? The society here is different.

Thus, the only thing you can do is the alternative—create a desire within the slum community to change, to live in better conditions. But you have seen the apathy, the lack of interest in these matters. The people have literally adapted to this mode of living, and you talking to them or putting up trash cans will do nothing."

Me: "But you have given me no choice. How and what am I supposed to do then? Let me try at least to do the vaccination drive—that will be the biggest concrete change I can make, and maybe it will inspire the students to take their health and hygiene more seriously."

Mr. Khan: "Oh no, no no no no no. The vaccination drive cannot happen. The people here do not trust it. A few years ago, polio drops were distributed to a few children and one girl developed polio. Since then, there has been distrust, and no matter what your position is, it cannot happen. Why would the people even come? Raamis, I have to warn you about this step. Among the distrust, among the nature of the people here, you will not be able to accomplish much with a vaccination drive. It is not the method to bring about change."

Me: "My worst fear is that I will leave here and accomplish nothing concrete. I came here this summer with the promise of researching in order to find solutions. Where are the solutions? You have worked here for several years as a teacher, an administrator. Surely, there is a pattern that you have seen? How can the people of the slum be made to realize their precarious health situation? The very water here is contaminated."

Mr. Khan: "As I told you, the school is your answer. Once again, if you cannot scare the people here into action, you must inspire them or create a desire in them to change. But this is a matter of generations. The adults here will be deaf to your message. They have lived out their time here and slaved away in penal jobs. But their children—there is a future for their children. You saw the conditions right outside the school. See here—the floors are clean, the students sit on rugs, they see the hand washing posters you brought last year every day. There are rules here—they must ask to go to the bathroom and wash their hands in the basin afterwards. They must speak in turn and learn how to dress. This is the most important point: we cultivate an inner desire in the students to be clean and maintain healthy practices. They stay here for five hours a day, six days a week. When they leave and go home, they notice the difference in conditions. They begin to notice the trash and become disturbed by it. It is a painstakingly slow process, but it is the best way. Use the school to create a desire within the students to improve their habits. Then, when they go home, they will make the changes inside the house. After you leave here, go inspect the houses of the students who do attend the school, and then inspect the houses of those children who do not. You will see what I mean. The best way you can help is to be here, and beyond that, craft your ideas to help this process."

Commentary

Mr. Khan stressed one important point again and again—that a certain mentality can be so deeply entrenched in the roots of society that goals have to be modified and restructured to accommodate patterns of thought, behavior and culture. In the context of his advice, the issues at hand became even more pressing. The administering of oral polio drops resulted in one

girl later developing polio. Medically speaking, there are a number of possible reasons for how this could have happened. For one, existing viral stomach infections can interfere with the replication of the attenuated vaccine. This is a cause for concern in slum areas because water contamination is rampant. Thus, booster doses are often required, but in some instances, 20% of people fail to return for these doses. Beyond a simple public health intervention, the children needed to be educated in an effective way that counteract years of adaption to the slum. Thus, in place of the vaccination drive, focusing on everyday sanitation practices, effects of living conditions on the health of children and health literacy education became the immediate goal.

Effect of the Conditions in the Slum on Children

One of my first observations was that the children were well adapted to the living conditions in the slum, making them extremely resourceful and street smart. Students who went to the slum school would find the nearest street light from their houses, sit underneath and study on the ground because there was no electricity inside their homes. On the flip side, the ability to adapt to circumstances fostered an attitude of apathy. Children in the slum would take small buckets and bathe near hand pumps in open view of the public, or think nothing of jumping into puddles that were mixed with sewage. Walking around naked was a common practice, as was jumping over sewage to enter homes and small shops. This is not a new phenomenon—becoming adapted to living conditions is nothing shocking. What is shocking is how the very process of becoming adapted has caused children to stop questioning their living conditions. No-one is disgusted by periodic sewage floods in the monsoon season; few are bothered by the 14-hour electricity cuts (or the lack of electricity altogether), the piles and piles of garbage occupying every free space or the stray dogs and pigs roaming freely. In one embarrassing instance, I watched five or six mosquitoes buzzing around a child during the evening hours and ran over to wave them off. The child didn't question my act but also didn't understand the need.

This mentality of adaptation is what the principal highlighted in the interview. Any form of concrete change hinged on the ability of the students to internalize, apply and promote healthy sanitation practices based on their own initiative. As a possible means of conveying important health literacy topics in a visual, tangible sense, I made six or seven colorful posters with illustrations and a small amount of text at the bottom. The posters featured a broad scope of topics—everything from "Cleanliness is Godliness" to why it is important not to play near animals to how water and mosquitoes are vectors of harmful diseases. Undoubtedly, drawing pictures of the causes and effects of certain diseases brought about a change. The students began to internalize the meaning behind the posters, and even the smaller children, passive up untill now, gathered around the posters to see what the pictures meant.

In one case, a group of seven-year-old girls walked over to the "Cover Your Cough!" poster and began putting their arms up to their mouths and making coughing noises. At first, they began to giggle and even went around taking turns practicing the "1-2-3!" step process on the poster. One girl beamed her face up at me and put her arm up again to her mouth. "Do you know why we do this?" I asked, smiling. They fell somewhat silent and waited for me to answer. "So that we do not cough on each other and let dirty little germs go from one person to another." The children listened carefully, trying to learn not just what practices are hygienic but the reason behind each. To promote health, health literacy must be promoted first, and that is why starting any sort of public health effort in the slum with a vaccination program would have failed.

My Experiences with the Students

There is much to learn from the perspective of the students—their insight is the best way to gauge immediate and long-term problems. Two students I spoke to (their names will be arbitrarily referred to as Zara and Sahil, respectively) conveyed how much they cherished learning, yet at the same time, faced personal and family-related struggles.

Me: "Do you think your time at this school is what made you realize how important education is?" Zara's eyes became animated, and I could feel the passion behind her words.

Zara: "I have always dreamed about studying! I am lucky enough to have a mother who wants me to grow and live a better life than she could provide me with. Not all the parents here are like that. Many are happy in their conditions and see no reason to change. But I love learning! I love to read good books and see how different the world can be from the way in which I live. By coming here, I realized there are so many other students who want to learn just as much I do. I am trying to teach my younger brother why education at his early age is so important—why he should appreciate the school, the work and the learning."

I asked Sahil a few days later, "How has the transition been from studying here to a mainstream school?"

Sahil: "I am enjoying my chance to learn, but the transition has been difficult. Homework is a problem because my parents cannot help me with it, and I have no one else to go to, except come here. Usually, I come here in the evenings to do my homework and help my parents work in the afternoons after I come back from school."

Me: "How difficult is it to live in the slum and what sorts of challenges do you currently face?"

Sahil: "My family came here as refugees from another state [Bihar] when our house was destroyed there. Sometime later, my father abandoned the family, and it was up to me and my mother to care for my siblings. I had never known anything different until I began to come to the school. Our conditions are hard—we have little food on many days, we have to conserve water, we have no money to afford the rich schools and wear uniforms."

Zara highlighted how important it was to cultivate a passion for learning among the children. She mentioned how reading books and learning in school had given her a vision of exactly how life could be better than the slums. Illustrating that picture for the younger students would help create that inner desire Mr. Khan had stressed in his interview.

Sahil, on the other hand, imparted a sense of how real certain challenges are in the slum. Many children have unsupportive parents, or parents who simply do not see the need for an education. He spoke in practical terms and indicated that, despite what the school offered, other challenges remained. In essence, our conversation boiled down to one key point: sustainability. As one of the older students, he was beginning to deal with obstacles in mainstream schools: lack of family support, harder classes and more academic work. However, he also related a sense of camaraderie with other students his age, with whom he could study

together and share experiences. In the future, forming a strong network of older students in the slum who are going through similar challenges may be a possible way to offer sustainability.

It was heartwarming to listen to Zara and Sahil's narratives, heartwarming to hear two students speak about their change in mentality. Zara's little brother, however, was inordinately bashful—the more I tried to coax him to talk with me, the harder he clung to his sister. Part natural shyness, part uncertainty at what my purpose was, the smaller children in general were more hesitant to interact with me. Mr. Khan suggested addressing the younger and older students together. The presence of the older students would put the smaller children at ease and let them see my role as an observer, friend and helper. His advice worked. At first, I had the older students sit with me facing the smaller children and had each one hold a poster. All of a sudden, the younger students pulled in more closely to see what their own older friends were doing. A few of them scrambled to the front excitedly, straining to get a better look. I requested one of the smaller children to come forward and read aloud what was written on the poster. The boy came forward and struggled to read, pausing, rolling the letters on his tongue and then reading again. For the first time, every single eye in the room was concentrated on him. He dictated the message to keen-eyed fellow students and smiling teachers—it was the ideal way to reach out to all of the smaller children, who were suddenly interested in seeing their own friend in front of them speaking about hygiene, health and sanitation.

Raamis Khwaja

Solutions, Reflections, Implications, Future Research

Simple, low-key measures are often the most effective in crafting solutions to fit the psychology of the slum. For example, I worked with the principal of the school to create a "health chart" that would be used to evaluate every student biweekly. The chart consists of the student's name on the left hand side and criteria such as "Combed Hair," "Brushed Teeth," "Cut Nails," "Signs of Illness" and "Stomach Pains." This will allow the teachers to instill a need for cleanliness and hygiene among the students, as well as identify students who are at a greater risk of illness.

The kinds of challenges faced since the beginning of the trip—drafting the health chart, foregoing the vaccination drive, trying to gauge the effectiveness of my interventions and the children's response and looking closely at water contamination—served as topics of discussion in the first health assembly. The health assemblies would be held once every week by a teacher or the principal, as a way to remind the students of effective hygienic practices, early recognition of sickness and careful attention to water contamination. It would be the first step to integrate health literacy into their school education. As one of the older students told me, "You can speak all day about hygiene, but if the smaller children do not hear the message consistently, they will forget it." I began telling the students that disease and illness could cause an interruption in their studies, or create problems for their families. In the long run, giving simple advice like not stepping on nails to avoid tetanus, washing hands frequently, not playing with pigs and roosters or jumping in dirty puddles may cause these lessons to become second nature. It was my last day at the slum, a point not lost on the children. They began to clap loudly, talk excitedly amongst each other and collectively said a loud "Thank You!" Several of the older students profusely thanked me for coming, for encouraging them and for promising to come back. I replied that this was our project, one that had to be sustained and one that could only improve as time went on and awareness grew. It was our moment of greatest trust, and in that moment, I asked every student to promise me to talk about what they learned at home, to share their lessons with parents, friends and siblings. "Don't be shy! Tell your friends why it is an unclean thing to play with a cricket ball that has been in the sewage." They nodded, and several of the more talkative and serious children promised to share as soon as they went home.

The latter emphasis on sharing lessons through word-of-mouth is my biggest hope for how health literacy can extend to children in the slum who do not attend the school. Though I did interact with these children occasionally, it was in light situations when they were outside running or playing on the street. In that context, I had no authority to impart the lessons about hygiene that I could inside the school.

The hope is that slowly, students will learn the basics of hygiene at the slum and create a difference in their households. If one household at a time can be made aware of the dangers certain health practices hold, the slum can continually improve. Perhaps most significantly, the long held mentality of apathy towards change can be reversed to foster an atmosphere of deep interest in health and sanitation.

My goal is that my interdisciplinary, qualitative approach will highlight key points for conducting research in slum areas and identify the need to implement short-term practices in order to influence long-term mentality.

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info@ghjournal.org
4039 Lerner Hall,
2920 Broadway
New York, NY 10027
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