Towards Effective Emerging Infectious Diseases Surveillance: Evidence from Kenya, Peru, Thailand, and the U.S.-Mexico Border

Sophal Ear, Ph.D.
U.S. Naval Postgraduate School

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For further information, please contact:

The Center on Contemporary Conflict
Naval Postgraduate School
1411 Cunningham Road
Monterey, CA 93943

ccc@nps.edu

or

OSRDInfo@dtra.mil

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EXECUTIVE SUMMARY

Subject Matter

This DTRA-sponsored research examines the political economy of emerging infectious disease (EID) surveillance programs; it also provides lessons learned for U.S. military medical research laboratories collaborating with developing countries. It is the third study in a series that began with a comparison of Indonesia, Cambodia, and the Naval Area Medical Research Unit 2 in the context of EID surveillance and viral sovereignty (published by the author as "Emerging Infectious Disease Surveillance in Southeast Asia: Cambodia, Indonesia, and the Naval Area Medical Research Unit 2," *Asian Security*, 8(2), (July 2012): 164-187). The second study compared Mexico's handling of H1N1 in 2009 with U.S. handling of H1N1 in 1976 (currently under revise and resubmit with *Politics and the Life Sciences*). This third report comprises four case studies: Kenya (U.S. Army Medical Research Unit-K or USAMRU-K), Peru (U.S. Naval Area Medical Research Unit-6 or NAMRU-6), Thailand (Armed Forces Research Institute of Medical Sciences or AFRIMS), and the U.S.-Mexico Border (Early Warning Infectious Disease Surveillance or EWIDS). It provides policy makers tools for improving the effectiveness of new or existing EID surveillance programs. Moreover, it offers host countries the opportunity to incorporate ideas, provide opinions, and debate the management of political and economic constraints facing their programs.

Methodology

Researchers set up fact-based interviews in a semi-structured format and gave interviewees a promise of confidentiality. For each case study, the author asked the subject matter experts qualitative questions about the state of diagnostic labs in their host country. The basic questions asked in each interview were: What infrastructure would be necessary to actualize effective EID surveillance in the host country (and other developing countries)? What would it take to have this infrastructure available in the host country (and other developing countries)? Within the host country (and other developing countries), what are the cultural, political, and economic challenges that would be encountered? Finally, are there any general lessons for developing countries based on lessons from the host country? Once the interviews were completed, each case study examined interview notes by assessing the overall relevance of a particular issue and analyzing the frequency with which that issue was mentioned across interviews.

Overall Findings

Case Study 1: Kenya

In the past three decades, there have been recurrent outbreaks of emerging infectious diseases in the East African Community (EAC) region. These outbreaks include Viral Hemorrhagic Fevers, Marburg fever, Ebola, and Rift Valley Fever. Clearly, EIDs are a great economic burden to any country. Besides the loss of human lives and animals, EIDs also have an adverse effect on cross-border trade, which depresses economic growth for the affected country and negatively affects the entire region. EIDs have further attracted the attention of health experts and policy makers in the region due to the recent increase in human and animal mobility following the signing of the EAC Common Market in 2010. As an example, the December 2006 - May 2007 Rift Valley Fever outbreak in Kenya, Tanzania, and Burundi cost more than 200 human lives and the lives of an unidentified number of wildlife and domestic animals. This outbreak, in turn, affected the region's beef industry. Kenya was chosen as a case study because it is the only other country in Africa besides Egypt that hosts a U.S. military medical research laboratory (USAMRU-K). Furthermore, Kenya is the economic leader of the five EAC Partner States (which also includes Uganda, Tanzania, Rwanda and Burundi) with over 40% of the EAC's GDP, so its ability to deal with EIDs has significant implications for the entire region.

The study uncovered a number of key challenges across political, economic, and cultural dimensions. Six major political challenges were apparent: political instability, decentralization, competition between state and non-state actors, bureaucracy, donor-driven research projects, and corruption. Four economic challenges emerged: inadequate funds, insufficient remuneration for civil servants, poor infrastructure, and rural-urban disparities. Finally, four key cultural challenges were identified: stigmatization, religious beliefs and reliance on traditional medicine, hostility towards minority groups, and protocol observation. Together, these challenges are daunting in their overall impact on EID surveillance in Kenya, but awareness of such challenges by USAMRU-K and other external actors will only help improve the effectiveness of their in-country work and their relationship with Kenya.

Case Study 2: Peru

Compared to the other countries in this report, Peru has strong international relationships, but struggles with overlapping functions between internal agencies; this occasionally limits cooperation, especially when programs overlap. For example, the government of Peru has three similarly functioning health institutions, which complicates efficient surveillance capacity. Health Experts are concerned that the Ministry of Health is doing the same task as the armed forces, wasting resources instead of using them to improve the state of diagnostic labs. NAMRU-6 puts a strong emphasis on publications (as part of its three P's: publications, products, and partnerships),

which may not align with what the host country desires (as was apparent with NAMRU-2 in Indonesia). Like a university environment, it's publish or perish.

Additionally, this case study uncovered limited surveillance capabilities in Peru, especially in rural areas. Although cultural diversity and educating locals are typical barriers that surveillance experts experience, decentralization exaggerates these factors: there is a notable lack of technical capacity and an absence of resources outside the capital city of Lima. The country does have a cadre of experienced health experts, but infrastructure and deficient conditions keeps them from realizing their potential. These frustrations have manifested themselves in strikes, where health officials argue that while military wages have risen, no efforts have gone towards increasing wages for doctors, public health officials, or epidemiologists. Consequently, Peru has lost many of its knowledgeable health experts to other countries that will pay them a better salary. By contrast, the Prime Minister of Cambodia banned the use of wage incentives in its civil service because the military (allegedly) could not share the same benefit, creating a poverty of equality instead.

Case Study 3: Thailand

This case study evaluates past efforts to manage emerging infectious diseases in Thailand and gives recommendations on ways in which the Ministry of Public Health, AFRIMS, and the U.S. CDC can improve future collaboration. Specifically, it focuses on the Thai government's 2003 decision to wait three months to announce that there was a Highly Pathogenic Avian Influenza outbreak. Thailand has significant resources, expertise, and capabilities, but the connection between regional and international networks is tenuous. The majority of interviewees said that overlapping missions, miscommunications, and mistrust in the international community were the typical impediments. These contributed to slow response times from Thai government regarding sudden outbreaks. This report recommends that international organizations (such as the World Health Organization) use their neutral status and resources to link regional and international networks and improve surveillance systems. Most importantly, it recommends that when creating new programs, the needs of the host country must be paramount.

Case Study 4: U.S.-Mexico Border

This case study was unique in that it looked at a regional system instead of a specific host country; it recommendations ways for U.S. policy makers and the U.S. military to be proactive and effective when providing funding and other resources to Mexico. The primary constraints mentioned in the report were: political insecurity and violence from drug cartels, which prohibited U.S. government officials in Texas and California from entering the country; difficulty transferring resources and reagents across borders; and poor laboratory capacity in most regions of Mexico. Mexico's strengths were technological knowhow, specifically its web-based platform, which allowed partners to share information and instantly receive outbreak notices. Although the majority of partners have—or are in the process of implementing their own—Declarations of

Cooperation (States are not allowed to enter into treaties per the U.S. Constitution), there is a debate on whether or not relationships will stay intact after EWIDS funding ends (already the case in all states except for California).

Conclusion

Each country faces unique political and economic challenges, but they all encountered similar communication problems; the source of these problems varied and were the result of agency shortcomings, structural deficiencies (decentralization), or international barriers. Moreover, most interviewees reported conflict between parties when civilian and military responsibilities overlapped. To improve communication between agencies, experts recommended assigning a local principal investigator to each project. This would increase the likelihood that host country priorities stay in focus. Furthermore, all case studies recommend developing a surveillance system in a way which allows locals to take ownership of the project. This approach is particularly important in certain Kenyan districts, because local experts are more proficient in managing cultural grievances and avoiding the conflict-ridden rural areas. More advanced developing countries, like Thailand, have extensive resources because they have already created a network of local individuals who are experts in effective surveillance and are committed to improving their country's capacity.

The Mexico study recommends using technology to build a community network, embedding cooperation into the surveillance system: If a high-profile health experts leaves, the remaining members can reconnect with new individuals through the web-based system. Peru, another relatively advanced developing country, has the technical capacity to have a web-based platform; however, it is legally limited in what it can share through NAMRU-6. Lastly, experts recommended using lessons learned from other countries—and from regions within the host country—to improve surveillance systems.

CASE STUDY 1: KENYA*

Introduction

In the East African Community (EAC) region, there have been recurrent outbreaks of emerging infectious diseases in the past three decades. These include Viral Hemorrhagic Fevers (such as a recent case of yellow fever in Uganda), Marburg fever, Ebola (in Uganda in July and August 2012, and in the Democratic Republic of the Congo in August and September 2012), and Rift Valley Fever (in Kenya in 2006/2007 and Tanzania and Burundi in 2007). The increasing mobility of humans and animals has put EID surveillance at the forefront for health experts and policy makers in the African region. Although the loss of animal and human lives is the primary concern, epidemics also have an adverse effect on cross-border trade. This is a clear detriment to economic growth and development for the affected country and for the entire region. For instance, the December 2006 - May 2007 Rift Valley Fever outbreak experienced in Kenya, Tanzania, and Burundi cost the lives of more than 200 humans and an unidentified number of wildlife and domestic animals in the region, which in turn affected the region's beef industry.[1] In fact, EID surveillance is so important to economic well-being that preventing and managing epidemics was a topic of conversation when signing the EAC Common Market in 2010.[2]

Kenya is an important player in EID surveillance because it is the only other country in Africa other than Egypt, which hosts the U.S. Naval Area Medical Research Unit 3, that hosts a U.S. military medical research laboratory (the United States Army Medical Research Unit-Kenya). Kenya is an interesting subject of investigation in the EAC region, because it is the most developed of the five EAC Partner States (Kenya, Uganda, Tanzania, Rwanda and Burundi); Kenya's ability—or inability—to deal with EIDs has profound implications for the entire EAC region.[3] This study looks at the roles played by international institutions (such as USAMRU-K) as well as local institutions in the surveillance of EIDs. It also reveals the major challenges—political, economic, and cultural—

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* Inputs to this case study were provided by Grace Njeri with backstop by Angela Archambault under the supervision of Sophal Ear.

[1] East African Community, "Regional Plan of Action for the Prevention and Control of Human and Animal Transboundary Diseases in East Africa: 2007-2012," 3.

[2] East African Common Market, "Common Market Protocol," 38. The EAC Common Market aims at, among other things, enhancing trade among the five member states by removing all barriers to trade and granting the region the four freedom of movement: movement of persons and workers, goods, capital and services. But of the five Partners States, Kenya is the most lenient and its borders the most porous.

[3] European Commission, "Generalized System of Preferences: Everything but Arms," 1. Whereas Kenya is categorized as a developing country, the other four EAC Partner States are categorized as least developed countries (LDCs).

faced by these institutions in their surveillance work. The results of this research are a tool to strengthen EID surveillance in Kenya; this should occur by establishing a collaborative approach between the Kenyan government and international players.

Background and Context

Kenya's Healthcare Sector in Brief

The majority of Kenyans are vulnerable to a wide range of diseases due to the country's unique geographical and climatic conditions. Located in the Horn of Africa region, Kenya has large chunks of arid and semi-arid lands, as well as malaria-prone regions along the coast and in the western provinces. Children are particularly at risk, with childhood illnesses resulting in high mortality rates that are easily preventable or controlled with a better-quality water supply and improved sanitation practices. Moreover, high levels of insecurity and frequent conflicts that are endemic to the region have transformed the country into a haven for refugees from Somalia, Sudan, and Ethiopia,[4] which puts the local population at further risk.[5]

Historically, the priority of the Kenyan government, through the Ministry of Health, was communicable diseases.[6] Nevertheless, the country recently experienced a high incidence of injuries and non-communicable diseases (NCDs) such as heart complications and diabetes (and the associated high mortality rates). In addition, tuberculosis (TB) resurfaced as a major cause of ill health, while Rift Valley Fever and cholera continued to burden Kenya's healthcare system. Although the country has undertaken significant efforts to reduce the prevalence of HIV over the past decade, the infection rate remains static.

Despite the enormous burdens on Kenya's healthcare sector, the government has made significant progress towards reducing mortality and morbidity rates. The government accomplished reductions with two concurrent programs: the Millennium Development Goals (MDGs) and the country's long-term development agenda, Vision 2030. The objective of these programs was "to provide an equitable and affordable healthcare system of the highest possible quality."[7] Moreover, the Kenyan government does not work alone in achieving its public health goals; there are many players in the country's healthcare sector, including faith-based organizations, non-governmental organizations (NGOs), the private sector, and international organizations. One such international organization is the United States Army Medical Research Unit–Kenya (USAMRU-K).

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[4] Society for International Development, "Greater Horn of Eastern Africa (GHEA) Outlook #25: Human trafficking in the GHEA," 7. As of September 2011, Kenya hosted more than 452,000 refugees, the majority of whom were of Somali origin, at Dadaab camp, the largest refugee camp in the region.

[5] Society for International Development, "Greater Horn of Eastern Africa," 3.

[6] Information obtained from Government Official 1 on 5/15/12 at 11AM in Nairobi, Kenya.

[7] Ministry of Medical Services (2008). *Reversing the trends: The second National Health Sector Strategic Plan of Kenya 2008-2012*.

USAMRU-K and Its Role in EID Surveillance

USAMRU-K, also known as the Walter Reed Project, was formed provisionally at the invitation of the Kenyan government in 1969; it was permanently established in 1973 with its headquarters in Nairobi. It is overseen by the Walter Reed Army Institute of Research (WRAIR) and is part of an international network of laboratories, including the U.S. component of the Armed Forces Research Institute of Medical Sciences in Thailand. It collaborates with key local and international institutions including: the MoPHS, the Ministry of Medical Services; the Kenya Medical Research Institute (KEMRI), USAMRU-K's official host; the U.S Agency for International Development (USAID); the Centers for Disease Control and Prevention (CDC); the World Health Organization, and many others.[8]

USAMRU-K includes the Narobi-based Department of Emerging Infectious Diseases (DEID) and a number of satellite surveillance sites across the country and the continent. DEID executes the Department of Defense Global Emerging Infections Surveillance and Response System (DoD GEIS). USAMRU-K DEID was established in 1998 through a cooperative arrangement with KEMRI, but the program has been expanded to other African countries such as Uganda, Tanzania and Cameroon. [9] The motivation for establishing DEID was to improve surveillance and outbreak response capacities in the majority of sub-Saharan African countries. Prior underreporting in these countries limited the detection of disease outbreaks. USAMRU-K DEID carries out research and surveillance in influenza, arbovirology, viral hemorrhagic fever, acute febrile illnesses, leishmaniasis, enteric diseases, sexually transmitted diseases, rodent borne viruses, health demographics, and malaria drug susceptibility.[10] The capability of DEID to conduct field research, predict outbreaks, and respond to pandemics is attributed to its robust surveillance network.

USAMRU-K also engages in extensive capacity building for local researchers and scientists in host countries to enhance disease surveillance and research infrastructure. For example, before 2006, Kenya lacked the laboratories and infrastructure for detecting influenza (or influenza-like illness). DEID assisted the Kenyan government by funding the National Influenza Center, which primarily conducts influenza surveillance. Since then, the program has grown and it now serves Somalia and the Seychelles islands.[11] USAMRU-K recognizes the need to gain trust by working closely with host governments; this trust enables effective surveillance and other research and related activities. To this end, the 2010 profile report stated, "in any community, wherever you go, you need the good will of the government to be able to operate."[12] A Kenyan government official reinforced this idea when he spoke about USAMRU-K's desire to work with the Ministry of Public

[8] USAMRU-Kenya, "USAMRU-K Mission."

[9] The institution is actually located within KEMRI's Nairobi campus.

[10] USAMRU-K-DEID, "Overview."

[11] Department of Emerging Infectious Diseases, "USAMRU-K: DEID 2010 Profile," 10.

[12] Department of Emerging Infectious Diseases, "USAMRU-K: DEID 2010 Profile," 43.

Health and Sanitation (MoPHS); "we felt we had a problem, USAMRU-K had the expertise to fix it, so we allowed them to participate in activities that are beneficial to our citizenry."[13]

Literature Review

Despite devoting huge resources towards EIDs, they continue to plague populations and encumber the public health system. The EID burden is especially concerning in developing countries that lack resources and capabilities. Many factors have contributed to the spread of EIDs including globalization, increased cross-border mobility, rural-urban migration (which leads to congestion in urban areas), poor nutrition, drug resistance, and population pressures resulting in settlement of rural or uninhabited areas.[14] These diseases are difficult to destroy and do not respect boundaries. The answer to the growing problems caused by EIDs is in active surveillance, which requires public health officials go into the field and gather data directly.[15] This method is more accurate and extensive, but it can be challenging to implement, because it is costly and time consuming.

The global community's response towards EIDs has always been to control, prevent, and treat diseases. However, detecting emerging outbreaks is difficult and time consuming because the international community is "dependent on local physicians to diagnose cases, on laboratories to isolate and serotype the organism, [and] on the notification systems to inform the state and federal agencies."[16] Despite strong international support (both in monetary and non-monetary terms), EID surveillance in developing countries remains substandard. A pandemic preparedness plan is needed to to address these gaps. There also must be a clear expectation that all participating organizations establish and uphold veterinary standards and international health regulations (IHR). Likewise, participating organizations should adopt a long-term commitment to the host country.[17] Other challenges affecting EID surveillance include under-developed surveillance capacity, the ill-functioning public health sector, and donor interference.

Underdeveloped Surveillance Capacity

According to Robbins, "Sixty percent of emerging infectious diseases that affect humans are zoonotic … and more than two-thirds of those originate in wildlife."[18] In the book, *The Viral Storm: The Dawn of a New Pandemic Age,* Wolfe recommends that deadly animal viruses are hunted by creating a "system focused on small set of sentinels, key populations that would allow us to monitor

[13] Ibid.

[14] Kombe and Darrow. "Revisiting emerging infectious diseases: The unfinished agenda," 113-122.

[15] United States General Accounting Office, "Emerging Infectious Diseases: National Surveillance System Could be Strengthened," 3.

[16] Broome, "Effective Global Responses to Emerging Infectious Diseases," 358.

[17] Australian Government, "Pandemics and Emerging Infectious Disease Framework," 8.

[18] Reports estimate as high as 80% of the human pathogens have zoonotic origin.

viral chatter with the resources we currently have."[19] While information gathering is important, obtaining specimens in remote locations is logistically problematic and makes identification difficult. Locating livestock, determining quality of living conditions, and identifying areas that are ecologically changing are all useful to improving EID surveillance systems.[20] A report "found a 99 percent correlation between country levels of protein-energy malnutrition and the burden of zoonosis."[21] In other words, if individuals can barely provide medical care for themselves, there is a good chance that the numbers of sick livestock are under reported.

Moreover, the capacity for animal surveillance in many developing countries has been low due to lack of specific government policies and legal frameworks, poor financial and non-financial resources, weak reporting systems, and insufficient cooperation between animal and human public health. In China, for instance, the majority of the clinical laboratories do not provide timely and high-quality microbiology services due to the lack of skilled laboratory technicians and testing supplies.[22] The status of laboratories in the East African region is equally poor. At the district level, they are only capable of carrying out slide examination of malaria, tuberculosis, general blood tests and routine urine and stool analysis. One study looked at 4,000 health facilities in Kenya and found that public health venues had a 54% reporting rate.[23] This outcome is a crucial for animal surveillance, particularly laboratory networking and communication, which remain poor in the majority of developing areas.

Murphy suggests that health experts should alter their strategy and "involve more of a field and laboratory research enterprise than [traditional] surveillance and reference diagnosis enterprise."[24] In his opinion, it would make systems more adaptable so countries could adjust conditions if necessary. In another review, experts from universities and research centers in California recommend looking at historical data to fully understand the pathogen cycle through a process called origins initiative. In their opinion, studying a more diverse group of species would help surveillance, because it would provide a "better understanding of how diseases have emerged; new laboratory models for studying public health threats; and perhaps clues that could aid in predictions of future disease threats."[25]

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[19] Wolfe, *The Viral Storm: The Dawn of a New Pandemic Age*, 181.

[20] Robbins, "The Ecology of Disease," 1.

[21] MacMillan, "New ILRI study maps hotspots of human-animal infectious diseases and emerging disease outbreaks," 1.

[22] Feng and Varma, "Gaps remain in China's ability to detect emerging infectious diseases despite advances since the onset of SARS and Avian flu," 127-135.

[23] CORE Group, "Rapid Qualitative Assessment of the Malaria Control Environment in Kenya," 12.

[24] Murphy, "Emerging Zoonoses," 435.

[25] Wolfe et al., "Origins of Major Human Infectious Diseases," 283.

Ill-Functioning Public Health Sector

Some challenges facing the public health sector in developing countries include low ratios of healthcare professionals to patients, inadequate healthcare facilities, low public sector remuneration, and lack of accessibility to facilities. These challenges make it difficult for the government to address the population's needs. Providing basic services become especially difficult when "systems are under pressure (due to funding squeezes), are rapidly changing (as new private health providers enter the scene), and where disease are new and emerging (as with zoonoses)."[26] Yach and Bettcher argue that, in the globalizing world, building international norms and national health legislation is necessary so that instruments are in place not only to help public health, but also to ensure host countries are aware of the desired outcomes.[27] Bond suggests that international institutions focus on building private and public health "infrastructure, especially in surveillance, research, and training; in the development and deployment of vaccines and antimicrobial drugs and the control of resistance; vector control; and research on personal and community health practices relevant to disease transmission."[28]

Donor Interference

EID surveillance is a capital-intensive undertaking, which means that it is a low priority for most developing countries' governments. The trend has always been that programs dealing with EID surveillance are almost exclusively funded by donor countries, international health organizations, and development agencies. Some common funders for the health sector include the World Bank, United States Agency for International Development (USAID), regional development banks (such as the African Development Bank), the Global Fund to fight AIDS, Tuberculosis and Malaria, the Bill & Melinda Gates Foundation, and the Clinton Foundation. Although donations and grants given to counteract biological threats are needed to strengthen infrastructure, the downside to international funds is that they often come with conditions. [29] It has been argued that "foreign investment reflects the interest of donor countries or mainstream trends in public health—interests that are not necessarily aligned with public health priorities of recipient countries."[30]

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[26] Scoones, "Towards a One World, One Health Approach," 214.

[27] Yach and Bettcher, "The Globalization of Public Health II: The convergence of Self-Interest and Altruism," 739.

[28] Bond, "Public/Private Sector Partnerships for Emerging Infections," 523.

[29] Morens et al., "The Challenge of Emerging and Re-emerging Infectious Diseases," 248.

[30] Coker et al., "Emerging infectious diseases in Southeast Asia; regional challenges to control," 606.

Methodology

The literature review above identifies the gaps and concerns with existing disease surveillance institutions and policies, but it fails to explain a host country's political and economic motives for conducting active surveillance. For this reason, the purpose of the field study was to portray the views and opinions of the surveillance policy makers and practitioners on the ground in Kenya. The research involved conducting intensive interviews with key officials and representatives from various health-related organizations and institutions with the goal of identifying lessons and best practices for other developing countries to adopt.

From 7-19 May 2012, the author conducted 21 individual and group interviews in Monterey, California and Nairobi, Kenya. For the Kenya-based interviews, the author included a one-page proposal, a biography, and research questions. The interviews were set up two weeks prior to the field visit. Each interviewee had a chance to review interview questions, gather data and reports, and research the author. While the author did review a set of questions, interviewees were free to expand on particular subjects of interest and decline to talk if they felt they could not provide an accurate response.

Results

These research questions evaluated current research projects, diagnostic labs, and surveillance systems. Overall, the author was able to gather feedback from over 32 experts (many in group settings) and reviewed 15 EID reports, studies and brochures. Table 1.1 below outlines a number of political, economic, and cultural indicators that were identified as potential and actual barriers to EID surveillance in Kenya.

Table 1.1. Kenya: Key Issues Identified in Nairobi Interviews

Political Barriers	**Percent of Interviews That Identified Barriers**
Political instability	2 of 18 = 11%
Decentralization	2 of 18 = 11%
Competition between state and non-state actors	4 of 18 = 22%
Bureaucracy	1 of 18 = 6%
Donor-driven research projects	3 of 18 = 17%
Corruption	3 of 18 = 17%
Economic Barriers	**Percent of Interviews That Identified Barriers**
Inadequate funds	11 of 18 = 61%
Lower remuneration in the public sector	4 of 18 = 22%
Poor infrastructure	10 of 18 = 56%

Rural-urban disparities	3 of 18 = 17%
Cultural Barriers	**Percent of Interviews That Identified Barriers**
Stigmatization	1 of 18 = 6%
Religious beliefs and reliance on traditional medicine	14 of 18 = 78%
Hostility towards minority groups	1 of 18 = 6%
Protocol observation	3 of 18 = 17%

Note: Some interviews included more than one expert.
Source: Analysis of interviews conducted.

Overall, the report concluded that political and economic indicators provided the most challenges, inadequate funds being the primary concern. In addition, the lacking resources are those that affect the host country. Kenya Government Official 1 stated it well when she said, "the one thing Kenya is doing right is that we are acknowledging that there are problems. We need to put programs into communicable diseases and preventative structures such as obesity, cancer, and diabetes."

Specific Political Findings in Kenya

Political Instability

First, political instability and violence in Kenya greatly hinders the ability for health experts and officials to conduct effective surveillance. Tensions surrounding a general election are hindrances to disease surveillance. For instance, in the aftermath of the last general election in 2007, the country witnessed an ethnically charged bloodbath, which resulted in the loss of thousands of lives, destruction of property, and a surge in the number of internally displaced persons. Such unfortunate events imply that health experts and officials cannot research in areas where high tensions cause underreporting in unsafe areas. Local Health Expert 2 was particularly concerned with tribal violence in the upcoming election (March 2013). This resulted in a requirement for epidemiologists to be escorted by security guards. Predictably, this created new problems in the field, and added to the stresses on the organizations and institutions involved. Moreover, in such a situation, the local population may become fearful of the surveillance project, and, if they think it is aligned with the military, they might be unwilling to participate.

Decentralization

The new Constitution of Kenya, promulgated in 2010, calls for decentralization of the government through the devolution process. The perceived impact of decentralization was not consistent among interviewees. One set of interviewees believed that the devolution process would

not affect disease surveillance; they believed that if there was an impact, it would be an improvement because funds given to local governments would be dependent on the county's population size. Moreover, they viewed the new Constitution as clearly delineating the roles and responsibilities of different levels of government and believed that institutional guidelines would prevent administrative challenges from arising. For example, Local Health Expert 7 stated his opinion; "devolution does not affect surveillance because KEMRI is independent and does not need to consult with county governments. There is high collaboration between the local governments and the institution. The only thing that is likely to change is the way finance is distributed from the central to local governments."

The other set of interviewees were concerned that decentralization would negatively impact health policy, especially if challenges arose when coordinating activities. For example, Government Official 2 argued that "the country is in the process of devolution, as provided in the new Constitution. Coordination between the central and local governments could be a challenge once the devolution process is fully implemented, which needs to be addressed." Inadequate funding, overlapping efforts and/or a lack of coordination between central and local governments, all negatively affect a country's capacity to manage an outbreak. Funding commitments and inability to provide resources to outbreak-susceptible areas are the main concern, says International Health Expert 1. The decentralization process can complicate the assistance process and provide incentives for local governments to request funding when they know it may be better spent elsewhere.

Competition Between the Government and International NGOs

Although a high level of collaboration is expected from state-and-non-state actors, there is often stiff competition between them. For instance, when an NGO or international organization undertakes surveillance and comes across an interesting discovery, it is required to inform the government of its findings. Competition can then arise if either the host country or the international organization takes too much credit. Furthermore, citizens are often uninformed about developments in EID surveillance, because the decision to inform the public lies with the government, not the organization. Unfortunately, these types of data ownership issues are difficult to eliminate.

Projects initiated by WRAIR through USAMRU-K are a good illustration of competition between international organizations and government institutions. The lakeside city of Kisumu, Kenya, is prone to malaria, and is a hotspot for EID researchers.[31] International Health Expert 2 says the majority of malarial drugs in the country are tested in Kisumu. Given that USAMRU-K has substantial resources and infrastructure, the quality of care it provides to the local residents far outperforms district hospitals. [32] While many of the interviewees see international assistance as

[31] USAMRU-K, "Kisian MDR Laboratory."

[32] Ohrt et al., "Establishing a malaria diagnostics centre of excellence in Kisumu, Kenya," 1.

essential, in this instance it creates a negative atmosphere between USAMRU-K and government-based hospitals. USAMRU-K is taking over their designated projects, explains International Health Expert 2. Power struggles persist because the MoPHS desires funds to improve poor infrastructure, low compensation, and bolster international expertise; yet, they also desire full control of new initiatives and programs. However, this does not mean that USAMRU-K works directly with the Kenyan government. Instead, international Health Expert 2 argued, "fear of inefficiencies in the government would make their work difficult; for instance, something that could be done in 6 months could end up taking 3 years."

In other instances, gaining the trust of the host country's government could be problematic, particularly for new partnerships. In most cases, the government collaborates with specific non-state or international organizations. This is how local Health Expert 1 explained his challenges in collecting research funds: "the government likes to work with partners it has worked with for a long time; hence it's difficult for me to tell the government that I have these facilities that can help." Local Health Expert 10 agreed that partnerships are too strong and feels that these tight connections prevent locals from getting the resources they need. Although Government Official 1 acknowledges these tight partnerships, she argued that these strong networks have enforced guidelines to ensure a quick response. For example, because epidemics are sensitive in nature, these organizations know that MoPHS needs to be contacted first and involved throughout the entire process.

In addition, Government Official 1 would say that these partners have effectively solved past problems. Although USAMRU-K serves the health needs of the military in Kenya, it also supports the civilian population. According to the International Health Expert 2, USAMRU-K has improved local surveillance by ensuring that officials do not wear military uniforms when dealing with the public. "I would hate to make a local person I am talking to think he is talking to a soldier," he added. Moreover, USAMRU-K stopped using principal investigators (PIs) from the United States when providing surveillance or performing official business, and uses local PIs instead. International Health Expert 4 says that, currently, the majority of scientists are local. "At present, [USAMRU-K] has 300 local scientists in its payroll," says International Health Expert 2. Using local PIs not only further cements the host country's trust in USAMRU-K, but also builds the capacity of the local population.

Bureaucracy

The separation of the Ministry of Health into two different ministries, the Ministry of Medical Services, and the Ministry of Public Health and Sanitation, represents another bureaucratic obstacle. The two ministries play similar roles, and there are disputes over which ministry should be in charge over what responsibilities. The separation of the Ministry of Health into two bodies also increased the number of government institutions requiring consultation before implementing a project. It has therefore become difficult for health institutions to obtain permits for research or surveillance. According to International Health Expert 3, "there are many different government

agencies, and each thinks it must provide a permit." International Health Expert 4 explains that without the correct government contacts or the right connections to donor agencies, academics and scientists may struggle when implementing a project. A more transparent process would not only make grants more competitive, but also it would allow locals more practice in research writing.

Donor-driven research projects

It was very clear from the study that international organizations fund the majority of disease surveillance research studies. This provides a country with financial resources to allow viable surveillance, but also relies on donors to decide which health challenges to research or projects to implement, sometimes without taking into account the country's needs. In Kenya, for instance, HIV/AIDS, malaria, and TB are heavily funded, but tens of thousands of children die every year from easily preventable and manageable illnesses such as pneumonia and diarrhea.

International Health Expert 3 stated that this priority mismatch results in "a focus on diseases that matter least to developing countries, but matter most to the developed countries—more money is channeled into these diseases on a global front." Local Health Expert 6 agrees and states that "It is sometimes hard to access some major public health goals because there is no interest." There is a dire need to refocus on the diseases that matter most to developing countries. It will require the reorientation of the international community, with either a change in project focus or a relative decline of external funding. While it is true that international groups prioritize certain diseases and programs differently, there are efforts that can be taken by parties to create a more cooperative approach. International Health Expert 3 believes that there is progress in this area, and stated that donor organizations are increasingly open to changing strategies. Disease-specific initiatives can be integrated through technology and consolidated into surveillance activities to ensure a more coherent global information system. This requires bridging the gaps between "primary care providers and the public health system, the human and animal communities, and public health experts and intelligence analysis."

Corruption

Like many developing countries, Kenya struggles with corruption. The corruption in Kenya's health sector predictably involves funding, with the most recent scandal hitting the country's largest public health insurance scheme, the Kenya National Hospital Insurance Fund (NHIF), in May 2012. The scam advanced millions of Kenyan shillings (Ks85 = U.S.$1) to clinics despite the fact that they lacked the capacity to offer health and medical services to Kenyans.[33] Undoubtedly, such corruption hinders government efforts to provide affordable and accessible health services to needy Kenyans.

[33] Ndung'u, "Kibaki Demands Probe into NHIF Scandal," 1.

But how does corruption affect EID surveillance? The opinion of three interviewees was that corruption has indirect effect on surveillance. Local Health Expert 2 believed that corruption could have been one of the reasons why the Japan International Cooperation Agency discontinued funding and left the country. Government Official 2 argued that the impact of corruption on malaria surveillance has not yet had an impact since it is relatively new. In an interview with Local Health Expert 8, he said that "corruption is not directly affecting science but maybe indirectly, for example, it determines the budget allocated to the sector. However, things have improved in the last 10 years."

Specific Economic Findings in Kenya

Inadequate Funds

The majority of interviewees cited lack of adequate funding, especially when conducting EID surveillance of particular diseases that are unpopular worldwide, as the main economic challenge to EIDs surveillance in Kenya. "There is political will but inadequate funds," explains Local Health Expert 1. Local Health Expert 9 felt that Kenya, "has human [resources], but they would not have the capacity to do all what they do without support from the funders." Local Health Expert 6 felt that donor support was necessary, but recommended that these international institutions create a long-term plan when agreeing to collaborate with a laboratory. The equipment used in surveillance, much of which is provided by donors, requires burdensome maintenance costs and stresses the government and local organizations and institutions. Therefore, the Ministry of Health has adopted a placement system of procurement, whereby companies involved in purchasing equipment are charged with the responsibility of maintaining it, notes Government Official 1.

Funding shortages also indirectly hinders surveillance. In some cases, donors built laboratories and provided supplies, and then stopped supporting them, turning them over to the locals without an exit strategy. In many cases, these labs do not continue to be properly utilized and are described as "ghost labs." Local Health Expert 2 explained the harsh economic environment; "the labs are there fully equipped but no one is using them because of lack of funds to purchase the supplies." Instead, ghost labs are now used for training students. According to Local Health Expert 7, the students pay for reagents. Another consequence of this funding challenge is revenue-generation, whereby departments engage in activities that can generate revenue for continued research and surveillance. Unfortunately, the revenue generated in this manner is not equitable, so some departments gain while others lose.

Lower Salaries in the Public Sector

The issue of insufficient wages was mentioned frequently during the interviews. It is especially difficult to train individuals in rural regions, says International Health Expert 3. As in

most developing countries, public sector health professionals paid much lower salaries than their private sector counterparts; the effect is "brain drain," as workers in the public sector flee to the private sector in search of higher wages. Furthermore, while there are laboratory practice experts, many struggle with building reports to gather research funding, says Local Health Expert 7. Fewer grants increase reliance on donor organizations and decrease the focus host country priorities. To improve the funding and wage situation, Local Health Expert 6 recommends "giving a small grant so that Kenyan scientists can return and reorient back into the system." Local Health Expert 9 said that the government is aware of the issue and is developing a wage scale that would bring improvements, but it would probably not fix the entire problem.

Poor Infrastructure

The EID surveillance infrastructure in Kenya consists of laboratories, equipment, machines, and space for storing the equipment. Although Kenya has adequate numbers of biosafety level II and biosafety level III laboratories, the same cannot be said of other equipment and machines required for surveillance. For instance, Local Health Expert 3 revealed that the polio laboratory, which caters to the needs of the entire Horn of Africa region, has only one incubator; however, the laboratory handles more than 100 samples on any given day. Local Health Expert 4 was uneasy when he reported that the Uninterruptible Power Supply (UPS) in his biosafety level IV (BSL-4) laboratory had been down since last year. The BSL-4 laboratory relies heavily on the availability of regular power; if the generator turns off, scientists only have nine seconds to exit the secured safety lab, explains Local Health Expert 4. Broken-down equipment, like an UPS, poses serious risks. These risks include inadvertently contracting a disease; a worker could catch a virus due to lack of negative pressure in the lab.

It was obvious that space was another major challenge in some of the institutions. In one case, freezers lines the corridors due to lack of storage space. In addition, the rooms and hallways were cluttered with students who were practicing or observing new laboratory techniques. A large group of individuals in such a small spot also increases the likelihood of accidents, and makes it impossible for all the scientists to be in the laboratory at once. Conditions imposed upon the institution by donors exacerbate the problem. Local Health Expert 4 stated that one donor requested their donated machines be kept in different rooms from a competing brand's equipment, even if the equipment served the same purpose. Donor restraints and poor infrastructure keep laboratories from maintaining full capacity and could threaten safety in the event of a natural disaster, armed conflict, or a long-term power outage.

Rural-Urban Disparities

There are sharp differences in surveillance infrastructure; rural areas have a shortage of equipped facilities and skilled manpower. Trained health workers prefer working in resource-rich communities that provide opportunities for themselves and their family members. "In the North,

you train them and they learn, but 70% of them leave because of poor infrastructure and lifestyle," says International Health Expert 3. In addition, motivation levels spiral downwards when experts are disconnected from government officials and donors. Local Health Expert 8 adds that, "when infrastructure is lacking but the [human resources] are there, it creates fear; the people cannot deliver." Inaccessible roads also conspire to make EID surveillance in such regions a major challenge, especially when security is an issue. Satellite labs predominantly exist in rural areas; however, these are largely owned by NGOs, which work in partnership with the government, explains Local Health Expert 2.

Specific Cultural Findings in Kenya

After reviewing the findings, the majority of the interviewees felt that cultural barriers to EID surveillance were insignificant when compared to the political and economic sphere. The cultural concerns depended on the beliefs and practices of different populations. According to Local Health Expert 8, Kenya is a multi-ethnic society with 42 different ethnic groups. These groups differ in their beliefs and practices, some of which affect their health services in rural areas. Conducting effective surveillance in the rural areas is dependent largely on the "how" aspect, says Local Health Expert 6; Success requires surveillance teams to work closely with the local administration. Close relationships provide local staff an advantage in breaking cultural barriers, which may keep a community resistant to EID surveillance. They can help inform the community, explain why surveillance is necessary, and ensure that the community is cooperative.

Stigmatization

Kenya remains a relatively conservative society, and practices such as homosexuality and prostitution are shameful, even though there has been an increase in their prevalence. For this reason, facilities that cater to the special health needs of HIV/AIDS and TB patients, which are oftentimes associated with the risky practices above, are often inadequate. Local Health Expert 4 argues, "because of hostility and lack of acceptance, these people may not come out openly and seek medical services." Moreover, stigmatization and lack of public health awareness may lead to underreporting, states Local Health Expert 8. Improving public health awareness is crucial, because fear could influence an individual decisions to report, adversely affecting surveillance.

Furthermore, a lack of medical understanding keeps locals from following protocols. "We are trying to get a medication with a shorter regimen because once people start feeling better, they will stop taking the medication," says Local Health Expert 8. Local Health Expert 4 agreed that there should be a shorter process, and that medication usage is a problem with almost all illnesses in Kenya. There is a "share what you have" approach; people may give part of their medication away when they feel better, or ask for more and then sell the drugs for food. By not taking the full dose of medication, individuals are risking their life and exposing other family and community members to drug-resistant pathogens.

Religious Beliefs and Reliance on Traditional Medicine

While Kenya might not have extensive financial capabilities, it is rich in the traditional herbs used by indigenous communities for medicinal purposes. Many communities have not yet embraced conventional medicine and instead rely on traditional medicine, says Local Health Expert 5. Some religious beliefs even *prohibit* their followers from going to hospitals, even for serious healthcare services such as the immunization of children, states Local Health Expert 3. Some religious groups prohibit drawing of blood, making surveillance difficult in such communities. Small—but important—cultural considerations, such as the removal of the coiled snake from the logo of KEMRI vehicles in the field, have helped allay concerns of devil worshipping: the sight of a Caduceus (two coiled snakes), common in medicine, foretells of death in the family.[34]

Conclusion

The study of Kenya's EID surveillance system and the factors affecting the country's health care provides important findings to help improve the health care system in other developing countries. The existence of USAMRU-K in Kenya has strengthened local governmental institutions, but there is room for improvement in the laboratory capabilities and providing adequate salaries. Furthermore, the significant lack of domestic funding requires dependence on international donors and NGOs, and their associated agendas and restrictions. Furthermore, political and cultural factors create barriers to surveillance due to widespread corruption, regional instability, violence, and stigmas against the health officials or infected individuals.

To further enhance surveillance success rates, it is important to involve the populace, either as part of the surveillance team or as security officers. "We need more evidence-based policy. Kenyan researcher's needs to be involved with lessons learned," says Government Official 2. Also, international donors need to focus their resources on the most pressing needs of the host country instead of advancing their own research priorities or the needs of the general international community. Instead of trying to reinvent programs and build expensive laboratories, efforts should go towards improving Kenya's public health structure, so that they have the capabilities and resources to detect high burden diseases as well as EIDs at the district and provincial level.

[34] Marsh et al., "Beginning community engagement at a busy biomedical research programme: Experiences from the KEMRI CGMRC-Wellcome Trust Research Programme, Kilifi, Kenya," 728.

Table 1.2. Kenya: Date, Time of Interview, Generic Title and Code[35]

Date and Time of Interview	Generic Title and Code
5/15/12 1100	Government official 1
5/15/12 1400	Government official 2
5/15/12 1600	Local health expert 1
5/16/12 1000	Local health expert 2
5/16/12 1030	Local health expert 3
5/16/12 1100	Local health expert 4
5/16/12 1200	Local health expert 5
5/16/12 1400	Local health expert 6
5/17/12 1000	Local health expert 7
5/17/12 1100	Local health expert 8
5/17/12 1200	Local health expert 9
5/7/12 1300	Local Health Expert 10
5/15/12 1500	Local Health Expert 11
5/16/12 0800	Local Health Expert 12
5/16/12 0830	Local Health Expert 13
5/16/12 1500	International Health Expert 1
5/17/12 0800	International Health Expert 2
5/19/12 0800	International Health Expert 3
5/19/12 1400	International Health Expert 4
5/9/12 1000 (in Monterey)	International Health Expert 5
5/18/12 1100	International Health Expert 6

[35] To protect personally identifiable information.

CASE STUDY 2: PERU[†]

Introduction

Medical doctors and scientists have studied tropical and other infectious diseases in Peru since at least the 19th Century. Scientists in locations such as Lima, Cusco, and Iquitos have broad experience examining infections of interest, given the wide variations in the country's geography, climates, flora and fauna that create the conditions for their appearance. Notably, Health Expert 1 asserts that there are pre-Hispanic records of tropical infections in Peru. Although scientists are concerned about all emerging and re-emerging diseases, they predominantly concentrate on mycotic diseases, malaria, and dengue. Despite the strong presence of researchers and epidemiologists, these bio-diverse ecological sites continue to inflict harm in both urban and rural regions. This report reviews surveillance efforts done by the Peruvian government and provides recommendations on ways in which the global community can assist Peru. Additionally, it will study EID surveillance from political and economic perspectives, and examine neighboring countries in Latin America, which receive assistance from the U.S. Naval Medical Research Unit-6 (NAMRU-6).

Background and Context

The EID study in Peru began with the case of Daniel Alcides Carrión's martyrdom in 1885. Carrión, a young medical doctor born in 1857, injected himself with *Bartonella* bacteria to track symptoms of a disease that was prevalent in the Peru's central Andes, and that he assumed to be non-lethal. The condition, known as the "wart's disease" coexisted with another lethal disease known as Oroya Fever. Carrión took a sample from a patient's wart and injected himself with it to learn about the disease process.[36] Although Carrión thought that it would be non-lethal, he contracted Oroya Fever. The disease killed him, but in the process he discovered that wart's disease and Oroya Fever were the same thing. Carrión's pioneering spirit motivates Peruvian medical doctors to do research in that field today.

The Peruvian government supports three health care systems: the Ministry of Health (MINSA), the public health care insurance (Essalud), and the armed forces' hospitals and medical facilities. NAMRU-6 and the United States Agency for International Development (USAID) are the key international players that assist Peru in EID surveillance. According to Oliver and Chang-Neyra, "experience in Latin America [shows] that, in terms of both technical effectiveness and

[†] Inputs to this case study were provided by Álvaro Zapatel Malpartida with backstop by Angela Archambault under the supervision of Sophal Ear.

[36] Maguiña et al. "Bartonellosis (Carrión's Disease) in the Modern Era," 772.

sustainability, strengthening regional activities at the mission level may be the best use of USAID resources."[37] NAMRU-6 has a slightly different mission; it is "to research, understand, and develop protective strategies against infectious diseases affecting uniformed service members and the general population in Peru and throughout Central and South America, while enhancing public health capacity through respectful cooperation with our collaborators."[38] While NAMRU-6 has many partnerships overseas, they collaborate most often with U.S. and Peruvian universities, non-governmental organizations (NGOs), USAID, the Centers for Disease Control and Prevention (CDC), and the Pan American Health Organization (PAHO).

Literature Review

Peru's most notorious case of a re-emerging disease outbreak was the cholera epidemic of 1991. Before that outbreak, cholera was last reported in Peru in 1867 and the Americas in 1895.[39] At that time, there were 321,334 reported diarrhea cases in Peru in 1991 and 2,906 deaths due to cholera.[40] In the most recent outbreak, the media played an important role by educating citizens to consume vegetables properly, to avoid consuming raw fish, and seek medical treatment when needed. Nonetheless, there were several miscommunications between government agencies that prevented a better response to the epidemic. The outbreak of EIDs, such as cholera, played a large role in receiving the attention of policy makers, particularly in the U.S.. In fact, after the cholera outbreak in 1991, specialists criticized U.S. complacency regarding monitoring strategies and control of EIDs. Consequently, "the need to strengthen the surveillance and research infrastructures" was emphasized.

Despite the good interactions between agencies such as NAMRU-6 and the Peruvian government, chronic diseases are becoming more common. According to Stuckler, 80% of deaths that are the result of chronic diseases such as heart disease, cancer, respiratory diseases and diabetes will occur in low and middle income countries, where "these chronic diseases claim around 80% more lives than they do the total of all infectious causes."[41] Certainly, NAMRU-6 interactions with Peruvian institutions such as the National Health Institute (Instituto Nacional de Salud in Spanish, abbreviated as INS) are not focused on the control of chronic diseases. However, a deeper interaction between them could enhance public health measures to reduce the incidence of chronic diseases and reduce the incidence of EIDs.

According to *Combating Tropical Infections,* the level of international cooperation and the employment of new tools for diagnosis have reduced the prevalence of re-emerging diseases such

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[37] Oliver and Chang, "Combating Threats of USAID," 51.

[38] Naval Medical Research Unit-6 Peru, "Mission."

[39] Ries et al, "Cholera in Piura, Peru: A Modern Urban Epidemic," 1429.

[40] Ibid.

[41] Stuckler, "Population Causes and Consequences of Leading Chronic Disease: A Comparative Analysis of Prevailing Explanations," 276.

as leprosy (among others).[42] Yet, in South America, there are still some EIDs that are not effectively monitored. For example, Paul Reiter argues that breeding sites for *Aedes aegypti* (dengue fever) have not been adequately identified.[43] Clearly, the lack of monitoring capacities, combined with infrastructure problems and high population density, constitute the ideal conditions for an EID outbreak.

Additionally, research done on cholera in Peru suggested that environmental phenomena such as El Niño may be correlated to cholera outbreaks.[44] Research done in Bangladesh on the subject was consistent with the findings in Peru.[45] Similar research done in two different locations in India also demonstrated that environmental conditions directly influence the dynamics of cholera epidemics.[46] Therefore, EIDs may be more prevalent in locations such as Peru where the environment creates the conditions for them to appear and thrive.

Accordingly, Heymann argues that rural-urban migration resulted in inadequate sanitation, crowded living conditions, and other problems associated with population growth.[47] In that context, EIDs found the ideal environment to flourish and infect a large population. Consequently, the re-emergence of diseases such as yellow fever became notorious in South America and Africa, mainly due to bad sanitary conditions combined with environmental factors. Also, educational issues played an important role in consumers' behavior, given that people infected by an EID did not receive medical treatment from a doctor; hence, in most cases antibiotics were used without the proper prescription.[48]

Methodology

The following results are the product of several interviews conducted in 26 April-3 May 2012. The interviews, conducted with several RAs, were with Peruvian government officials working in the public health sector, private sector researchers, NGOs, researchers affiliated to U.S. donor agencies, and U.S. government personnel in Peru. The interviews' objective was to clearly define the context in which EID surveillance has taken place in Peru in recent years and how relationships have developed between government agencies, private institutions, and foreign cooperation in charge of this mission.

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[42] Hotez et al., "Combating Tropical Infections Diseases: Report of the Disease Control Priorities in Developing Countries Project," 871.

[43] Reiter, "Climate Change and Mosquito-borne disease," 156.

[44] De Magny et al., "Proceedings of the National Academy of Sciences of the United States of America," 1767.

[45] Pascual et al., "Cholera Dynamics and El Niño-Southern Oscillation," 1768.

[46] Ibid.

[47] Heymann, "Social, Behavioural and Environmental Factors and Their Impact on Infectious Disease Outbreaks," 133-134.

[48] Ibid.

On several occasions, interviewees were consulted on the current status of Peruvian research facilities and on their relationships with foreign institutions such as NAMRU-6. Furthermore, interviewees were also asked about the cultural constraints that complicated communications between institutions (either between public and private Peruvian institutions, or national and foreign institutions) in different regions of Peru. Similarly, to understand the extent to which institutions affect interactions, the weight of politics, decentralization, and transitions in government administrations were addressed. Likewise, interviewees were consulted about potential similarities and differences between the institutional interactions in Peru and those in Indonesia that led to problems between national and foreign researchers due to sovereignty issues.

Results

The main objective of the study was to identify economic, political, and cultural barriers that hinder Peru's public health sector capacity to successfully engage in EID surveillance. The author, with several RAs, conducted 10 individual interviews and three group interviews. For the purposes of this project, approximately 22 specialists were interviewed from the public sector, the private sector, NGOs, and donor agencies in Lima and Iquitos. For Peru, key economic, political, and cultural factors influencing EID surveillance emerged from interviews. Table 2.1 lists the most commonly identified barriers in order of importance by frequency across interview. In each issue, several situations were explained, and the most relevant ones are discussed in this paper as follows.

Table 2.1. Peru: Key Issues Identified in Lima and Iquitos Interviews

Political Barriers	**Percent of Interviews That Identified Barriers**
Overlap in functions and inefficiency in processes	6 of 20 = 30%
Need for systematization at government institutions.	5 of 20 = 25%
Centralized health care, moving to more decentralized approach	2 of 20 = 10%
Interference of friend loyalties and corruption within government institutions.	3 of 20 = 10%
Lack of goal settings and planning in the Ministry of Health (MINSA)	5 of 20 = 5%
Economic Barriers	**Percent of Interviews That Identified Barriers**
Lack of funding at government institutions	8 of 20 = 40%
Difficulties in implementing software and technology in rural areas.	5 of 20 = 25%
Laboratories not fully equipped (definitely a pivotal problem in Iquitos)	5 of 20 = 25%

Lack of personnel due to insufficient funds.	4 of 20 = 20%
Cultural Barriers	**Percent of Interviews That Identified Barriers**
Gap between western medicine and cultural practices in the Andes	5 of 20 = 25%
Lack of preventive healthcare	5 of 20 = 25%
Lack of personnel trained to assist indigenous peoples.	4 of 20 = 20%
Lack of education for people living in rural areas	4 of 20 = 20%
Traditional medicine often used first	4 of 20 = 20%

Note: Some interviews included more than one expert.
Source: Analysis of interviews conducted.

Specific Political Barriers in Peru

Overlapping Functions

Health Expert 2 stressed the problems that arise when MINSA, Essalud, and NAMRU-6 overlap. Accordingly, the INS, the leading medical research facility for the study and research of EIDs in Peru, has several communication and interaction problems with other government institutions, such as MINSA and Essalud. Nonetheless, the source identified a sounder interaction between the INS and NAMRU-6, since the former tends to facilitate samples and requests for assistance if it lacks the needed capacity to achieve a given result. For instance, Health Expert 2 asserted that, "in many cases, patients tend to go to private clinics with well-known private labs that detect the EIDs, and afterwards report to the INS since the institution may lack of proper equipment and infrastructure available in the private sector." Nevertheless, Donor Staff 1 argues that "private practices do not always report on suspicious symptoms" since it is optional in the private sector; however, government institutions are required to report on a regular basis. Consequently, several specialists interviewed agree that lack of coordination among health institutions in Peru is a problem, but they do recognize the good communications between Peruvian institutions such as the INS and foreign research facilities such as NAMRU-6 for EID surveillance.

Lack of Coordination

"There is insufficient coordination between government institutions and citizens," asserts Staff Donor 1. This perspective is consistent with the views of the other specialists interviewed. Across the public sector, health institutions encounter problems in systematizing processes and efficient EID control. Consequently, both private healthcare institutions and foreign agencies such as NAMRU-6 have supplied services and the logistics needed to overcome the structural inefficiencies in the Peruvian health care sector. Those inefficiencies are evident when government

institutions interact with citizens in rural areas who lack of the means to report EIDs and have a difficult relationship with institutions such as MINSA. Health Experts 1, 2, and 3 all agreed on the government's detachment from rural communities, which further complicates the communication problem. "Clearly, the MINSA has failed in relating to patients living in rural areas," says Health Expert 2. Accordingly, Health Expert 1 emphasizes MINSA's recent attempts to accept cultural practices, such as vertical birth, in order to bring government institutions closer to people living in rural areas who are more prone to exposure to EIDs.

In that sense, Peru Government Official 1 asserts that "there is a strong need for the standardization of practices among government institutions that may facilitate technological transfers." Therefore, government officials, such as the one cited, agree on the need to systematize processes that may come with a greater interaction and the creation of alliances with other actors such as universities and the private sector. In fact, universities have been critical in assisting government institutions, and have cooperated extensively with NAMRU-6 to try to improve research practices. In the words of U.S. Government Expert 1: "[NAMRU-6 has] worked well with local partners such as universities given that [they] have common perspectives and complement each other's efforts." Even though private institutions and research facilities are aware of the deficiencies, progress is still insufficient given the government's setbacks with respect to organization and planning of a unified health care system for the whole country.

Even though government research and surveillance practices overlap, both private and foreign institutions, such as NAMRU-6, have succeeded in earning credibility and have become reliable with respect to research and capacity building. In that sense, U.S. Government Expert 2 asserted that the research facility has created a system that monitors and alerts possible EID outbreaks in Peru through the use of telephones and the internet. The system, named Vigila, is only available for the military. Yet, the official said that MINSA also has access to it—although he also said that "MINSA would not use the system since the Peruvian government would not like to make its own data public for security reasons."

When asked if the Peruvian government's failure to use the Vigila system was a result of possible issues related to sovereignty, Health Expert 2 asserted that the INS, the reference lab for Peru, has to receive the reports before any other institution. Nonetheless, U.S. Government Expert 2 disregarded viral sovereignty as a concern for the public health sector, given the relevant partnerships between government institutions and international agencies funding them. Consequently, the aforementioned examples portray the positive relationship between government institutions and foreign institutions for EID surveillance, although problems do exist at the domestic level with coordination and reporting from the population to the Peruvian government officials.

Following Surveillance Protocol Takes Time and Is Difficult

U.S. Government Expert 4 recognized that reporting and confirming the existence or prevalence of EIDs in regions outside of the capital of Lima tends to be a very slow process. "First, you have to find out that the observations fit the characteristics for a specific disease. Then the institution has to report to the agency and wait for it to answer with its conclusions. Finally, when the agency has confirmed the existence of an EID, then we [specialists] can do the diagnosis."

Problems with surveillance protocols are prevalent in other rural areas, particularly Iquitos. Peru Government Official 3 said "to adhere to NAMRU-6 standards, every 10,000 patients should have a proportion of eight doctors in Iquitos." To comply with these standards there would be a need for 80 doctors, a current shortage of 20 doctors. This deficiency results in "doctors [having] less time for research and to do fieldwork since they don't have the knowledge to confront the disease." An official from a public health care institution in Iquitos asserts that regions such as Iquitos lack the proper equipment for diagnostics such as those related to EIDs surveillance.

Conflicting Communications

Peru Government Official 2 also emphasized the difficulties in promoting a common position on policies across government institutions and government officials. "Food is an important vehicle in cholera transmission" (also very likely for other EIDs), therefore a strict government policy must be implemented. [49] Peru Government Official 2 said that during the Fujimori administration's handling of the 1991 cholera outbreak, the minister of health publicly stated that Peruvians should refrain from eating raw fish in dishes such as ceviche, the unofficial national dish of Peru. Shortly thereafter, President Fujimori himself, to support fishing interests, ate ceviche publicly as proof that fish was safe. As a matter of fact, "the fish for that ceviche was brought from the deep sea, miles from the coast, and not from the near shores where average Peruvians tend to fish. Soon afterwards the health minister resigned," says Peru Government Official 2. This example shows the need for government officials to serve as role models and abide by the health policies that they recommend to the public. Fujimori was not alone in his exhibitionism; Prime Minister Thaksin Shinawatra of Thailand ate chicken in front of cameras early on during Thailand's initial outbreak of Highly Pathogenic Avian Influenza. While politicians are more aware of their impacts, Peru Government Official 2 asserted that communications continue to be a hindrance among government officials at a national level. In addition, recent attempts to decentralize Peru may magnify these communication problems and disaffirmations between institutions.

At the domestic level, communications between different government institutions are generally ineffective and filled with bureaucratic problems. Certainly, Health Expert 2 identified the detachment between medical doctors and policy makers to be a significant problem when controlling for EIDs. "The main problem with MINSA is… the lack of interest in participating and

[49] Estrada-García and Mintz, "Cholera: Foodborne transmission and its prevention," 462.

having a better knowledge of what goes on at the clinical side. Therefore, they are unable to relate to patients, which leads them to make mistaken policies due to their lack of empathy with patients and medical doctors on site," she argued. In that context, NAMRU-6 plays an important role in capacity-building for Peruvian institutions. U.S. Government Expert 1 stated that U.S. facilities tend to work on a site for two to three years, "but NAMRU-6 has had good communications and interactions with its Peruvian counterparts which have made it possible for NAMRU-6 to do research."

Decentralization

Attempts to decentralize the public health sector's capacity and distribute its funds have produced mixed results for Peru. Fiscal decentralization maked autonomous regions responsible for their funds; however, the regions' capacity to make use of their budget depends on their management capacity and situation. Therefore, decentralization will be incomplete and will have mixed results if it fails to focus on the budgetary needs of the highest priority surveillance programs and the most at-risk populations.

An official from MINSA recognizes that there have been some improvements in the government-led decentralization process. In fact, President Ollanta Humala's government has emphasized consultation and negotiation processes with indigenous peoples for the use of land in addition to other decisions involving government and inhabitants of a specific location. "We need to allocate funds correctly with respect to specific specialties," asserts U.S. Government Expert 3. U.S. Government Expert 4 thinks that decentralization will improve as new initiatives are developed. MINSA redistributed unspent regional funds in an effort to give resources to areas that requested surveillance assistance. Although pushing local government officials to spend surveillance funds is important, it is unknown how key leaders will react. They may respond by managing their surveillance budgets more efficiently; however, this political initiative could also push them to spend unnecessary funds to ensure they receive money in years to come.

NAMRU-6 and Peruvian Institutions

While interviewees varied in their opinions based on the role of NAMRU-6 as a partner with the Peruvian government, there was a general consensus in the importance of NAMRU-6. The institution's importance is based on its facilitation between international partners and the assistance in research and EID surveillance. Peru Government Official 2 pointed out that "there isn't a negative view of NAMRU-6 at the government level. In fact, whenever there is a problem or an EID outbreak, Peruvian institutions such as the INS work together with NAMRU-6 to identify the problem." Similarly, Health Expert 3 agreed on the importance of NAMRU-6 for Peruvian institutions. Therefore, she cannot foresee a future situation in which NAMRU-6 could have problems with health institutions such as MINSA. Furthermore, a specialist from a foreign research facility stated that while NAMRU-6 is mainly research-oriented, it may do extra work if requested.

"NAMRU-6 will not do diagnostics of any sort. However, it will assist on some analyses when needed although its main role is to do research and nothing else," he said. Likewise, U.S. Government Expert 6 specified that NAMRU-6 does active surveillance while government institutions such as MINSA do passive surveillance.

Specific Economic Barriers in Peru

Infrastructure

In Peru, institutional infrastructure is a constant problem. Geographic constraints and centralization continue to broaden gaps between Lima and other cities and rural areas. In the same way, governmental attempts to create a universal healthcare system have been partial failures, given the lack of equipment and personnel to assist individuals at the clinical level. In fact, Peru Government Official 2 stated that they "don't have instrumental capacities to fully support a universal healthcare system in Peru." Accordingly, Health Expert 1 stated that the hospital's lab "doesn't make diagnostics for migrant diseases. Therefore, we have to send the samples to the INS or NAMRU-6." It is true that hospitals protocol restricts hospitals from making diagnostics, but it is unclear if they have the capacity to undertake this task. Health Expert 2 also stated that the "INS is the first reference laboratory for Peruvian Hospitals, but the INS may refer samples to NAMRU-6 if needed".

Meanwhile, deficiencies in infrastructure and public health care facilities arise from failed attempts to transfer know-how in the construction and development of these structures. Peru Government Official 1 stated that "we [the INS] had several mistakes when we had to equip and build our facilities with the standards" needed to guarantee biosecurity measures. In that sense, the official stresses the need for experts to advise the development and construction of infrastructure projects.

Human Resources and Personnel

Despite the lack of transfer of knowledge and expertise, Donor Staff 1 recognizes that the INS has successfully implemented laboratories in all regions in Peru with the capacity to diagnose EIDs. However, human resources are scarce in those regions. "A solution to that problem would be to increase the budget for the health care sector," points Peru Government Official 1. His point of view is consistent with Peru Government Official 2 who asserts "medical doctors receive a low salary. On average, a medical doctor—who trains for approximately 12 years—is paid US$1,200 per month at MINSA; nurses earn US$400 per month on average." Peru Government Official 2 recognizes the government's need to invest in the health care sector to fully prepare its medical doctors and grant them proper working conditions. In fact, Health Expert 1 stated, "from 32 medical schools existing in Peru, only 20 have extensive training while the rest of them are not prepared enough to build their skills."

Furthermore, Donor Staff 1 stressed the need for a clearer career path in the public health sector to provide more opportunities to medical doctors entering government institution such as MINSA, Essalud, or INS. In August 2012, Peruvian medical doctors working at Essalud instigated a national strike against the government, demanding higher salaries since these have not increased since the 1990s.[50] Although Essalud doctors have resolved their dispute, MINSA is now on strike. The strike is the result of conflict escalation after several years of complaints and unsuccessful negotiations between medical doctors and the government.

In regions far from Lima, such as Iquitos, the lack of available personnel is critical. In fact, U.S. Government Expert 3 pointed out that "[the hospital] had about 6,000 women giving birth and only two specialists available to assist them. The neighboring hospital had a similar situation, with 2,000 women giving birth and only ten specialists available to assist those births." The official went on to explain that there are few incentives for medical doctors to work in hospitals located in regions such as Iquitos. Wages tend to be the same across all doctors regardless of the challenges specialists may face in terms of distance, access to these locations, stress, and working conditions.

Specific Cultural Barriers in Peru

In countries such as Peru, cultural barriers complicate the interaction between patients and doctors since the former are hesitant to receive assistance from the latter. Western and traditional medicines are often antagonistic and patients prefer to receive traditional treatment instead for EIDs. For instance, through a research study made in Mexico, homeopathya—a form of non-conventional medicine—was perceived as "a panacea for everything"[51] including not only regular infections or diseases, but also more complex problems such as cancer or cholera. Accordingly, the research interviewees highly regarded the good course of treatment between non-conventional health specialists compared to regular medical doctors.

People in rural or semi-urban areas are more prone to receive assistance from non-conventional doctors. In that sense, cultural barriers tend to explain the lack of trust between patients and medical doctors compared to that between doctors and non-conventional health specialists. In Peru, medical doctors lack training in indigenous languages (such as Quechua) and traditional health care. As a result, the lack of those important components in health care lead to further miscommunications and obvious lack of trust between inhabitants in rural or semi-urban areas and the medical doctors located there.

[50] Sifuentes, "Todas las guerras de Essalud."

[51] Whiteford, "Homeopathic Medicine in the City of Oaxaca. Mexico: Patients' Perspectives and Observations," 74.

Preventative Health Awareness/Education

There is a clear lack in government investment in public health policies in recent decades. Peru is only above Haiti for healthcare budget allocation in the Americas.[52] For that reason, 30% of Peruvians lack access to health care, although they have access to traditional medicine, says Government Official 1. The lack of health education is the main barrier for medical doctors to reach people in rural areas and properly monitor EIDs. For instance, Peru Government Official 4 argues, "approximately 10% of the population would not accept certain medicines." Accordingly, public health care institutions have failed in earning rural communities' confidence and trust. For that reason, in the eyes of Peru Government Official 1, "some people living in rural areas do not trust Western medicine such as the use of vaccinations in public health campaigns." Nonetheless, cultural differences may not be a significant problem in urban and semi-urban areas. According to Staff Donor 1, "Peruvians are used to modern health care at many socioeconomic sectors. In fact, there is a willingness to accept health practices and preventive health education."

Peru Government Official 1 stressed the importance of health specialists with language knowledge besides Spanish and English. "The lack of specialists proficient in native languages is very problematic," he said. Bilingual medical doctors in Spanish and Quechua are scarce, complicating the relationship between them and their patients, and reinforcing distrust and the lack of confidence in the government for people living in rural areas. Experts interviewed agree on the need to build medical doctors' skills because through better interactions with their patients, they will succeed in providing public health care services and be more efficient in monitoring EIDs.

Health Expert 4 stressed the importance of medical adaptation to specific circumstances surrounding traditional practices. For instance, the specialist said, "it is very complicated for us [the specialists and health workers] to communicate and make diagnosis in specific hospitals since there are no experts on specific EIDs in all locations. … Accordingly, we have to make specific food to fit each indigenous person's diet." Clearly, traditional practices create significant barriers for medical doctors to do appropriate research and monitor EIDs given the lack of resources and the extra effort needed to fit each traditional practice.

Conclusion

In conclusion, the relationship between the Peruvian government and research facilities such as NAMRU-6 is largely positive. Interviewees agreed that there is a substantial flow of information and good terms between Peruvian and foreign institutions, such as NAMRU-6. Although Peruvian health experts partially recognize the country's dependence on NAMRU-6, they also realize that there is no competition between Peruvian institutions and NAMRU-6; on the contrary, cooperation between indigenous health experts tends to be the norm. Peru's public health sector has several problems to fix in order to more efficiently control EIDs. Yet, their 1991

[52] Government Official 1.

experience with the cholera outbreak has given a good opportunity to reinforce research facilities and focus on research of EIDs through well-known institutions such as the INS. If Peruvian authorities want to organize their resources and delegate to NAMRU-6, they need better interaction with NAMRU-6.

While decentralization has been an effort with good intentions, several issues need to be solved to make it successful. Resources are still centralized in Lima and health facilities in other regions—either in the jungle or in the Andes—lack of funds to fully develop health care practices. This problem creates infrastructure deficiencies in rural areas with the greatest need for research but the least equipment and funds. In addition, conflicting communications and institutional overlapping confuses policy makers, which can further exacerbate the problem. Thus, Peruvian public health care institutions must synchronize efforts and improve interaction among one another to avoid miscommunication problems. Peru's EID control, surveillance, and research are progressing effectively. However, there are several operational and management problems that need to be addressed and solved. Peruvian institutions and the central government need to mitigate the drawbacks to decentralization in Peru, especially as they related to EID surveillance.

Finally, Peru's cultural diversity has created significant barriers for medical doctors who try to control EIDs in rural areas. This is due to language diversity and difficult access to certain locations, but these tend to be mostly Peruvian issues with no significant effects on their interactions with foreign researchers. Therefore, further investment is needed to build skills such as learning native languages and assisting specialists in their adaptation process when inserting themselves in rural areas mostly inhabited by indigenous peoples. Accordingly, while some capacity building efforts exist, there are no incentives for specialists to relocate in depressed areas with the need for specific medical doctors. Both universities and post-graduate institutions have to adapt their educational plan for medical doctors to fully train them so that they can acquire those skills.

Table 2.2. Peru: Date, Time of Interview, Generic Title and Code[53]

Date and Time of Interview	Generic Title and Code
4/24/00 1900	Health Expert 1
4/21/12 1100	Health Expert 2
4/25/12 1900	Health Expert 3
4/27/12 1100	Health Expert 4
4/25/12 1330	Health Expert 5
4/26/12 1330	Health Expert 6
4/23/12 1100	U.S. Government Expert 1
4/23/12 1100	U.S. Government Expert 2
4/27/12 1100	U.S. Government Expert 3
4/27/12 1630	U.S. Government Expert 4
4/24/12 1100	U.S. Government Expert 5
4/24/12 1400	U.S. Government Expert 6
4/24/12 1045	U.S. Government Expert 7
4/27/12 0800	U.S. Government Expert 8
4/21/12 1000	Donor Staff 1
4/21/12 0830	Peru Government Official 1
4/21/12 0730	Peru Government Official 2
4/27/12 0900	Peru Government Official 3
4/27/12 1100	Peru Government Official 4
4/26/12 0900	Peru Government Official 5

[53] To protect personally identifiable information.

CASE STUDY 3: THAILAND‡

Introduction

Since 1980, the U.S. Centers for Disease Control and Prevention (CDC) has expended significant resources building EID surveillance programs in Thailand. In the last decade, Thailand has had to respond quickly to pandemics such as SARS, H5N1, and H1N1. Recent globalization efforts, such as trade and international travel, have intensified the idea that infectious diseases have the potential to produce a worldwide outbreak. Understanding zoonotic disease is essential to developing surveillance programs because, "nearly two-thirds of human pathogens are zoonotic and, of greater concern, nearly three-quarters of emerging and re-emerging disease of human beings are zoonosis."[54] As Veterinary Health Expert 1 notes, this is because "most diseases tend to go to where people are tied to the environment; where they harvest, hunt, and consume."[55]

The best way to prevent the spread of emerging diseases is to look at "'the protective effects of nature intact" and detect the pathogen before it transfers from animals to humans.[56] Sadly, the majority of individuals who contract EIDs come from developing countries like Thailand. This is because poor populations experience environmental consequences from population growth, such as "urbanization, deforestation, and encroachment of wildlife."[57] Although outbreaks have the potential to hurt local populations and their livestock, there is a global responsibility to react to conditions quickly, ensuring that disease does not spread through economic trade, tourism, and migration.

This paper uses Thailand as a case study to understand EID surveillance in Southeast Asia. It looks at key international players, such as the U.S. Army component of the Armed Forces Research Institute of Medical Sciences (AFRIMS), and evaluates the political economy of EID surveillance in Thailand. Additionally, the report evaluates political, economic, and cultural barriers which can prohibit effective disease surveillance in developing countries. The primary purpose of this paper is to assist both Thailand and key international players in improving the effectiveness of EID surveillance. An overlapping theme from all experts was that the best EID surveillance systems would be ones where both the host country and global institutions have an incentive to conduct capacity building.

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‡ Inputs to this case study were provided by Angela Archambault with editing from Dimitri Randall under the supervision of Sophal Ear.

[54] Coker et al, "Towards a Conceptual Framework to Support One-Health Research for Policy on Emerging Zoonoses," 1.

[55] Veterinary Health Expert 1.

[56] Robbins, "The Ecology of Disease," 1.

[57] Coker et al. "Towards a Conceptual Framework," 326.

Background and Context

The majority of health experts interviewed for this study mentioned three key disease detection partners in the U.S.-Thailand context: the Thai Ministry of Public Health (MOPH), which represents the Thai government; the CDC, which concentrates on the civilian sector; and AFRIMS, which manages the military sector with components from the Thai and U.S. armies. To fully comprehend the U.S.-Thailand relationship with respect to EIDs, one must understand the AFRIMS role in developing surveillance sites. AFRIMS is unique in the fact that it has a long-standing affiliation with Thailand; it assisted the Southeast Asia Treaty Organization (SEATO) since the 1958 cholera epidemic. As the research mission changed from cholera towards tropical diseases,[58] SEATO Medical Research Laboratory was renamed and refocused numerous times until it was finally disestablished in 1977.[59] AFRIMS took SEATO's place as the main research laboratory and then began cooperating with the Royal Thai Army Medical Component (RTA-AFRIMS) as a joint venture.[60]

Despite that AFRIMS studies over 29 different pathogens, the majority of its research funding goes to malaria, dengue, and diarrheal diseases. AFRIMS's mission is as follows:

> *To conduct basic and applied research for development of diagnostic tests, drugs and vaccines for infectious diseases of military importance.*[61]
>
> *Other tasks include:*
> - *Field site development*
> - *Medical diplomacy and capacity building*
> - *Disease surveillance and outbreak investigation*
> - *Regional subject matter expert (PACOM, embassy, NGOs, GOs)*
> - *Development of Mil-Mil relationships/collaborations.*[62]

Although improving local laboratory capacity in Thailand is important, AFRIMS' primary goal is currently (and historically) product development. As U.S. Government Expert 1 explains, half of the organization's funding comes from the DoD, and there is an incentive to develop and evaluate products so the DoD can "protect the U.S. military from diseases that cannot be studied in the U.S. ...

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[58] Brown and Nitayaphan, "The Armed Forces Research Institute of Medical Sciences: Five Decades of Collaborative Medical Research," 477.

[59] Armed Forces Research Institute of Medical Sciences, "Mission and History," 1.

[60] Ibid.

[61] For more information see http://bangkok.usembassy.gov/embassy/usamc/usamc-afrims.html.

[62] Powerpoint shared on 5 Jun 2012 titled "AFRIMS Command Brief."

vaccines always come before surveillance."[63] The need to create products was expressed in AFRIMS' 50th anniversary reflection article, which found over 500 malaria publications produced in a 50-year period—because it was the leading infectious disease threat to U.S. deployments.[64]

Group interests and missions do not always coincide with one another, so there are occasional strains within the relationship. The MOPH's primary concern is protecting Thai citizens and promoting public health. There is little emphasis put towards publishing, something the U.S. side of AFRIMS emphasizes as part of the "Three Ps" (products, publications, and partnerships). Additionally, gaps occur with AFRIMS research because it grants funding for projects gradually instead of giving one lump sum. This prohibits the MOPH from using its extra resources to benefit locals. Thai Government Official 3 and U.S. Government Official 1 explain that more work needs to go towards working together on the "common problem" and maintaining continuity between projects.

Literature Review

Since the 1958 cholera epidemic, there have been a few situations that have contributed to defining the Thai MOPH's positive relationship with AFRIMS and the international health community: the tsunami in 2004/2005, Avian Influenza in 2004, the HIV/AIDS epidemic, and H1N1 in 2009, when Thailand requested active surveillance assistance from outsiders. After the tsunami, three teams from the CDC and AFRIMS used a World Health Organization (WHO) rapid assessment tool wherein "investigators collected data on hospital characteristics; damages to buildings and communication, electricity, water, and sewage systems; adequacy and conditions of health-care personnel, medical supplies, and morgue facilities; and anticipated medical needs" to six infected provinces from December 30, 2004 to January 6, 2005.[65] In the end, the Morbidity and Mortality Weekly Report (MMWR) determined that they were able to implement "active surveillance for 20 of the diseases plus wound infections and electric shock."[66] Overall, the reports found that the MOPH, the CDC, and AFRIMS were effective in identifying disease clusters and responding rapidly. The report recommended that future funding is appropriated to sustainable projects such as public sanitation and maintaining laboratory capacity for infectious diseases.

The Avian Influenza epidemic was slightly more controversial in the sense that it took approximately three months for the Thai government to announce that H5N1 had reached Thailand. Experts such as Safman felt that policy makers took this approach because of political and economic interests. The biggest reason was the Asian Financial Crisis in 1997 that "sent the Thai currency (the baht) into free fall, displaced tens of thousands workers, and undermined confidence

[63] U.S. Government Expert 1.

[64] Brown and Nitayaphan, "The Armed Forces Research Institute of Medical Sciences: Five Decades of Collaborative Medical Research," 47.

[65] Centers for Disease Control and Prevention (CDC). "Rapid Health Response," 62.

[66] Ibid.

in the country's financial management." [67] The 2003 SARS outbreak undoubtedly hurt Thailand's tourist industry. Additionally, new government leadership reshaped political interests; Thaksin Shinawatra, a powerful entrepreneur who made billions of dollars in the telecommunications industry, became Prime Minister (2001-2006), and is now a fugitive. He invested heavily in export-oriented business and was a "strong backer of pro-poor legislation such as low-cost health care and direct government investment in rural areas."[68]

Thailand, along with other Southeast Asian countries, was reliant on labor markets in the agricultural sector, and as a result, questioned whether it should prioritize the avian influenza outbreak. If Thailand had announced H5N1, all infected flocks would have been culled and poultry trade would have been temporarily halted; a devastating implication considering that Thailand was one of the world's major poultry exporters. Additionally, Thailand risked losing other markets linked with agriculture. Experts explained this further when they stated that international trade was not the only business being threatened; Thailand had specialized and was seen "as a major supplier of poultry genetics, poultry production inputs, and technical assistance."[69]

Structural challenges also played a part in the effectiveness of infectious disease surveillance systems. Experts felt that more effort should have been put towards identifying risk factors that impact the ecology of H5N1. For example, one study showed that there was a "strong association between the H5N1 virus in Thailand and the abundance of free-gazing ducks, and, to a lesser extent, native chickens, cocks, wetlands and humans."[70] Another Thailand community study "found that 12%-61% of rural residents had regular contact with backyard birds."[71] More energy should have gone towards understanding how pathogens initially transmit in animals. By regulating the movement of free grazing ducks in rice fields, health experts would have been able to reduce the chance of transmission to terrestrial poultry. They could have also reduced the spread of pathogens resulting from migration.[72] Moreover, they would have been able to control H5N1 by teaching "best practices" to the surveillance staff and by providing farmers education so that they could benefit from early virus warnings in their flocks. Slow responses showed that more emphasis is needed in building Thailand's veterinary surveillance system.[73]

AFRIMS has played a key role in providing resources when the MOPH lacks either laboratory or technical capacity. It created a web-based surveillance system to monitor avian influenza. In the future, it hopes to link all systems (the MOPH, the Ministry of Agriculture, and AFRIMS supported projects) to ensure sharing of "data on zoonotic illnesses between ministries at

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[67] Safman, "Avian Influenza: Science, Policy, and Politics," 169.

[68] Ibid., 171.

[69] Rushton et al., "Impact of Avian Influenza Outbreaks in the Poultry Sectors of Five South East Asian Countries (Cambodia, Indonesia, Lao PDR, Thailand, Viet Nam)," 3.

[70] Gilbert et al., "Free-grazing Ducks and Highly Pathogenic Avian Influenza, Thailand," 227.

[71] Chotpitayasunondh et al., "Human Disease from Influenza A (H5N1), Thailand 2004," 205.

[72] Gilbert et al., "Free-grazing Ducks," 234.

[73] Tiensin et al., "Highly Pathogenic Avian Influenza H5N1, Thailand, 2004," 1671.

the provincial and national level."[74] This will, it is hoped, reduce some of the gaps and provide a quicker response. In the end, Thailand slaughtered over 62 million birds; this decreased the transmission rate from animals to humans. Within 2 months, the number of human cases decreased significantly; however, if Thailand had detected H5N1 more quickly and responded more aggressively, more lives might have been saved.[75] As Tiensin and others note, "the delay between primary infection, first diagnosis, and finding the initial case allowed widespread dissemination."[76]

While some see the epidemic as managed poorly by Thai government, many of the authors expressed confidence in Thailand's surveillance capabilities. Once the Thai government decided to take action and announce the outbreak, the MOPH and the WHO established a surveillance system to interview patients from health care facilities with influenza or pneumonia symptoms to see if they had been exposed to poultry in the last seven days.[77] Safman states that:

> Although, there were substantial number of human infections (a total of 25 cases resulting in 17 deaths) during the early years of the epidemic, by late 2006 Thai public health officials appear to have been successful in decoupling the spread of infections in humans from poultry outbreaks and since 2007 no human cases of the disease have been recorded.[78]

In addition, the MOPH has taken significant efforts to create a health prevention campaign that emphasizes best practices when consuming chickens. A recent study showed that while high-risk behavior remains in handling poultry, the MOPH was effective in reaching the most rural populations.[79] In the future, Rushton and others suggest that more resources should go towards improving micro-level impacts so that there is an "understanding of the winners and losers in an outbreak situation."[80] This will allow policies and actions to be created in a way that encourages collaboration among actors.

Although Thailand was hesitant to announce avian flu, it was "one of the first countries to define HIV/AIDS as a national security threat."[81] Preventative HIV/AIDS education was first introduced by the Royal Thai army in the late 1980s,[82] and was later announced as a national

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[74] The Institute of Medicine. "Review of the DoD-GEIS Influenza Programs: Strengthening Global Surveillance Response," 85.

[75] Chotpitayasunondh et al., "Human Disease from Influenza," 207.

[76] Tiensin et al., "Highly Pathogenic Avian Influenza," 1669.

[77] Chotpitayasunondh et al., "Human Disease from Influenza," 202.

[78] Safman, "Avian Influenza: Science, Policy, and Politics," 173.

[79] Olsen et al., "Poultry-handling Practices During Avian Influenza Outbreak, Thailand," 1601.

[80] Rushton et al., "Impact of Avian Influenza Outbreaks," 22.

[81] Chuenchitra et al. "The Development of HIV Research," S321.

[82] Saengdidtha and Rangsin, "Roles of the Royal Thai Army Medical Department in supporting the country to fight against HIV/AIDS: 18 years of experience and success," S378.

priority by the government from 1993 to 1997.[83] The MOPH and other government agencies created a preventative HIV campaign that announced free condoms to all and explicitly recommended that all men use protection when engaging in commercial sex.[84] It was not until 1997, when the campaign ended, that HIV cases peaked in Thailand. Punyacharoensin and Viwatwongkasem speculate that the increase in reported cases was either connected with the Thai economic crisis and/or the cases had been previously underreported: "…several projects were either downscaled or suspended, and HIV/AIDS programs were not an exception. Domestic HIV/AIDS funding fell from almost 2.2 billion Baht in 1997 to less than 1.5 billion."[85] If free preventative health campaigns had not been cut, more individuals may have continued using safe sex practices.

The MOPH and the CDC now report, "…over 500,000 persons in Thailand are HIV infected."[86] AFRIMS played a key role in strengthening existing HIV/AIDS laboratories in Thailand; it was able to provide resources when requested by the MOPH and training on "biosafety, GLP, research methodology, relevant immunological, molecular and virological tests, storage, specific assays, and data management."[87] In addition to AFRIMS, HIV/AIDS laboratories have received support from other entities such as the CDC, non-governmental organizations, the WHO, and universities. The CDC and MOPH states: "Nearly 80% of public hospitals now participate in HIVQUAL-T. As a result, quality-of-care indicators in those hospitals are on the rise."[88] Intense collaboration between partners has expanded Thai capabilities, but the reports above suggest that improvements in confidentiality practices and technology practices are still necessary.

In contrast, according to the CDC, "During 2009-2010, a total of 234,050 influenza cases were reported in Thailand. Of these, 47,433 were laboratory-confirmed to be A(H1N1)pdm09 virus infections; 347 deaths were associated with the confirmed cases."[89] One author found that 67% of provinces were missing key equipment, such as medical ventilators, while others had a surplus of

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[83] Perez-Losada et al., "Phylodynamics of HIV-1 from a Phase III AIDS Vaccine Trial in Bangkok, Thailand," 1.

[84] Hanenberg et al., "Impact of Thailand HIV-Control Program as Indicated by the Decline of Sexually Transmitted Diseases," 245.

[85] Punyacharoensin and Viwatwongkasem, "Trends in three decades of HIV/AIDS epidemic in Thailand by nonparametric backcalculation method," 1150.

[86] Thailand MOPH and CDC, "Partners in Progress: Biennial Report 2009-2010," 16. HIVQUAL-T is a program that uses NHSO guidelines to improve quality of care for HIV patients: "Key indicators such as checks of the immune system (CD4 count), viral load monitoring, opportunistic infection prevention, tuberculosis screening, and promotion of antiretroviral treatment adherence are now increasingly common at HIV clinics in Thailand, thanks to HIVQUAL-T."

[87] Chuenchitra et al., "The Development of HIV Research," S318.

[88] Thailand MOPH and CDC, "Partners in Progress," 16.

[89] Ungchusak et al., "Lessons learned from Influenza A(H1N1)pdm09 Pandemic Response in Thailand," 1059.

resources.[90] Some authors mentioned financial concerns prohibiting Thailand from providing complete care. For example, the WHO recommends that all countries carry a 20% stockpile of antivirals; however, Thailand had approximately 1% prior to the A/H1N1 pandemic because it was not financially feasible to store such a large amount.[91] To manage the outbreak, Thailand developed a health campaign that focused on safe practices for preventing the spread of influenza. Control measures included self-isolation of infected cases, delaying mass gatherings, five-day school closures, educational pamphlets, hand washing, and animal handling hygiene.[92]

In 2010, Thailand provided antiviral medication for at-risk populations—elderly, pregnant women, and healthcare workers. One study showed that, although surveillance was extensive and preventative measures effective, better results could have been achieved by delaying school re-openings, avoiding "epidemic rebound."[93] The MOPH and the WHO did a joint study to evaluate lessons learned, mostly because they had received negative public feedback on pandemic management. Their results showed that the MOPH was transparent and handled the situations adequately. For future outbreaks, they recommended that more attention be placed on "surveillance, laboratory capacity, hospital infection control and surge capacity, coordination, and monitoring of guidelines for clinical management and non-pharmaceutical interventions, risk communications, and addressing vulnerabilities of non-Thai displaced and migrant populations."[94]

While there are many lessons to learn, it is important to remember that EID surveillance capabilities and strengths in developing countries vary from region to region. Because there are weak links in the system, it can be difficult to understand how competently one country can manage a pandemic.[95] There have been multiple studies assessing EID surveillance and national healthcare capacity, but little has been done to explain the complexity and constant change in pandemic policies. This report is unique in that it evaluates capacity as well as political and socio-economic encounters that can alter decisions in regards to disease surveillance. By examining lessons learned and evaluating key players, health experts can create surveillance systems in the developing world that are more effective and specific to host countries' needs.

Methodology

The purpose of this report is to create a list of lessons learned and best practices for dissemination to other developing countries, so they can improve their EID surveillance systems.

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[90] Krumkamp et al., "Health Service Resources Needs for Pandemic Influenza," 7.

[91] Hanvoravongchai et al., "Pandemic Influenza Preparedness and Health Systems Challenges in Asia: Results from Rapid Analyses in 6 Asian Countries," 9.

[92] Meeyai et al., "Pandemic Influenza H1N1 2009 in Thailand," 59.

[93] Ibid., 67.

[94] Ungchusak et al., "Lessons learned from Influenza A(H1N1)pdm09 Pandemic Response in Thailand," 1058.

[95] Hanvoravongchai and Coker, "Early reporting of pandemic flu and the challenge of global surveillance: A Lesson for Southeast Asia," 1098.

To prepare, we took insights from the literature review above and created a qualitative comparative case study that examines the state of diagnostic labs in Thailand. Moreover, we considered the political, economic, and cultural barriers that affect disease surveillance and evaluated the impact these factors had on relationships between government agencies, private institutions, and international organizations. The discussions were based on previous research examining the closure of the Naval Area Medical Research Unit 2 (NAMRU-2) in Indonesia and the country's declaration of viral sovereignty (viruses belong to the country in which they are found), the experience of Cambodia with respect to EID surveillance, and Mexico's handling of A/H1N1 in 2009. The ultimate goal is to create a better understanding of potential indicators for conflict (military and international), so that labs can improve systems and prevent future closures within host countries' governments.

These interviews followed a semi-structured format and were conducted with the help of two research assistants in June 2012. The team interviewed nearly 30 public health experts and gathered more than 100 pages of notes in the span of a week. Moreover, since the author is affiliated with the Naval Postgraduate School and the research is somewhat sensitive in nature, the majority of interviewees requested a proposal, a list of sample questions, and a CV in the preceding weeks for their superiors to review and approve. Additional background information was provided to ensure that interviewees understood that the goal was to assist developing countries struggling to build effective disease surveillance systems, and not to critique their organizations or host country. Building rapport increased the likelihood of honest responses and ensured an enhanced collaborative environment so that the report could be used as a tool for the organizations involved.

Results

Throughout the study, several interviews were set up in Bangkok to identify economic, political, and cultural barriers that could potentially prohibit Thailand from implementing a strong EID surveillance system. In the end, the author conducted 14 individual interviews and four group interviews, meeting approximately 30 public health officials in government, non-government, and donor agencies. Table 3.1 lists the most commonly identified barriers in the order of their importance by frequency across interviews.

Table 3.1 Thailand: Key Issues Identified in Bangkok Interviews

Political Barriers	Percent of Interviews That Identified Barriers
Miscommunication between health organizations	10 of 18 = 55%
Health organizations have overlapping missions and objectives/lack of collaboration	9 of 18 = 50%
International organizations looking out for self-interests and not host-country (e.g.: publishing)	7 of 18 = 38%
Government bureaucracies between AFRIMS and Thailand	7 of 18 = 38%

Centralized health care, moving to more decentralized approach	2 of 18 = 11%
Economic Barriers	**Percent of Interviews That Identified Barriers**
Gap with border areas, primarily because of migration	6 of 18 = 33%
Difficult to keep trained technicians in rural areas	5 of 18 = 28%
Tourism and poultry industry	5 of 18 = 28%
Government/Political parties not seeing health as priority, budget goes to defense and education.	4 of 18 = 22%
Cultural Barriers	**Percent of Interviews That Identified Barriers**
Mistrust in international community (suspicious of what happened in Indonesia)/data transfer difficult	7 of 18 = 38%
Superiority and age	6 of 18 = 33%
Rabies- cannot get rid of dogs	3 of 18 = 17%
Thai experts non-confrontational	3 of 18 = 17%
Traditional medicine often used first	2 of 18 = 11%

Note: Some interviews included more than one expert.
Source: Analysis of interviews conducted.

Specific Political Findings in Thailand

Thailand has contributed to funding and building human health programs, yet it still lacks the capacity to manage the economic, political, and cultural barriers that come from working with agencies with disparate interests. Unlike many developing countries, Thailand has an advanced ability to undertake disease surveillance. For example, when interviewers inquired about whether basic needs such as laboratory equipment, technology, human resources, and experienced staff were met, interviewees overwhelmingly stated that it was not a concern. As Health Expert 4 notes, "this is because of our extensive health care system; the skeleton already existed;" this infrastructure was implemented at the community level prior to any serious outbreak.

Thailand's focus on disaster management and human health has produced a superior network. Thailand was able to use its trained village health volunteers and request assistance from its natural disaster referral system to respond quickly to the Avian Flu outbreak. In fact, according to Health Expert 2, the majority of countries in Southeast Asia view Thailand as a regional leader and use it as a model for surveillance systems. From 2006-2009, the CDC's Global Disease Detection (GDD)-Thailand program responded to 39 outbreaks, established capacity for 27 pathogen-specific tests, discovered 12 new pathogens in the region or the world, and trained 7,421 public health officials from over 20 countries.[96] Furthermore, Thailand has expanded its cross-border program

[96] Centers for Disease Control and Prevention, "CDC Southeast Regional Office Annual Report FY 2009," 9.

by evaluating frequency, creating new strategies to collaborate regionally, and by providing resources to less developed countries.

Overlapping Missions and Objectives

Staff has the capacity to conduct surveillance, but the majority of the interviewees felt that Thailand struggles to effectively collaborate on interests between health sectors and bordering countries, especially when evaluating the ability to detect disease in animals before it reaches humans. Interviewees and donor agencies complained about the small amount of attention going towards zoonotic surveillance. They recommended that Thailand continue to restructure its programs to fit the One Health Concept, which links systems "… by enhancing cooperation and collaboration between physicians, veterinarians, other scientific health and environmental professionals and by promoting strengths in leadership and management to achieve these goals."[97]

The MOPH's missions and objectives diverge from the missions and objectives of the Ministry of Agriculture or the Department of Wildlife, explains Donor Staff 2: provinces and key internationals organizations are working autonomously to tackle EID surveillance systems. If the animal and human sector aligned their efforts, they could prevent duplication of tasks and reduce misunderstandings that come from assuming that one sector will manage a specific assignment. Health Expert 3 suggests that the government includes more experts when proposing a solution to handling an outbreak. Now, the MOPH is the primary actor, but it has had to reduce surveillance teams because of reduced government funding. To ensure funds are distributed correctly and farmers are properly compensated, "More money needs to go towards supervising the MOPH," states Health Expert 3. In the future, it would be beneficial to include provinces assessment because they may have ideas on ways to be resourceful, especially if areas that have dealt with emergencies.

Miscommunications Between Health Organizations

Donor Staff 3 believes that Thailand's main obstacle is managing miscommunication between actors, describing the situation as a "competitive relationship." While many of the interviewees agreed miscommunication was a factor, the majority experienced the competitive environment in laboratories: every scientist wants to be the first to get the specimen so they can announce and publish results. For example, during the Avian Flu outbreak in 2004, the Prime Minister and Director General agreed to let the Department of Agriculture be the first to announce that it had found human cases of Avian Flu in Thailand. However, for some reason, the Ministry of Health declared it one hour prior. This action created tension between the two Ministries and instilled mistrust within the health community.

Communications of outbreaks have been mishandled in the past. According to Donor Staff 3, when a visiting group first contracted A/H1N1, the MOPH called a press conference in the interest

[97] One Health Initiative, "Mission Statement," 1.

of transparency, asking the CDC and WHO to join. The MOPH announced the outbreak, but, to protect the families, refused comment. The resulting media frenzy spiraled out of control; members of the press believed that they had a right to know if there was an actual outbreak. Had health experts and the international community generated an action plan before the announcement, the press would have not reacted so harshly. The good news is that the MOPH is aware of the problems that come when various groups transmit conflicting information, and has put together a committee that controls messages to the public. Now, it tries to be proactive with the media and "bring people to talk about opinions and in the end have one person speak on behalf of the committee," says Local Donor Staff 1. This has helped, but there are still a few groups which the MOPH cannot control. Local Donor 1 especially sees this with politicians: "We try to prep politicians … but cannot control what they say."

To lessen the competition, Donor Staff 3 recommends identifying comparative advantages and constraints when working with partners. International partners—ostensibly neutral parties—could leverage capacity and stimulate cooperation between conflicting health sectors. Local Donor Staff 1 felt that inconsistencies were rooted in the MOPH's inability to officially meet with the secretary, steering committee, and technical committee to create common objectives. "We have not met formally for 3-4 years," states Local Donor Staff 1. These meetings are often scheduled, but cancelled, because they consist of senior officials, who are focused on multiple initiatives. There are many informal meetings taking place between health organizations to mesh objectives, but the challenge is that new procedures cannot be initiated unless they are approved formally. Both technical and higher-level MOPH staff should be more engaged in the process in the beginning of their employment, explains Local Donor Staff 1. With the constant change of policies and American directors, and Thai counterparts always rotating, consensus is difficult.

Bureaucracy between AFRIMS, International Organizations, and Thai Government

While it is easy to criticize the MOPH for miscommunication, it also should be noted that some of the challenges are intrinsic to the relationship between international organization and the Thai government. For instance, research funds are given for a short period of time and "from project to project," explains Thai Government Official 3. If there is a gap in funding or if AFRIMS has restrictions on how funds are used, the MOPH may prioritize tasks or manage projects differently. Even when research is approved and funds are guaranteed, there are still obstacles to overcome. U.S. Government Expert 2 sees this with veterinary surveillance. If animals are endangered or if they are being monitored in a certain area, permits can be blocked. The best way to deal with challenges is to maintain a positive attitude, says U.S. Government Expert 2; "learn the culture, love the culture, but realize that you can only abide to certain practices."

Gaining approval for certain projects in AFRIMS can also be problematic. As Health Expert 1 remarks, AFRIMS staff cannot work outside their chain of command, and the finishing officer, who approves all projects, usually has no vested interest to complete the task. Vital processes are frequently being stopped for review, which prevents a quick response from health experts. This

becomes especially difficult if Thai government and international institutions' rules and regulations are contradictory; for example, when the overseas Institutional Review Board (IRB) processes do not connect with in-country IRBs, states U.S. Government Expert 2.

International Organizations Looking Out for Individual-Interests

On a positive note, Thailand has the resources, laboratories, and equipment to ensure strong research capacity and infection control. Health Expert 1 agrees that the necessary infrastructure is available but is concerned because local diseases are not always prioritized. The diseases that are researched are usually of interest to internationals or the military, since they are the primary sponsors. The example given was Melioidosis, an emerging infectious disease that most commonly affects rice farmers in Thailand. According to Health Expert 1, it kills more people than malaria in Cambodia, but it is unknown to the majority of people in Thailand because it mainly affects the poor and requires special, costly treatment. International organizations, like AFRIMS, could be useful in initiating programs that particularly affect rural areas. Host-country focused disease research would highlight how AFRIMS and other international organizations contribute to improving surveillance programs.

When international organizations emphasize their research interests, they are often perceived as burdens to a host country. As U.S. Government Expert 4 states, there must be buy-in: the host country must want you there. Even though the majority of experts felt that the MOPH and AFRIMS had a positive relationship (and thought highly of the AFRIMS reference lab), there were a few health experts that mentioned challenges that caused conflict. The biggest criticism was AFRIMS officials wanting to be the main principal investigators (PIs) on the research project. When Thai experts expressed the concern that they were being exploited, AFRIMS was quick to change its model so that Thais received credit. While this has improved the relationship, Health Expert 1 states that research funding remains competitive between both parties. Donor Staff 1 has found that organizations deal with the bureaucracy by being more proactive; for example, one university has an agreement with national parks that reduces the redundancy of the approval process, yet assures national parks that they are meeting the appropriate standards.

In addition, Thai Government Official 3 mentioned the emphasis on publishing from AFRIMS and other international organizations. Interviewees felt the pressure to publish, and this generated more division than partnership. U.S. Government Official 2 recommends that international organizations expect outside staff to stay for the long term so that they are less likely to feel pushed to publish and cut corners. Krumkamp and others agree that there is an "under-representation of research in developing countries, ranging from poor research capacity to publication bias of journals against so-called 'disease of poverty.'"[98] More emphasis needs to be placed on actual surveillance in Thailand and less on clinical studies of the state of illnesses, says Health Expert 1.

[98] Krumkamp et al., "Health Service Resources," 8.

While the international community needs to assist host-countries in building capacity, it also needs to be careful in giving too much support, especially in advanced technology. If the U.S.-component of AFRIMS donates technology, it needs to ensure that the host country has the capabilities for maintenance, explains U.S. Government Expert 4. When asking if this was a problem in Thailand, the majority of experts said that Thai experts knew the risk of developing too quickly and were capable of maintaining their own laboratories and equipment. The other challenge is to build sustainable programs. "If you build programs without asking them if they want it, it will guarantee failure. The country will never want to take it over," observes Local Donor Staff 1. To create a successful program, Local Donor Staff 1 recommends building a system within the MOPH and collaborating with donors to ensure that there is mutual interest.

Specific Economic Findings in Thailand

Money Matters

In the past, markets in Thailand had a significant impact on the implementation of EID surveillance. Exporting poultry and tourism were two of Thailand's main economic justifications for delaying the announcement of Avian Flu in 2004. After interviewing multiple health experts, we found that the majority of interviewees expressed concern that budget constraints could potentially influence how policy makers react to future outbreaks. Foreign investment receives priority over public health initiatives because Thailand's economy would crash without tourists and exports. This is not to say that the MOPH did not learn from past events; most interviewees stated that the MOPH has taken significant steps to enhance transparency about new pathogens. The government realized its mistakes and took steps to improve emergency risk communications for senior representatives. However, recent situations such as the 2011 Chang Mai incident, during which multiple tourists died suddenly from a mysterious illness in the same hotel over the course of a few weeks, have shown that provinces may still be hesitant in speaking about the severity of an outbreak. Donor Staff 3 notes that continued efforts towards convincing local institutions to report unusual illnesses are important. Thailand's commitment to open communications regarding potential outbreaks will be determined by political issues within Thailand and its ability to trust that the international community has its best interest at heart.

The Thai government could have announced Avian Flu sooner, but experts did positively comment on how the government dealt with the poultry sector. The prime minister compensated approximately 75% of market price to farmers, says Thai Government Official 3. The government was active and decisive in choosing how to compensate farmers, which greatly improved field operations and response times. Additionally, the MOPH spent time speaking to individuals who resisted killing chickens so that locals understood the severity of the situation. According to Thai Government Official 3, the key to dealing with a local outbreak is communication: "If neighbors recognize that killing chickens prevents their neighbors from getting it, they will do it." Health Expert 3 agreed that poultry compensation was managed adequately, but felt that more funding

should have gone to social services and spread to certain regions that received less assistance and financial compensation. Providing social services would have shown that the international community and the MOPH were looking out for the province's best interest.

Health As a Priority

Recently, there has been a push to provide more research and greater health resources. Creating EID sustainable surveillance infrastructure in Thailand is problematic because the government does not always prioritize surveillance; the majority of its funds go towards defense and education. Health Expert 6, for example, states that the "government is trying to increase research and development to 1% of GDP, but it is still only at 0.4-0.5%." The private sector has contributed funding, significantly improving surveillance systems. Furthermore, policy makers need to emphasize the importance of EID surveillance. Having a health advocate is important to educating the public about the severity of the issue, explains Health Expert 3: "we need to tell the public how the disease spreads, how to prevent it, and how to behave during an outbreak." Health Expert 6 recommends funneling more funds towards the Department of Livestock to build capacity to conduct animal surveillance and detect diseases before they jump to humans.

Thailand lacks funds, but it has many investments and is transparent regarding asset distribution. Corruption is not a problem from a technical level. There is a strict audit process; if projects are not accomplished, the bureau of administrative funds will not allocate the funds, says Health Expert 3. Resource allocation decisions are currently centralized, but a few interviewees expressed doubts about pending decentralization. Giving more power and resources to local governments could potentially increase economic barriers to the health system in Thailand. Health expert 4 explains this further: "Since most locals lack experience with financial decision making, there is concern that less will go towards health and more towards infrastructure." With infrastructure, there is more to gain financially for locals. Thailand's construction companies would be able to profit immensely, improve employment opportunities, and provide business ventures with funds that are supposed to be specifically allocated towards disease surveillance projects. Health Expert 4 recommends that the central government take an advisory role and require a final assessment to ensure that funds are being distributed to the public health sector. Health Expert 1 agrees that surveillance is done best when leadership is at the top; however, to gather best results, the person leading initiatives should be someone with a political background and strong connections so that he or she can have some influence within government.

Difficulty in Keeping Trained Technicians in Rural Areas

Compared to other developing countries, Thailand has one of the strongest EID surveillance training programs. The majority of interviewees said that it was not difficult to keep Thai experts in the country because they are paid a decent wage. If individuals do leave, they usually go to the CDC or another international organization, says U.S. Government Expert 1. Thailand continues to expand

its qualified staff by providing special funds for research and advanced education. Moreover, academics may be awarded a one-time bonus if they receive a grant or publish. "By giving a grant, there is a salary incentive to stay in Thailand," expresses Health Expert 6. While there are grants available to Ph.D. students, Health Expert 7 said that it can be difficult to access due to limitations. The MOPH also gives a 10,000 baht bonus to government workers. "The challenge is that people can make more money in the private sector, the salary is double," states Health Expert 3. If individuals do work for the MOPH, they usually are doing contract work on the side. Rural areas are somewhat strong in regards to infrastructure, but it is difficult to retain skilled staff, making it difficult to maintain the sustainability of surveillance systems. Staff need to be trained from the ground up, but generally do not want to stay in rural areas. "As soon as they receive training, they leave to the capital," explains Health Expert 1. It is particularly difficult to train individuals in rural areas to do veterinary surveillance because many vets prefer to work in the private sector with household pets. Every year, less attention is allocated for the animal sector and the shortage of trained veterinary specialists increases, says Health Expert 4. The CDC and the MOPH are aware that vets lack capacity and have introduced a new program called "Field Epidemiology Training Program for Veterinarians (FETP-V), which aims to increase expertise and capacity in zoonotic epidemiology."[99]

Migration from bordering countries can be a huge hurdle for most developing countries. Thailand is not an exception; it wants to attract migrants for the cheap labor, but is also aware of the difficulties that can occur when collaborating with neighbors. Migrants are particularly prone to emerging infectious diseases in the Mekong Basin Region because their living conditions are extremely difficult, says Donor Staff 3. According to Coker, "Thailand is estimated to have 1.5-2 million immigrants from neighboring countries, and about 150,000 refugees. Large-scale migration of economic and political refugees, including the frequent movements of hill tribe populations along with their livestock, present[s] substantial challenges to cross-border disease control in the Mekong Basin subregion."[100] Diseases continue to spread through bordering areas, yet countries and regions will not come to a consensus or talk about important underlying issues. Additionally, rural locals often use traditional medicine when they first experience symptoms of illness, so health officials may be unaware of the initial outbreak until it spreads to another location. The lack of collaboration makes strategizing and sharing information particularly difficult between local, international, and regional groups working in rural areas.

While Thailand struggles with providing services to migrants, the Joint Review on Preparedness and Response report states that the core challenges are cramped living conditions, limited resources for staff, training on clinical practice guidelines, and preventative health education. The study found that Thailand had sufficient capacity to conduct human surveillance.[101] Donor Staff 3, who was aware of the study, said that communication was weak in assisting migrant

[99] Thailand MOPH and CDC, "Partners in Progress," 38.

[100] Coker et al., "Emerging Infectious Diseases in Southeast Asia," 603.

[101] MOPH-WHO, "Joint Review (MOPH-WHO) on Preparedness and Response to Pandemic Influenza (H1N1) with Focus on Vulnerable Non-Thai Populations," 5.

camps, but "they found no evidence of people in need not getting care." Thai and local experts are aware and are now trying to work side by side to educate the rural population about disease management so that provinces understand the symptoms and can be proactive in using preventative techniques. Significant actions have been taken by regional groups to build trust in human diseases since 2005; however, Health Expert 2 states that it will take some time before partners are willing to cooperate on zoonotic diseases since veterinary surveillance still lacks capacity.

There needs to be political commitment to improve EID surveillance. Bureaucratic and political arrangements keep countries from being open and honest: "Cambodia is willing to share, but Vietnam cannot because of it unilateral system," explains Health Expert 2. These political strains also occur within and between countries. Examples of these strains are the "lingering border dispute centered on Preah Vihear temple between Thailand and Cambodia, an ongoing ethnic separatist insurgency in the south of Thailand, recent violence associated with elections in the Philippines, and terrorist attacks on tourist areas in Indonesia," write Coker and others.[102] Tensions in the Southeast Asia region can be managed by strong leaders to direct regional cohorts towards a solution. As security improves, countries will have more success in transporting samples, getting experts in the field, and gathering advice from regional and local partners.

Specific Cultural Findings in Thailand

Mistrust in the International Community

Interviewees felt that the majority of miscommunication errors stemmed from cultural cues between internationals and the Thai community. Health Expert 6 felt that Thai citizens in rural areas are accepting of most western practices: "They are more concerned with relationships and feelings, if they can trust you or not." Donor Staff 1 says that a large amount of the mistrust originates from what occurred in Indonesia with NAMRU-2 and viral sovereignty; the MOPH are worried that someone may take the samples and publish in the U.S. before the disease is announced. Thailand is possessive of its viruses (and understands Indonesia's viral sovereignty concerns) and fully supports Indonesia's decision to assert more control. Health Expert 5 agrees, and further states that the Thai government is, "concerned with specimens being shipped abroad because of security issues."

Due to this mistrust, the majority of conversations with officials are informal. Thais will go to great lengths to keep information confidential. For example, Donor Staff 3 says that human resources will occasionally hide outbreaks on their webpages or put it in Thai language so that the diplomatic community cannot read updates or public warnings. Hiding documents will create tension in the future, especially with the power of social media and the likelihood of the

[102] Coker et al., "Emerging Infectious Diseases in Southeast Asia," 607.

international community discovering the outbreak. It is better to be truthful, explains Health Expert 4: "if you are transparent, people will be more willing to help and it will be easier."

To improve partnerships and sustain results, donor funds should be utilized and developed in a way that accentuates the importance of building trust and relationships. Moreover, programs should be introduced autonomously by key members at the MOPH so that the Thai government can be perceived as a regional leader in EID surveillance. Thailand desires the resources and technology, but does not want to be "joined at the hip with the international community," explains Donor Staff 3. Thailand's government will be more likely to tackle difficult situations if it is able to profit from the success and make the project its own.

Additionally, the government needs to create guidelines that will ensure a positive relationship and response from health networks. To do so, the Thai government has collaborated with international organizations and developed memorandums of agreement (MOAs) to outline roles and regulations, so both parties can meet upon a fixed objective. These MOAs are "strict on who gets the specimens, who is the owner, and who publishes the test results," states Local Donor Staff 1. This interviewee believes that a clear and transparent MOA will increase the likelihood that both parties will work together in a positive and open manner. The government has also created an Ethical Review Board that demands that a Thai PI is on the research project. This policy was implemented to ensure Thai experts are key players in developing new research. According to Local Donor Staff 1, this guarantees that Thais "are the only ones that can sign a transfer of virus safeguard to ensure Thais are protected."

The majority of interviewees see the Thai Ethical Review Board (ERB) as a positive institution to instill trust in partnerships; however, there were a few academics concerned that bureaucracy could slow down research (or even bring it to a halt) if political officials decided to withhold information deemed not in the political or economic interest of Thailand. Donor Staff 1 observed government pressuring academia on the results of a surveillance study that placed hospitals in an unfavorable light. Academics get particularly frustrated when the ERB decides to destroy samples after a certain period of time. "It can be difficult to collect a sample bank," explains Health Expert 4. These types of actions indicate that the ERB can be an obstacle if it is not managed properly. Although formal documents and bureaucratic measures create more assurance, they are not the solution. Every time an official transfers or leaves his or her job, relationships need to be rebuilt and trust needs to be reinstated, says Health Expert 5. Continuous strides need to go towards interlinking community efforts, gathering consent from the government, and building trust between partners.

Thai Experts Non-Confrontational

Miscommunications can also occur when the international community is unaware of their cultural mishaps. A few of the interviewees stated that it is common for Thais to be non-confrontational; "they may say yes, but they mean no," says Local Donor Staff 1. In addition, officials may ignore the international community's recommendations and fix institutional inadequacies

based on experts from Thai government. "They will not always take lessons learned from other countries," notes Donor Staff 3. This decision to stay Thai-focused is cultural, but it is also political. "It is all about being the best in Thailand," explains Health Expert 1. Thailand wants to maintain its independence and regional leadership role. Using lessons learned from other countries and provinces could save Thailand a lot of time, money, and political capital. For example, countries or regions that have strong surveillance systems may have recommendations on how to deal with complex bureaucratic issues or economic barriers. If a region is struggling during an outbreak, the MOPH should consider consulting other nearby provinces to get new concepts and resources, explains Health Expert 3.

Cultural Practices That Limit Effective Surveillance

While there are not any cultural barriers that prohibit surveillance, there are constraints that prevent health experts from providing quick responses to epidemics. Almost all the interviews said that the Southeast Asia region struggles with deference to seniority and age. "There is a youngest to oldest problem. Younger people may have more technical experience or be safer than older people, yet they are taken less seriously," observes Health Expert 3. In some laboratories, Health Expert 3 said that it was still difficult to convince senior officials to wear masks or gloves. While this is disconcerting, most interviewees felt that disputes occurring in Thailand between counterparts have decreased significantly. "This generation is more educated; we are teaching younger employees to question elders or senior staff," says Health Expert 1. Challenges arise when health experts collaborate on cross-border issues with other countries or when they are working with rural populations. Laboratories in different countries that seek regional advice or services may be unwilling to make a decision until gathering approval from their superior. "What happens when someone from Laos is out and junior officers cannot finish the project?" asks Donor Staff 1. Education is the key to fixing hierarchical issues, says Health Expert 6, "questioning superiors is improving as we work with international organizations."

Rabies: Is it a Problem?

Interviewees expressed mixed opinion on whether or not rabies is problematic in Thailand. Since the majority of the interviewees were not veterinarians, they could not accurately comment on this issue. Two of the interviewees, however, said that rabies was concerning in Thailand. Just as on the island of Bali, Indonesia, with its Hindu beliefs, Thailand's Buddhist values make it culturally unacceptable to kill dogs (hence the phenomenon of the abandoned temple dogs in both Bali and Bangkok), observes U.S. Government Expert 4. Furthermore, this interviewee states that, in this case, statistics from government are not always transparent. If there was an advisory warning on the Department of State website, it could impact whether or not tourists come to Thailand, explains U.S. Government Expert 4. Donor Staff 1 disagreed and said that rabies was no longer a concern.

This interviewee stated that there was already a plan in place to eradicate rabies in Thailand by 2020.

Conclusion

The primary challenges impeding surveillance in Thailand could be improved by increased collaboration and communications. Healthy competition can actually stimulate more change and build capacity, but (as in this case) it can also have the tendency to disconnect groups. International organizations, such as the CDC, the WHO, and AFRIMS, should use their neutral status to help link different networks in Thailand—and apply lessons learned—without compromising the independence of Thai surveillance capabilities or their leadership role in the region. As leadership strengthens networks, more efforts can go towards understanding government bureaucracies, improving economic markets, and assisting border areas where migration is common.

The initial focus should be on assessment, especially when evaluating political, economic, and cultural indicators. For example, what does the host country want? How can we involve actors in the animal sector? What does Thailand need to do to maintain its role as a stronger regional actor? How can international organizations, like AFRIMS, assist Thailand, but also ensure that their research stays military focused? If organizations assess the situation together, they can find a solution which benefits both the host country and the actors involved. They can also create infrastructure and guidelines to ensure that programs stay Thai-focused as well as allows Thailand its independence in building sustainable surveillance programs. As relationships develop internally, more emphasis can transfer towards regional partners, so that they can work with Thailand as a model for other developing countries.

Table 3.2. Thailand: Date, Time of Interview, Generic Title and Code[103]

Date and Time of Interview	Generic Title and Code
5 June 2012 1100	Health Expert 1
6 June 2012 1300	Health Expert 2
6 June 2012 1600	Health Expert 3
7 June 2012 0800	Health Expert 4
7 June 2012 0930	Health Expert 5
7 June 2012 1100	Health Expert 6
7 June 2012 1130	Health Expert 7
5 June 2012 1300	U.S. Government Expert 1
5 June 2012 1400	U.S. Government Expert 2
5 June 2012 1500	U.S. Government Expert 3
5 June 2012 1600	U.S. Government Expert 4
6 June 2012 1000	Donor Staff 1
6 June 2012 1000	Donor Staff 2
8 June 2012 1000	Donor Staff 3
8 June 2012 1130	Local Donor Staff 1
8 June 2012 1400	Thai Government Official 1
8 June 2012 1400	Thailand Government Official 2
8 June 2012 1400	Thai Government official 3
25 June 2012 1400	Veterinary Health Expert 1

[103] To protect personally identifiable information.

CASE STUDY 4: U.S. MEXICO BORDER[§]

Introduction

To better safeguard the homeland in the aftermath of September 11, 2001, the U.S. government increased emerging infectious disease (EID) surveillance programs on the U.S.-Mexico and U.S.-Canada borders. Policy makers began by assessing the most impoverished areas along the boundary lines and examining their respective health care infrastructures. Eventually, southern regions such as Arizona, Texas, Tijuana, Baja California Norte, and Ciudad Juarez, Chihuahua were deemed more susceptible to infectious diseases due to a history of HIV/AIDS and influenza A (H1N1). Focusing on these regions with higher risk of developing infectious diseases, the U.S. government implemented several programs to prevent the occurrence of harmful epidemics. By stationing these EID surveillance systems in these areas, scientists are able to research the most prevalent maladies along the U.S.-Mexico border and "[develop] regional vaccination and disease prevention responses."[104]

The effort to prevent the spread of infectious diseases continues today; it aims to prevent the "spread of diseases such as H1N1 influenza and SARS, which ignore geographic and political boundaries."[105] President Obama instituted the National Strategy for Countering Biological Threats in December 2009. This effort reinforced the use of modern technology and implemented policies that advocate stronger surveillance in less developed areas. With sustained effort, more competent EID surveillance systems can be employed for the protection of all citizens.

This paper identifies EID surveillance in the context of the U.S.-Mexico border by examining programs such as Early Warning Infectious Disease Surveillance (EWIDS) and Border Infectious Disease Surveillance (BIDS) as case studies to emphasize the importance of national security against bioterrorism agents. Additionally, the report evaluates the political, economic, and cultural barriers that currently prevent the implementation of effective EID surveillance systems. The ultimate purpose is to advocate a more promising methodology for the prevention of EIDs that is applicable to the U.S.-Mexico border.

Background and Context

[§] Inputs to this case study were provided by Angela Archambault and Taylor Tidwell (Literature Review) under the supervision of Sophal Ear.

[104] Kammerer et al., "Influenza-like illness surveillance on the California-Mexico border, 2004-2009. Influenza and Other Respiratory Viruses," 358-366.

[105] National Security Council, "National Strategy for Countering Biological Threats," 1.

Responding to a need for greater and qualitative epidemiological surveillance along the U.S. northern border with Canada and southern border with Mexico, the Centers for Disease Control and Prevention (CDC) and the Department of Health and Human Services Assistant Secretary for Preparedness and Response (HHS-ASPR) implemented the EWIDS program in 2003. Its primary purpose was to address the alarming spread of influenza in the general population and field an effective program to fight "potential bioterrorism agents."[106] Since 2003, EWIDS has "built a foundation for a coordinated bi-national system for infectious disease epidemiology, surveillance, improved laboratory analyses, notifiable disease reporting, and collaborative health emergency response in the U.S.-Mexico border region."[107]

In addition to EWIDS, the BIDS project, a "surveillance system for infectious diseases along the U.S.-Mexico border," was established in 1997. [108] BIDS has been useful in improving geographical hurdles. The challenge with the U.S.-Mexico region is that it borders cities, "which [serve] as corridors for bi-national transmission of infectious diseases."[109] To improve dysfunctions and instill more responsibility between countries, a system called BIDS was created. BIDS is capable of managing and mobilizing shared resources. The goal was to bridge the surveillance gap between epidemiological institutions in different countries.[110] Since its initiation, BIDS has earned a reputation as a potent force against the proliferation of viruses such as measles, rubella, hepatitis A, B, and E, and febrile exanthem.[111] Through the collaborative efforts of the Mexican Secretariat of Health, the CDC, and border health officials, a bi-national team was established in 13 clinical centers to enact a "network [that] developed surveillance protocols, trained nine surveillance coordinators, established serologic testing at four Mexican border laboratories, and created agreements for data sharing and notification of selected diseases and outbreaks."[112]

Literature Review

In recent years, there have been several significant outbreaks of infectious diseases that have demonstrated the effectiveness of programs such as EWIDS and BIDS. In April 2009, the influenza A (H1N1) outbreak (declared a pandemic by the World Health Organization in June 2009), was met by a "coordinated response among health authorities and healthcare services

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[106] Article given during interviews on 6/27/12 2PM. "Early Warning Infectious Disease Surveillances (EWIDS) Program in the U.S.-Mexico Border Region: Accomplishments and Capacity to Assist in the Implementation of International Health Strategies," 1.

[107] Article given during interviews on 6/27/12 2PM. "Early Warning Infectious Disease Surveillances (EWIDS)," 1.

[108] Weinberg et al., "The U.S.-Mexico Border Infectious Disease Surveillance Project: Establishing Binational Border Surveillance," 1.

[109] Rodwell, "Pandemic (H1N1) 2009 Surveillance in Marginalized Populations, Tijuana, Mexico," 1.

[110] Weinberg et al., "The U.S.-Mexico Border Infectious Disease Surveillance Project," 1.

[111] Ibid.

[112] Ibid.

providers located throughout the U.S.-Mexico border region."[113] This was made possible by the strategic methods utilized by EWIDS, which are:

- Establishing a database directory of laboratories
- Drafting Memoranda of Understanding (MOUs) to share data, personnel and equipment between jurisdictions during an infectious disease public health emergency
- Laboratory surveillance through PulseNet and FoodNet
- Working with tribes whose land is on the border and crosses into Mexico and Canada
- Expanding the Laboratory Response Network (LRN) into Canada and Mexico
- Conducting tabletop workshops to discuss binational communication strategies
- Developing binational communication strategy including binational crisis and emergency health alert communication, case reporting and notification protocols
- Expanding sentinel and active surveillance for infectious diseases[114]

Under this guidance, epidemiological centers in Mexico transported their flu specimens for laboratory examination in California, Arizona, New Mexico, and Texas.[115] Such collaboration from both countries provided an important foundation for battling influenza A (H1N1) virus. According to experts, this quick and successful response was due to "emergency operation center activation, institutional based surveillance (schools, prisons, and nursing homes), year round surveillance, increased communication frequency, and expanded sentinel networks."[116] Essentially, the H1N1 influenza outbreak demonstrated that effective communications between countries produce the best results. However, this also highlighted the weaknesses in the EWIDs program. At the 2009 Pandemic H1N1 Influenza workshop, M.C. Rita Flores Leon presented her thoughts on the H1N1 response, "In general, activation of emergency protocols during the outbreak were very successful. […] Evaluation of the process did reveal some areas of improvement regarding diagnosis, data management, coordination and logistics, and coordination with the U.S.."[117] In addition to poor bi-national coordination, Dr. McVay of the San Diego County Public Health Laboratory stressed that in order to address future pandemics completely, clinic staff must be trained more thoroughly and each laboratory should devise a strategy for communicating with the media.[118] Even though EWIDs

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[113] Article given during interviews on 6/27/12 2PM "Early Warning Infectious Disease Surveillances (EWIDS)," 2.

[114] Centers for Disease Control and Prevention, "Early Warning Infectious Disease Surveillance (EWIDS) Program Activities on the Northern and Southern Border States."

[115] Article given during interviews on 6/27/12 2PM. "Early Warning Infectious Disease Surveillances (EWIDS)."

[116] California Department of Public Health "2009 Pandemic H1N1 Influenza A Case study in Border Response," 20.

[117] Flores, *Dirección General de Epidemiología Instituto de Diagnostico y Referencia Epidemiológicos*, 15.

[118] McVay, "2009 Pandemic H1N1 Influenza," 14.

developed promising methodologies to maximize EID surveillance, training shortfalls and communication gaps still need to be resolved.

According to Russell and others, there have been significant improvements since Fiscal year 2009.[119] The primary reason for advancements was extensive training with laboratory staff, which facilitated the transfer of samples between the U.S. and Mexico. In addition, BIDS drastically renovated the communications protocols between countries, which reduced technical barriers; regular conference calls have become the standard method for information sharing. Strategies have ensured a strong correspondence between epidemiological labs and an efficient staff to ensure qualitative results.[120] Although BIDS has implemented an extremely competent system for EID surveillance, interagency problems still exist. As *The Viral Storm: The Dawn of a New Pandemic Age* by Nathaniel Wolfe notes, common issues met by most EID surveillance organizations are "bureaucracy, insufficient and ever-shifting funding, and constantly changing objective from higher up the food chain… these organizations need to grow stronger and better equipped, and they desperately need more funding."[121]

In addition, geographical concerns require evolving approaches. PREDICT, a project of USAID's Emerging Pandemic Threats Program, has introduced new strategies including mapping "hotspots."[122] Evaluating these hotspots and improving laboratory capacity should provide health experts more time to catch pathogens before they jump from animals to humans. To deal with geographical concerns, Woolhouse suggests focusing on more qualitative predictions and asking practical questions such as: where it is likely to happen, and whether it is likely to represent a serious threat to human or animal health.[123] Being able to quantify terms is useful, yet difficult when unexpected factors are brought to bear. For example, Davis and Lederberg state that climate variability and natural disasters along borders often determine the severity and reach of an outbreak.[124] Moreover, poverty and poor health outcomes on the Mexican border increases the likelihood of EID proliferation. Further questions include: Who is responsible for the outbreak? What about animals migrating to (or from) neutral zones? If it is a bordering area, can countries agree on how the outbreak should be managed while also adhering to locals' wishes?

Therefore, programs such as BIDS and EWIDS have made tremendous progress towards more effective EID surveillance by increasing laboratory capacity, fostering a more integrated and communicative network, and improving health care infrastructure for communities located along the U.S.-Mexico border. However, there is still much more to do; research is needed to understand policy maker's roles in establishing effective EID surveillance systems in developing countries. Evaluating political and economic indicators is crucial—yet often overlooked—because it often lies

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[119] Russel et al., "The Global Emerging Infection Surveillance and Response System (GEIS)," 1.

[120] Ibid.

[121] Wolfe, *The Viral Storm,* 239.

[122] Jones et al., "Global trends in emerging infectious diseases," 990.

[123] Woolhouse. "How to make predictions about future infectious disease risks," 2051.

[124]Davis and Lederberg, *Emerging Infectious Diseases from the Global to the Local Perspective,* 8-9.

outside of health experts and epidemiologists responsibilities. Having a strong institutional and legal framework is beneficial in reducing costs, managing bureaucracies, and diminishing overlapping objectives tasked by local, regional, and international programs.

Methodology

The central purpose of this report is to identify and propagate EID surveillance systems for worldwide utilization for anticipating and mitigating the devastating effects of lethal diseases. Conclusions were derived from a close examination of the literature review above and resulted from a detailed comparison between BIDS and EWIDS. Additionally, this paper implements extensive notes and analysis of governmental, economic, and political environments along the U.S.-Mexico border territories. The main objective in each interview was to evaluate institutional constraints, which inhibit regional surveillance systems from collaborating effectively and provide recommendations and lessons learned for developing countries.

Six group interviews were conducted and organized in a semi-structured format to ensure capture of both qualitative and quantitative points from U.S. and Mexican experts. Insights from the interviews came from both government and international institutions. To ensure openness, trust, and transparency, the author sent a summary list of questions and his CV so that participants had time to evaluate each situation and ask questions if needed before interviews. All interviewees were aware that the report would be published and hoped to use the results as a tool to improve their own surveillance programs.

Results

Within the span of a week, the author and his research assistant spoke with 21 U.S. and Mexican public health officials who were either connected with or assigned to EWIDS-related projects. Since the six interviews occurred in four states, each expert faced different challenges and provided diverse recommendations. Mixed opinions on the state of diagnostic labs in Mexico stemmed from how each region organizes and prioritizes EWIDS programs, their relationship with Mexican counterparts, security concerns, and the amount of federally mandated funding in each area. Each state had different recommendations and concerns, but the report found similar underlying themes that altered Mexican EID surveillance systems. The main difference was the degree to which an identified obstacle could affect Mexican states; the areas of most concern were those regions that may not be as economically or politically strong. Interview subjects from Texas, Arizona, New Mexico, and California described in Table 4.1 the key barriers to EID surveillance on the U.S.-Mexico border. These political, economic, and cultural issues are listed by importance via frequency across interviews.

Table 4.1. U.S.-Mexico Border: Key Issues Identified in AZ, CA, NM, and TX Interviews

Political Barriers	**Percent of Interviews That Identified Barriers**
Insecurity in Texas and California	6 of 6 = 100%
Difficult transferring resources across borders	5 of 6 = 83%
Political instability in Mexico- especially during elections	4 of 6 = 67%
Political fragmentation	2 of 6 = 33%
Economic Barriers	**Percent of Interviews That Identified Barriers**
Loss of EWIDS funding	6 of 6 = 100%
Mexico laboratories not up to standards	5 of 6 = 83%
Funding inadequately dispersed to bordering states	5 of 6 = 83%
Surveillance systems lacking, especially veterinary	5 of 6 = 83%
Difficult to keep trained Mexican staff	3 of 6 = 50%
Technology capabilities vary from region to region	3 of 6 = 50%
Cultural Barriers	**Percent of Interviews That Identified Barriers**
Surveillance measured differently across borders	4 of 6 =67%
Strong partnerships between regions	4 of 6 =67%
Mercury poison for skin cream	3 of 6 =50%
Immigration can alter data	3 of 6 =50%

Note: All interviews included more than one expert. AZ, CA, NM, and TX are Arizona, California, New Mexico, and Texas, respectively.
Source: Analysis of interviews conducted.

Specific Political Findings on the U.S.-Mexico Border

Security Issues

After reviewing all the interview remarks, it became apparent that drug violence near border areas was one of the biggest challenges to implementing effective surveillance. Interviewees recommended focusing on Texas and California where a large portion of the drug cartels reside. Violence is a serious issue and continues to increase; "when Calderon's six-year term draws to a close late in 2012, an average of 10,000 crime-related murders per year will have taken place," explains Beittel.[125] Despite the insecurity, Mexican health officers are capable of assisting patients and getting in the field. The drug cartel is "taking over health facilities and streets, but not the actual

[125] Beittel, "Mexico's Drug Trafficking Organizations: Source and Scope of the Rising Violence," 1.

health department or hospitals," states Health Expert 5. If the drug cartel gained more control in the future, surveillance could be potentially halted.

For the last three years, due to safety precautions, U.S. government officials in Texas and California have been denied clearance to travel to adjoining Mexican states. Face-to-face communication only occurs if Mexican officials travel to the U.S. When Mexican counterparts do travel to Texas or California, they usually prefer to fly in order to avoid roadblocks and violence from drug cartels. "Cartels are fighting among themselves. Physicians have been told not to treat people if injured because they could get shot because they are seen helping the enemy. … There is the idea that if the enemy cannot seek medical care, they will die" explains Health Expert 1.

Mexican experts stressed the importance of maintaining good relationships. Conversations generally occur through teleconference. "We can't Skype because of security and confidentiality of patients," says Health Expert 2. Health professionals who are unable to fully assess the situation or to actually see the outbreak is a huge barrier. Although U.S. officials expect that laboratories and field sites are managed correctly, they cannot officially visit the locations themselves. Other communication networks need to be utilized to ensure both sides are active and responsive. California has dealt with security-related issues by hiring contract employees who are willing to travel to Mexico and do not require travel clearances. According to Health Expert 18, laboratories in Mexico are evaluated by California health officials on a monthly basis. Contract employees have improved the U.S.-Mexico relationship, but there still are barriers when trying to collaborate with state or government officials. Because state and government officials are not granted travel clearance to Mexico, EWIDS has to hold conferences in San Diego or Baja, explains Health Expert 17. Hosting conferences in the U.S. prevents Mexican counterparts from organizing or leading U.S.-Mexico events.

Both countries realize how severe conflict can disrupt communications and they attempt to find ways to improve networking and collaborate with security officers. The U.S. and Mexican health departments aim to maintain neutrality when it comes to participating in security matters. The goal is to prevent the spread of disease and assist everyone, even members of the drug cartels, according to Mexican Counterpart 1. Additionally, the Mexican health department is trying to collaborate with police and army officials to ensure tasks are accomplished and medical doctors are safe. "If the army finds TB patients, they will report it to the health department and bring them in," explains the Mexican Counterpart 1. Connecting outside networks and private industries has been useful in improving weak systems. Lastly, providing Mexicans opportunities to influence the surveillance conducted in the U.S. improved communication. "When doing trainings and conferences, we try to have opening remarks from both the U.S. and Mexico. We want them to still be key contributors, even though we cannot have the conference in Mexico," notes Health Expert 17. Providing opportunities like the example above is vital because it creates a team environment and allows both sides to take ownership of new programs and ideas.

Managing Political Bureaucracies Across Borders

One of the biggest bureaucratic challenges was the transferring of reagents, specimens, and small equipment. Not only are materials costly, but it can also take up to six months to receive resources across borders. "Sometimes we have to send medicines via contraband because of bureaucracy. The U.S. and Mexican customs do not speak the same language," explains Health Expert 8; interviewees said that these communication difficulties are a severe impediment to response times. The permit process is extremely lengthy and tedious which causes reagents and medications to often arrive expired. As a result, "people are smuggling reagents across borders," said Health Expert 12. At the moment, the interviewees did not have suggestions on ways to improve the permit process. "They (border officials and policy makers) admit that there is a problem but there is not a solution to be offered," says Health Expert 15. Another challenge that occurs at border areas is illegal animal trade. If animals cross without epidemiologists knowing, there is increased risk of disease and little knowledge of where it originated. To expedite transportation and monitor illegal industries, time and effort is needed in connecting with Border Control and partnering on projects. Their assistance is crucial in creating a more organized system with quick response times. Projects will be at a standstill if they do not have the necessary resources to detect disease.

Political Instability

In addition to drug violence, political instability alters how EID surveillance systems function. Elections play a considerable role, especially in Mexico City. Some interviewees questioned whether the end of the EWIDS program came from political demands. While elections can be problematic, many have observed little interference at the mid and lower levels. Junior officials from Mexico can stay in office for many years and have strong relationships with their U.S. counterparts, notes Health Expert 8. A sizeable portion of the interviewees felt the closure of EWIDS was due to the political dynamics between the state and federal level. Others, such as Health Expert 19, wondered if the closure meant decreased political interest, since the influenza A (H1N1) virus was not as deadly as first thought. Health Expert 8 noticed many new initiatives and missions instilled in border surveillance during the election season. Instead of building onto old health systems and making them stronger, politicians prefer to initiate new programs to show action, even if existing programs accomplished the same goal, explains Health Expert 12. Once elections start, there is no doubt that there will be a continuation in assessing official guidelines, asserts Mexican Counterpart 1.

There are many difficulties posed by U.S. federalism and the diverse policies and guidelines in both countries. There are two different countries with two different health systems, and representation from the federal and local level, says Health Expert 8. "Everything of value is swept away during the election season. Party loyalists come in and then there are six months of dead work," notes Health Expert 12. Official guidelines between Mexico and the U.S. are finally being

recognized by both governments, but this is occurring as policy makers cut EWIDS funding. If change does not occur quickly, the effort and time taken to join government's policies and guidelines could be for naught.

New policies during election season can also determine how collaborative the relationship is between U.S. and Mexican leaders. Disagreements between governments occur when citizens are directly affected by an initiative, for example, with immigration laws. Health Expert 15 recently saw this in Arizona, when they were temporarily boycotted from the Nogales Port of Entry because of a U.S. immigration law that was introduced during an election. These state-interest initiatives delay the implementation of new guidelines that would strengthen the U.S.-Mexico relationship.

Specific Economic Findings on the U.S.-Mexico Border

Funding Inadequately Dispersed Across Borders

Political fragmentation also complicates how money is transferred across borders. BIDS and EWIDS provide the majority of EID border surveillance funding; however, their roles vary state to state. For example, in California, they are completely autonomous. The difference between BIDS and EWIDS in California is "BIDS focuses on acute respiratory and influenza while EWIDS focuses on communication, lab capacity, training, and health security. EWIDS is much broader than BIDS," explains Health Expert 18. Moreover, the formula that stipulates how much EWIDS funding each state receives is dependent on the number of individuals who cross the borders. There is a significant disparity in resource distribution when comparing California (with approximately 300,000 crossings a day) to New Mexico (approximately 10,000 crossings a day).[126] Texas and California receive the largest portion of funding and supervise a variety of projects, whereas New Mexico supervises smaller short-term projects. In fact, Health Expert 12 said that the New Mexico funding situation caused them to rely on other CDC-funded programs to accomplish surveillance tasks. When New Mexico officials contribute, it is expected that a portion of their labor will come from EWIDS and BIDS funds.

While California's EWIDS program has had a stronger role in improving surveillance, "So much of EWIDS was a function of the CDC … The state wants us to do a certain role, while other organizations feel that the CDC should be doing the work," explains Health Expert 18. Currently, funds are distributed at the state level in the U.S. and national level in Mexico. According to Health Expert 1, Mexico uses its money to evaluate and create unified surveillance while the U.S. has allocated funds towards building laboratory capacity. Health Expert 17 prefers funds to be dispersed at the state level because health organizations can have more control of how items are distributed. Health Expert 12 disagrees and thinks that it is best to have "a system that spans the border rather than have individual state programs. This type of work needs to come from the federal level in the U.S." In Health Expert 12's opinion it would ensure that decisions are

[126] PowerPoint presentation on 6/26/2012 and 6/25/2012, respectively.

centralized, resources are disseminated adequately, and that organizations stick to their designated roles.

Difficulty to Keep Trained Staff

Many interviewees expressed concern about maintaining quality personnel during violent times. Instability often keeps epidemiologists from doing research. They may quit working or transfer to a new location if they feel their safety is in jeopardy. Health Expert 1 was told that kidnapping is an issue; in fact, one student quit doing research because the drug cartel stole all of his equipment and held him against his will. Drug violence in Mexico has particularly affected wildlife surveillance, since it occurs in rural areas are where criminals often reside. "We used to go to the river, on the border of the U.S. side, and collect mosquitos and ticks, but why risk it now?" says Health Expert 4.

Veterinarians and epidemiologist also leave rural and insecure areas because of low wages. Those who reside in rural areas are often overworked. According to Mexican Counterpart 1, in one region, 200 private doctors as well as several pharmacies closed due to violence from the drug cartels. Many buses, restaurants, tourist agencies, and pharmacies are transitioning their offices and services to the U.S.. Moreover, public hospitals are now understaffed because they have to care for patients who previously went to private hospitals, stresses Mexican Counterpart 1. According to Health Expert 12, a few surveillance sites established in Texas were reported to be severely lacking and in danger of being shut down because officials were unable to give them enough attention. If they do not have the capacity to collect samples, they risk missing an opportunity to detect an outbreak. "You have to coddle surveillance sites because they are doing the work for free," explains Health Expert 12. Both sides increased manpower and provide incentives for continuing surveillance in rural areas.

Improving Laboratories in Mexico

In most regions, Mexico is capable of implementing EID surveillance. Although laboratory manpower, training, and consumables vary from region to region, both Mexican Counterparts assured the author that health officials could access resources and equipment if necessary. Even though some regions lack skill, interviewees were impressed with the safety education and measures that had been introduced within the last five years. "With anthrax, I now know how to use protection. I will not go out in the field without it. I will not risk my family or myself," says the Mexican Counterpart 2. The interviewees presented two main concerns in Mexico: most laboratories lack capacity and there is misallocation of resources meant for surveillance. A high portion of the money is spent on phones and technology, but it then disappears once new leaderships arrive, explains Health Expert 1. More efforts need to go towards funding sustainable resources and infrastructure.

The majority of interviewees felt that Mexico's veterinary surveillance is substandard. They are able to manage domestic pets, but not wildlife. They need more zoonosis control veterinarians, explains Health Expert 4. The lack of clinical testing in Mexico also makes it difficult to do early warning detection in animals. For example, when trying to detect Lyme disease, Health Expert 4 says they struggle "because of cross-reactivity and little clinical testing, we don't know the exact disease … if it is not a reportable condition, labs are not required to respond."

The good news is that Mexico has strong networks and is capable of managing most outbreaks. Areas with less violence (i.e. bordering Arizona), are even more resilient and efficient because they have the ability to evaluate laboratories before providing skill-based training and funds. As Health Expert 15 notes, training is accomplished at the Sonora Laboratory, a model lab. When assessed, this expert said the laboratory passed with a score of 92%.

Mexico's biggest strength is that country's information technology. Currently, California and Arizona are working with their neighboring Mexican states to obtain a declaration of cooperation from the state governments. This will allow the four states to work together and share information on a secure web-based platform. Arizona is currently using Medical Electronic Disease Surveillance Intelligence System (MEDSIS), a secure portal. It has a shared library, secure email, and a Wikipedia-like page that the entire agency can utilize. This is extremely useful because it tracks data instantly, and both sides have instant access to reports. MEDSIS also has the capability to maintain confidentiality if needed. For example, "the Mexican side can only see things marked bi-national," explains Health Expert 15. Now, experts are improving the portal by translating enhancements into Spanish and fixing small system errors. Health Expert 17 and Health Expert 18 feel this is a huge next step.

Specific Cultural Findings on the U.S.-Mexico Border

Strong Partnerships Between Regions

While Mexico may have lower standards in some areas, it is open and transparent about sample sharing. In all the interviews, health experts stated that both parties share daily and weekly reports and engage in networking between cities. The majority of interviewees expressed a strong partnership with Mexican health officials and agreed that there was a willingness to solve problems quickly. Health Expert 1 explains why transparency has improved over the past 20 years; "employees have stayed long term and are willing to stick their neck out to get things done." When working with developing countries, this interviewee recommended not being too pushy, because it takes time, patience, and trust to network between leaders and epidemiologists. There is concern that the closure of EWIDS could hurt partnerships, especially if counterparts are lost due to a bi-national case. "You really need to know who key players are on both side of the border to make things sustainable," notes Health Expert 15. Because Mexico is centralized, health officials are not supposed to publicize disease reports without permission from the federal government. They need to know we will honor this arrangement and not publish before them, explains Health Expert 1. If

someone asks, parties involved can give generalizations, but not actual numbers. This arrangement is crucial to ensuring open and transparent reports. "We don't want to go back to small projects and basic conversations," said Mexican Counterpart 1. Mexican Counterpart 2 agreed.

While there are strong partnerships across borders, Health Expert 4 found that there are occasionally miscommunications and a lack of information sharing between U.S. and Mexican states when political interests do not align. To improve relationships, health networks have come together and created 15 border bi-national councils (eight of which are in Mexico) to inform each other of new health initiatives, tackle regional dilemmas, and exchange lessons learned regarding outbreaks. These regional partnerships were introduced because of the One Health-One Border Program, the mission of which is to improve early detection of the transmission from animal to human by networking. When evaluating the U.S.-Mexico Border, there was a lack of infrastructure and integration between all states, explains Health Expert 17; therefore, an integrated system was introduced to manage challenges as a whole. As a result, EWIDS attempted to engage more collaboratively with the CDC, the academic community, and volunteers. Interviewees from California and Arizona expressed how valuable it was to have the four corners regional program, "a communication channel where bi-national information interest cases are collected for the four corners [California, Baja, Sonora, and Arizona], providing confidentiality, immediate notification, and georeferencing of epidemiological cases."[127] Communication is enhanced when representatives from each state unite to tackle official political issues. "It formalizes things so that we are going to speak with a position and not lean on one person to get all our answers," says Health Expert 17.

Immigration Can Alter Data

Additionally, interviewees said that tracking certain patients is difficult. Discrepancies like these are important, because the inability to track patients can lengthen outbreak response times. If medical officers do not know where an outbreak originated, they cannot stop it from spreading. For instance, Health Expert 8 gave the example of conducting surveillance in schools. Data was missing because students chose to see medical doctors in Mexico instead of the United States. While crossing borders to get inexpensive check-ups is a challenge, Mexican Counterpart 1 and Mexico counterpart 2 said this concern has significantly decreased. Because of the potential risk from drug cartels, fewer U.S. citizens and immigrants without health insurance prefer to travel to Mexico.

Additionally, Mexican officials found inconsistencies when evaluating pregnant patients. Many would try to cross the border in hopes of gaining U.S. citizenship for their children. To manage pregnancy transfers, a protocol that has been put in place to only allow extreme cases into the U.S.; "they won't let pregnant women from Mexico go into the U.S. without a note from their healthcare provider," says Mexican Counterpart 1. Even though U.S. Border Patrol carefully monitored who they let cross borders, U.S. officials were mindful in helping Mexican patients with

[127] Four Corners, "Epidemiological Surveillance."

severe illnesses. "If Mexican patients are denied treatment, we offer them assistance and oftentimes help them get across the border," states Health Expert 1.

Surveillance Measured Differently Across Borders

After evaluating capabilities, interviewees found that a large number of laboratories had inadequate standards and were incapable of performing clinical testing. This is partially due to how they conduct surveillance. Epidemiologists in Mexico and the U.S. collect data differently; instead of obtaining two samples, they just use one. The U.S. does not report a disease unless it has clinical confirmation; however, Mexico confirms data based on a patient's symptoms. These two conflicting types of surveillance lead to different results and case definitions. "Mexico says we under diagnose while we say they over diagnose," says Health Expert 1. One of the reasons why syndromic surveillance is done is because it is significantly quicker and cheaper. The majority of the clinical testing done in Mexico is at secured laboratory in Mexico City. Many interviewees reported slow response times when doing clinical surveillance. "Sometimes we [Americans] get responses back before they do which can upset them," says Health Expert 1.

The challenge with syndromic surveillance is that diseases can have similar symptoms. Without clinical testing, it is difficult to identify emerging diseases. A few o interviewees felt that Mexico chooses to use syndromic surveillance because it lacks skilled staff and resources. Health Expert 2 found that the majority of individuals working as epidemiologists were previously physicians. Many struggle to understand the U.S. methodology because they do not have a statistical background. To fix this discrepancy, Health Expert 2 suggests that more efforts go towards improving bi-national case definitions across borders; creating these case definitions is useful in ensuring that data is accurate and evaluated correctly. If data is misinterpreted, it could change how policy makers react to health events, or more importantly, an outbreak.

Even though both countries use different techniques, Mexico is equally as stringent as the U.S. when it comes to managing outbreaks. Health Expert 1 gives the example of a natural disaster that happened in the past. The U.S. just provided tetanus shots while Mexico sprayed city blocks and set up clinics for citizens. Mexican health officials took extra measures to ensure the public knew it was safe. Officials' desire to be strong and independent has been positive; Mexico is more participatory when evaluating surveillance policy. However, it occasionally causes challenges between partners. It is important that relationships are built horizontally; "we do not want to be seen as a Malinche," says Health Expert 12. If the U.S. takes action without consulting Mexico, it could signal that they are inferior.[128] Decisions are not always done realistically, but rather, what Mexico feels will make them more powerful. This is mostly seen when they request technology or

[128] Rolando and Harris, "Feminism, Nation and Myth: La Malinche," 4, argue: "It is a traditional Mexican belief that La Malinche- Aztec interpreter and mistress of Cortes- betrayed her own people in exchange for a new life. It is said that La Malinche bore a son by Cortes, the first mestizo of Aztec and Spanish blood, whom she later sacrificed when Cortes threatened to take the boy to Spain."

elaborate equipment. High tech equipment is useless if it cannot be operated or repaired, says Health Expert 2. Many Mexican officials would like to have Biosafety Level (BSL) 3 laboratory capability, but there are mixed opinions on whether or not more advanced is always better. Approximately half of the interviewees felt that Mexico would be more successful if they focused on improving manpower and strengthening lab capacity before building BSL3 labs. "Many countries want new medical technology but it would be in their best interest to do things that are sustainable," says Health Expert 1. Maintaining equipment is still extremely difficult in laboratories and it could cause further problems in the long run says Health Expert 12.

Conclusion

The U.S. and Mexico have introduced many beneficial techniques for developing countries. As a case study, it provides interesting insight because Mexico has areas which have either succeeded enormously or struggled, depending on the location and drug cartel violence. While both countries struggle with dealing with political bureaucracy, they have developed regional networks to work more collaboratively and efficiently. Advanced technology ensures both parties communicate on a day-to-day basis and has made outside networking more attainable. One of the reasons why both countries have been successful is because they fully assessed border capacity and identified key leaders who were influential in building EID surveillance programs. In the future, more attention needs to go towards improving wildlife surveillance, managing funding constraints, and expanding laboratory capacity. In addition, focus needs to be directed on rural areas that receive less attention because of security constraints.

Both countries have had successes, but policy makers cannot truly understand the U.S. and Mexico's border surveillance capacity until EWIDS shuts down. Many of the interviewed experts are concerned that detection capabilities and leadership will decrease if EIDs are not continually prioritized politically. By closing EWIDS, officials are shortening the life span of current projects. "EWIDS is ending when programs are finally being put in place" says Health Expert 12. Rather than starting from scratch, higher officials and funders should assess existing policies and revamp systems based on public need, to ensure they are sustainable. These political moves just counteract the mission of creating a strong relationship between the U.S. and Mexico and, in effect, make it more difficult for Mexicans to take ownership of their EID surveillance activities.

Table 4.2. U.S.-Mexico Border: Date, Time of Interview, Generic Title and Code[129]

Date and Time of Interview	Generic Title and Code
06/25/12 1000	Health Expert 1
06/25/12 1000	Health Expert 2
06/25/12 1000	Health Expert 3
06/25/12 1200	Health Expert 4
6/26/12 0800	Health Expert 5
6/26/12 0800	Health Expert 6
6/26/12 0800	Health Expert 7
6/26/12 0800	Health Expert 8
6/26/12 0800	Health Expert 9
6/26/12 0800	Health Expert 10
6/26/12 1400	Health Expert 11
6/26/12 1400	Health Expert 12
6/26/12 1400	Health Expert 13
6/26/12 1400	Health Expert 14
06/27/12 0800	Health Expert 15
06/27/12 0800	Health Expert 16
6/27/12 1400	Health Expert 17
6/27/12 1400	Health Expert 18
6/27/12 1400	Health Expert 19
6/26/12 0800	Mexican Counterpart 1
6/26/12 0800	Mexican Counterpart 2

[129] To protect personally identifiable information.

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KEY TAKEAWAYS

Constraints:

Kenya: Decentralization; lack of infrastructure and manpower; Ministry of Public Health and Sanitation prioritizes diagnostics over research; international organizations provide funding without following through.

Peru: Overlapping government functions; decentralization; lack of rural infrastructure; western medicine and cultural practices at odds with each other.

Thailand: Miscommunication and overlapping missions among health organizations; mistrust between host and international community.

U.S.-Mexico border: Drug cartels in Mexico; difficulty transferring resources across borders; loss of Early Warning Infectious Diseases Surveillance program funding; poor laboratory capacity in Mexico.

Recommendations:

- Involve local experts in EID surveillance.
- Support technology that facilitates communication (e.g. U.S.-Mexico).
- Develop projects in a way that benefits both parties (e.g. host country Principal Investigator instead of a foreign PI).
- Centralize health networks, and separate civilian and military sector influence in EID surveillance so functions do not overlap.
- To improve outcomes, use lessons from other regions that have experienced outbreaks.

COVER: Wordle of key issues identified in Kenya, Peru, Thailand, and U.S. Mexico Border across political, economic, and cultural barriers confronting effective emerging diseases surveillance. Words are sized according to frequency. Courtesy of wordle.net