The Rockefeller Foundation Initiative

Disease Surveillance Networks

The Problem

Diseases do not respect boundaries

Once diseases spread beyond a localized region, their expansion becomes exponential and difficult to contain. Early detection and containment by effective disease surveillance networks are critical to arresting pandemics in their early stages. Cross-country disease surveillance networks are a mechanism that encompass human resources deployment, rapid communication, and transparent collaboration for early detection and response to emerging diseases and pandemics.
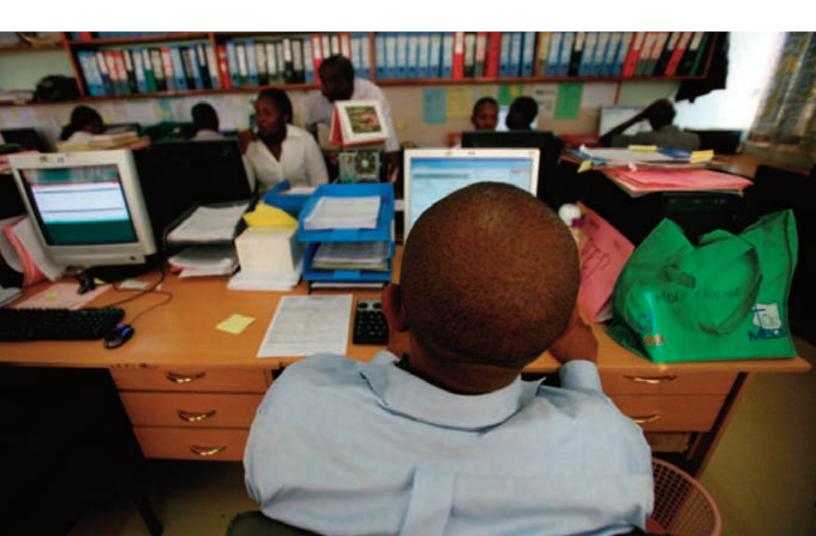
The Rockefeller Foundation's $22,000,000 Disease Surveillance Networks (DSN) Initiative was formally launched in 2007 (building on important and ground-breaking work that had begun as early as 1999) to address the rapid emergence of new infectious diseases, most often from zoonotic sources, with pandemic potential. The global health and economic impacts of SARS, H5N1 (Avian Flu) and H1N1 (Swine Flu) had raised awareness of global pandemic threats, which deeply affect the world's poorest people. Common drivers of pandemics include increased cross-border trade, mobility and migration of humans and animals, livestock productions systems, population density, viral adaptation and ecological shifts as a result of climate change.

Most emerging diseases originate and accelerate in places with the weakest borders and the greatest economic and social need. Thus, the Foundation's DSN Initiative awarded grants and supported activities in both Africa and Asia around three related areas, focused on capacity building, increased use of innovative and relevant tools, and improved information sharing—all to establish and better coordinate networks in the area of regional disease surveillance. The Foundation, responding to needs identified by actors in the two regions and interest expressed by the World

Health Organization, began in 1999 to explore the formation of sub-regional disease surveillance networks, first in Asia and shortly thereafter in Africa. Through the creation of these new sub-regional networks, the Foundation's goal was to support each region's ability to enhance detection, report and respond to pandemic disease outbreaks—leading to reduction or containment of the outbreak, saving lives, and sustaining human migration and trade. These efforts fall within a One Health world view that sees people, livestock, wildlife and the environment as interconnected systems. Moreover, The Rockefeller Foundation's approach takes into account that local and regional contexts are enmeshed in a global web of relationships that often require diplomatic actions, where a strong ability on the part of technocrats and diplomats from developing countries to better negotiate health issues leads to better health outcomes.

Grantmaking for this Initiative concluded at the end of 2012, after an extensive evaluation and having achieved the goals described above.

Our Solution

*Sub-regional networks:
A new way of managing
surveillance*

Since 1999, the Foundation has
awarded grants, fostered relationships
through our Bellagio Conference Center
and other convenings, and partnered
with increasing numbers of stakeholders
to launch and support locally-driven network building efforts, including:

1) The Mekong Basin Disease Surveillance Network
2) The East Africa Integrated Disease Surveillance Network
3) The Southern African Centre for Infectious Disease Surveillance
4) Connecting Organizations for Regional Disease Surveillance.

The Mekong Basin Disease Surveillance Network (MBDS), a network of the Ministries of Health of six countries sharing the Mekong River (Cambodia, the provinces of Yunnan and Guangxi of the People's Republic of China, Lao People's Democratic Republic, Myanmar, Thailand, and Vietnam) has demonstrated that enhanced disease surveillance capacity leads to improvements in health within the region. Building on its members' shared commitment to trust and transparency, the network developed a set of standard operating procedures and protocols for sharing information about outbreaks that has proved critical to its success. The MBDS Network has engaged in joint outbreak investigation and response to avian influenza, dengue and cholera. It investigated and contained a dengue fever outbreak between Lao PDR and Thailand in 2005, typhoid and malaria outbreak between Lao PDR and Vietnam in 2006 and an avian flu outbreak between Lao PDR and Thailand in 2007. All combined, without the MBDS network, these three outbreaks alone could have impacted the lives of many people throughout the region. The Network has successfully integrated local, national and regional level health officials. For example, MBDS utilized existing

bilateral and multilateral agreements between governments in the region to expand its cross-border initiative from four border sites in 2007 to 24 sites in 2010, effectively covering almost all key border crossing points in the region. Under a final grant from the Foundation's DSN Initiative, the Network has recently transformed into the MBDS Foundation, a new legal entity. The establishment of the MBDS Foundation provides assurance of the long-term sustainability of the network.

Established in 2000 the **East African Integrated Disease Surveillance Network (EAIDSNet)** arose out of the recognition of the increasing ability of serious and contagious diseases, such as Rift Valley fever, Ebola, and Marburg, to swiftly cross borders within the region. The Foundation's support began with a small grant to Tanzania-based researchers at the National Institute of Medical Research that were committed to cross-border collaboration. This collaborative mechanism soon found a natural home in the East African Community Secretariat and in fact paved the way for the establishment of permanent Health desk there. This Health Department now serves a much wider remit within the East African Community not only addressing disease surveillance but reproductive health, health systems, medicines, food safety regulation and HIV/AIDS. Since its inception, EAIDSNet has implemented a new mechanism for working within the region by conducting field simulations at border points and working across the animal and human health divide. They have put together a number of rapid response teams including both community and official members to enable quick alerts, and have formally institutionalized their operations by stewarding an agreement and operational framework between the five EAC countries (Burundi, Kenya, Rwanda, Tanzania and Uganda) on cross-border surveillance within the region.

Spanning fourteen countries in southern Africa, the **Southern African Centre for Infectious Disease Surveillance (SACIDS)** was formalized in 2008 as a consortium of academic and research institutions to strengthen capacity to detect, identify and monitor infectious diseases of humans, animals, and plants and their interactions. The Foundation's early support helped SACIDS map health system resources and their potential for mobilization in response to pandemic influenza and other emerging infectious diseases in the human and animal sectors. Subsequent support has fostered

a collaborative project with EAIDSNet to assess the impact and cost-effectiveness of mobile technologies on the efficiency of animal and human disease alerts, surveillance and response systems and to evaluate national and regional supportive policy and legal frameworks for sustainable surveillance systems. SACIDS's establishment of new methods for data capture and response to timely data has allowed for testing the applicability of smartphones in district level disease surveillance in Tanzania. Already the system has been shown to be effective in terms of data management and cost containment.

In 2008, experts gathered at the Rockefeller Foundation's Bellagio Center to call for more coordination among regional disease surveillance networks. From that meeting, **CORDS (Connecting Organizations for Regional Disease Surveillance)** was born. CORDS is responding to the need to strengthen the overall capacities and capabilities of networks, and their respective member countries, by providing a central forum for global exchanges of surveillance data, best practices, improved tools and strategies, training courses, technical innovations, successful operating procedures, and, where appropriate, case studies and other data. CORDS serves to amplify the benefits derived from individual networks to speed the development and capabilities of all CORDS network members. Strong regional networks are critical for disease eradication efforts and other global health strategies that require a coordinated, collaborative approach across national borders, and CORDS provides the opportunity for critical shared learning.

One Health—Bringing together established disciplines towards new problem solving methods/approaches

According to the National Center for Emerging and Zoonotic Infectious Diseases at the Centers for Disease Control and Prevention, approximately 75% of recently emerging infectious diseases affecting humans are diseases of animal origin; approximately 60% of all human pathogens are zoonotic. The One Health perspective emphasizes the interface between human, domestic and wild animals in complex ecosystems, to avert, if possible, or be better prepared for, the next emerging infectious disease. This perspective is woven into the fabric of the networks the Foundation has supported and to whom it has provided grants.

The Wildlife Conservation Society's Animal & Human Health for the Environment And Development (AHEAD) Program recognizes the importance of animal and human health to both conservation and development interests. AHEAD's interest in the future of resilient livelihoods and their focus on animal agriculture, human health, and wildlife health (which together encompass zoonotic diseases, competition over grazing and water resources, disease mitigation, local and global food security, and other potential sources of conflict related to land-use decision-making) dovetails with the Foundation's interest in these areas. The Foundation's grants supported innovative inter-disciplinary research and technical assistance at the interface of human livelihoods and well-being, wild and domestic animal health, and ecosystem health in sub-Saharan Africa. WCS leveraged support from other larger donors, such as USAID, and their work under the Foundation's grants led to their inclusion in high-level discussions among African governments on conservation and agricultural policy debates, and their implications for trade and livelihoods.

Several grants to the Ecohealth Alliance facilitated the formation of a network in South Asia, another 'hotspot' for newly emerging infectious diseases. Called One Health Alliance in South Asia (OHASA), it has already garnered support and participation of scientists and policy makers from Bangladesh, India, Nepal and Pakistan. These efforts resulted in the identification of a novel virus in bats (a common reservoir for emerging diseases) in Bangladesh that had the potential to spread to human populations.[1]

The University of Minnesota's Global Initiative for Food Systems Leadership in the College of Veterinary Medicine and School of Public Health has been assessing the state of the global One Health movement with the ultimate goal of facilitating the unification of the One Health movement, including the recruitment and consolidation of leadership within this field.

As a sign of the success and sustainability of the One Health approach, the Foundation has been able to support new stakeholders to acquire or improve the skills and understanding to maximize this idea.

Global health diplomacy

As the work at the local, national and sub-regional levels progressed, it became clear that global negotiations in a variety of fora were necessary to improving global health and maximizing the results of disease surveillance efforts. Starting in 2009 and building on the 2007 Oslo Declaration,[2] the Foundation awarded grants to a number of institutions to help build the field of global health diplomacy and to launch a global health diplomacy network (GHD Net), with three critical goals: research, training, coordination. A secretariat located in Carleton University facilitates the coordination of the various efforts, including the production of the Global Health Diplomacy Monitor, a resource about negotiations underway that have a significant impact on health.[3] DSN support enabled the Graduate Institute, Switzerland, to offer its executive course on global health diplomacy in Africa and Asia, and the development of a textbook and online training curriculum in global health diplomacy. Originally a partner under the Foundation's global health diplomacy work, the East Central and Southern African Health Community (ECSA), a regional inter-governmental health organization that promotes cooperation among ten member states, broadened its mandate to focus on and strengthen cross-border human and animal disease prevention, surveillance and control in the East African Community partner states.

Technological approaches to and for surveillance

At the time the first networks were established, and expectations of an imminent pandemic were growing, it was critical to support new technologies to take advantage of the internet and other modes of information collecting and sharing. As a result of this focus on using new technology, early support to the International Society for Infectious Disease for its Program for Monitoring Emerging Diseases (ProMED) and founding support to InSTEDD (Innovative Support to Emergencies Diseases and Disasters) greatly facilitated surveillance efforts. ProMED is an electronic mail reporting system to detect newly and re-emerging diseases, while InSTEDD is a non-governmental organization focused on developing innovative technology for disease surveillance. It developed an innovation lab in Cambodia (iLab) that provides a space for technology innovation, all developed by local Cambodian ICT experts.

The iLab and InSTEDD have since both gone on to create several open source products that are widely used in the region, including GeoChat (which provides geographic-based chat services to allow real-time collaboration during emergencies), and ResourceMapper (which is now being used as the basis for a national-level facility registration service in Rwanda and soon Tanzania).

Grants also supported the establishment of a regional informatics center in Thailand —BIOPHICS. BIOPHICS, or the Center of Excellence for Biomedical and Public Health Informatics, was founded at the Mahidol University School of Tropical Medicine with support of the DSN Initiative in 2007. The goal behind the creation of the Center of Excellence was to close an identified gap in capacity in the use of computer science and technology by public health practitioners in the South East Asia region. As many countries began using new technologies in their disease surveillance efforts, there were very few experts and most were imported from abroad. Beginning in 2013, a new master's degree program in health informatics at Mahidol University will take around 15 students a year from Thailand and neighboring countries, and the University will continue to hold short course trainings and technical overviews for hundreds of practitioners in South East Asia. The initial groundwork laid by the Rockefeller Foundation has been significant, as BIOPHICS has established itself as the first major university research center focused on the use of ICT in the public health domain in Thailand. The success of BIOPHICS has been leveraged to attract additional support from other donors such as the Gates Foundation and the Armed Forces Research Institute of Medical Sciences among many others.

In conclusion, the Disease Surveillance Networks Initiative was an important undertaking within the Foundation. An external evaluation confirmed the value and merit of the Foundation's investments in supporting disease surveillance networks, embracing a One Health paradigm and developing the field of global health diplomacy. Sustainability of the progress achieved and relationships nurtured through the DSN Initiative (and all our Initiatives) is important to the Foundation. Building on the clear evidence of ongoing relevance, motivation, and sustained engagement in the networks by members and partners, and solid interest from other funders, the Foundation concluded its work under this Initiative by supporting (with partners) the institutional independence of MBDS and CORDS, both of which became independent entities in 2012.

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1 Epstein JH, Quan P-L, Briese T, Street C, Jabado O, et al. (2010) Identification of GBV-D, a Novel GB-like Flavivirus from Old World Frugivorous Bats (Pteropus giganteus) in Bangladesh. PLoS Pathog 6(7): e1000972. doi:10.1371/journal.ppat.1000972

2 www.who.int/trade/events/Oslo_Ministerial_Declaration.pdf

3 www.ghd-net.org/health-diplomacy-action/health-diplomacy-monitor

Websites of Key Grantees

African Medical and Research Foundation: *www.amref.org*

American Veterinary Medical Association: *www.avma.org/Pages/home.aspx*

Asian Disaster Preparedness Center: *www.adpc.net*

BIOPHICS (Mahidol University): *www.biophics.org*

Carleton University: *www.carleton.ca*

Chiang Mai University: *vphcap.vet.cmu.ac.th/article/news/activity03.php*

Connecting Organizations for Regional Disease Surveillance: *www.cordsnetwork.org*

East African Community: *www.health.eac.int*

East, Central and Southern African Health Community: *www.ecsa.or.tz*

EcohealthAlliance (formerly Wildlife Trust Inc): *www.ecohealthalliance.org*

Graduate Institute of International and Development Studies: *graduateinstitute.ch*

Guangxi Center for Disease Prevention and Control: *www.gxcdc.com.cn/gxcdc/default_oa.asp*

Innovative Support to Emergencies Diseases and Disasters (InSTEDD): *instedd.org*

International Health Policy Program, Thailand: *www.ihpp.thaigov.net*

International Livestock Research Institute: *penaph.net*

International Society for Infectious Diseases, Inc. (ProMED): *www.isid.org*

Kenya Institute for Public Policy Research and Analysis: *www.kippra.org*

London School of Hygiene and Tropical Medicine: *www.lshtm.ac.uk/php*

Mahidol University: *www.mahidol.ac.th*

Makerere University: *www.musph.ac.ug*

McGill University: *www.mcgill.ca*

Mekong Basin Disease Surveillance Foundation: *www.mbdsoffice.com*

Ministry of Health, Cambodia: *www.moh.gov.kh*

Ministry of Health, Lao P.D.R.: *www.moh.gov.la*

Ministry of Health, Vietnam: *www.moh.gov.vn*

Ministry of Public Health, Thailand: *eng.moph.go.th*

Nuclear Threat Initiative: *www.nti.org*

RAND Corporation: *www.rand.org/health.html*

Regional Universities Forum for Capacity Building in Agriculture, Limited: *www.ruforum.org*

Royal Institute of International Affairs, Chatham House: *www.chathamhouse.org/research/global-health*

Southern African Centre for Infectious Diseases Surveillance: *www.sacids.org*

Tufts University, Cummings School of Veterinary Medicine: *vet.tufts.edu*

University of Minnesota, Global Initiative for Food Systems Leadership: *foodsystemsleadership.org*

Wildlife Conservation Society: *www.wcs.org*

Winrock International Institute for Agricultural Development: *www.winrock.org*

World Health Organization: *www.who.int/home-page*

Yunnan Centers for Diseases Control and Prevention: *www.yncdc.org*