excerpted from

Reducing Pandemic Risk, Promoting Global Health

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OUTBREAK RESPONSE
Out-break /ˈaʊtˌbrēk/  
_The sudden or violent start of something unwelcome._

In late March 2014, the World Health Organization and Ministry of Health in Guinea reported an outbreak of Ebola virus disease (EVD) in four southeastern districts. Reports of suspected cases in the neighboring countries of Liberia and Sierra Leone were already under investigation. This was the first reported outbreak of EVD in this area of West Africa.

At the end of September 2014, the Ebola virus had infected over 6,000 individuals in five West African countries and caused over 2,900 deaths (cases and deaths continued to increase past the end-date of PREDICT’s first phase). This epidemic has overwhelmed vulnerable health systems and demonstrated pandemic potential catalyzing an international response.

In late August 2014, the Ministry of Health in the Democratic Republic of Congo notified the World Health Organization of a separate Ebola virus disease outbreak in Equateur Province. This was the seventh outbreak of EVD in the country since 1976. A rapid response effort was implemented along with PREDICT staff, and the outbreak was largely contained, in part due to a public sensitized and educated on Ebola from previous outbreaks, but also due to the speed of detection from knowledgeable diagnosticians and rapid case identification and isolation and quarantine of potential contacts, along with the geographic good fortune that the outbreak emerged in a remote area with little connection to transport networks and densely populated urban centers.

Both outbreaks were likely caused by the spillover of Ebola virus into people from a wildlife host. In both outbreaks the virus was then transmitted between people infecting family members, friends, and health care providers. But in one outbreak, a health system was equipped and prepared to implement rapid response and control measures.

**Prevention and early control of outbreaks is key to reducing their impact.**

There is considerable uncertainty in predicting when and how a virus will spillover from wildlife into domestic animal or human populations. PREDICT’s surveillance and capacity building strategy emphasized the detection of pathogens early at their source, before they have the opportunity to emerge or spread from wildlife to people and then amplify in human populations. PREDICT’s capacity building strategy encouraged partnerships with governments and local institutions to strengthen disease surveillance and diagnostic centers and improve their capacity to detect known and novel pathogens. In coordination with USAID EPT partners, PREDICT’s outbreak response strategy adapted to stakeholder needs to provide requested and critical support in disease investigations, diagnostics, supply procurement, and communications in outbreaks affecting human, domestic animal, and wildlife populations. Further, as outbreak situations often encourage interagency and transdisciplinary cooperation, PREDICT and EPT partners worked with key stakeholders to operationalize the One Health approach, incorporating wildlife and animal population surveillance into disease investigations and promoting the expansion of a trained One Health workforce for response activities.
Between June 2010 and September 2014, PREDICT provided support to lead government and international organizations during 23 outbreaks in ten countries. Of these 23 outbreaks, over 83% involved support to response teams for diseases impacting human populations. PREDICT also assisted response teams during four epidemics involving wildlife populations (chimpanzees, bonobos, red howler monkeys, and wild birds), and two epidemics in domestic animal populations (poultry).

The *Outbreak Response Timeline* describes the support provided during outbreak response efforts. Additional information on outbreak response efforts is included in the country-specific sections where relevant.
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PREDICT OUTBREAK RESPONSE

- **23 outbreaks in 10 countries**

- **Affected population**
  - Humans
  - Nonhuman primates
  - Wild birds
  - Poultry

- **Countries with outbreaks**: Peru, Bolivia, Sierra Leone, Cameroon, Uganda, Guinea, Republic of Congo, China, Bangladesh, DRC

- **Outbreaks by year**
  - 2010: Peru
  - 2011: Bolivia, Cameroon, Gabon, Republic of Congo
  - 2012: Bolivia, Uganda, Republic of Congo (2)
  - 2013: Peru
  - 2014: DRC

- **Virus types**
  - Leptospirosis, Dengue, Hemorrhagic fever, Yellow fever, Yellow fever
  - Chikungunya, Suspected VHF, Alcohol poisoning
  - Ebola virus
  - Influenza, EMCV, Chikungunya, VHF, Lassa fever, Suspected monkeypox
  - Avian influenza, Nipah virus

Map highlighting countries and outbreaks with corresponding years and virus types.
**REPUBLI** **C OF** **Congo**
Collected history, clinical, and epidemiological information on 3 dead and 2 symptomatic villagers. Relayed information to government authorities.

*Suspected VHF*

**Bangladesh**
Collected bat samples and successfully integrated wildlife and human outbreak response teams for disease investigation.

*Nipah virus*

**Uganda**
Obtained wild vervet non-human primate samples in the Luwero district, helping integrate wildlife sampling in human disease outbreaks.

*Ebola virus*

**DRC**
First suspected case of human monkeypox in a hunter/mineworker from the District of Walikale (North Kivu Province). Facilitated sample collection, transfer, diagnostics, and confirmatory testing.

*Suspected monkeypox*

**Republic of Congo**
Enabled regional coordination of diagnostic expertise for outbreaks of unknown etiology in Likual, Northern Congo.

**Bolivia**
Integrated PREDICT expertise in national outbreak response plans and collaborated with the government in response to an outbreak in the Cercado province.

*Hemorrhagic fever*

**Cameroon**
Provided support during an outbreak of suspected hemorrhagic fever in Douala (1 death and 5 suspected cases).

*Yellow fever*

**Guinea**
Supported export of clinical samples from 27 patients presenting with neurological or hemorrhagic fever syndromes, successfully leveraging regional diagnostic resources.

*VHF, Lassa fever, novel rhabdovirus*
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PREDICT OUTBREAK SUPPORT

DRC
Lola Ya Bonobo sanctuary: mobilized a transdisciplinary team including entomologists to help with integrated human and animal disease investigations. **Chikungunya**

DRC
Integrated expertise with RESPOND and the PREDICT Republic of Congo team during an outbreak of unknown origin in bonobos at the Lola Ya Bonobo sanctuary. Linked labs in DR Congo with centers in the US to facilitate international pathogen detection networking. **EMCV**

UGANDA
Implemented human-animal contact surveys while assisting with the outbreak in Kibaale, where 17 died. Participated in the Ecological Studies subcommittee of the National Task Force and the development of National Response Plans for Ebola outbreaks. **Sudan ebolavirus**

GABON
Tested 205 samples from patients with acute febrile symptoms from Mouila, Ngounie province. Implemented the PREDICT diagnostic approach to detect the etiological agent. **Chikungunya**

DRC
Facilitated early detection of an Ebolavirus outbreak in the Equateur province, determined to be independent of the ongoing ebola outbreak in West Africa. Increased the likelihood of successful containment procedures. **Ebolavirus**

PERU
Recognized for wildlife surveillance expertise and participation in outbreak investigations. Assisted with rodent sample collection protocols during outbreaks. **Leptospirosis and Dengue fever**

BOLIVIA
Provided post-mortem and wildlife surveillance support in response to Red Howler monkey deaths at Ambue Ari Wildlife Refuge Park. Prompt implementation of preventive measures by the government, like human vaccination campaigns and mosquito control helped prevent human cases. **Yellow fever**

DRC
Investigated a potential disease spillover from wildlife into high-risk human populations (bonobo caretakers). **EMCV**

CHINA
Collaborated with Guangdong CDC to support optimization of testing for influenza A using the PREDICT diagnostic approach. Developed an enhanced One Health surveillance plan to support outbreak response. **Influenza**

SIERRA LEONE
Recognized for Ebola outbreak expertise; supported investigation and response efforts in countries outside of the PREDICT network. **Ebolavirus**

**“All support was conducted at the request of government authorities and in coordination with EPT partners, including other international health response organizations”**