ELECTRONIC COMMUNITY EVENT-BASED SURVEILLANCE SYSTEMS FOR RAPID RESPONSE TO INFECTIOUS DISEASE

Rapid outbreak response is vital for helping communities prevent, detect, and respond to infectious disease threats, such as Ebola and COVID-19. Management Sciences for Health (MSH) has developed a comprehensive epidemic readiness model to empower communities to become effective first responders. Our model strengthens local health systems to support community-level surveillance, preparedness planning, and inventory and supply chain management and includes an investment case to support advocacy. The ultimate goal is to support and protect local communities against global epidemic threats and facilitate global decisions on how best to be prepared for and respond to them.

A platform for rapid community response

Community participation is critical to detecting unusual health events before they develop into public health crises. Through MSH's electronic Community Event-Based Surveillance (eCEBS) system, communities are engaged in identifying and stopping outbreaks at their source, which can lessen the impact on the community and decrease negative health outcomes.

MSH addresses critical gaps in the health system infrastructures that hinder the prevention of, early detection of, and response to infectious disease outbreaks. We work with countries to build resilient health systems that continue to provide essential quality care and services during outbreaks. We invest in local leadership for a rapid, multisectoral response—resulting in lives saved and economies protected.

MSH works to:

- Ensure quality service delivery
- Improve infection prevention and control measures in health facilities
- Enhance community engagement
- Build a skilled health workforce
- Support robust information systems
- Contribute to effective pharmaceutical and supply chain management

MSH and its local and national partners support the Global Health Security Agenda and help countries achieve International Health Regulations compliance.

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Management Sciences *for* Health

Stronger health systems. Greater health impact.

COMMUNITY EVENT-BASED SURVEILLANCE

Participation of citizens, communities, frontline health workers, and those working with animal populations in direct reporting of suspected outbreaks saves lives and livelihoods through earlier detection and earlier response.

Shorter Response Time

Case detection reduced from weeks to hours

Designed as permanent routine surveillance system, rather than a temporary response to outbreak

Linked to National Information System

Instant alerts are sent to all relevant authorities, increasing system-wide accountability

Puts community-level data at the fingertips of national authorities

Integrated Surveillance Systems

Both human and animal events are reportable

Community health workers, animal health workers, and village leaders have formal obligation to report

Verifiable Electronic Record

By linking the electronic system to the community level, we establish a track record - a system that can be traced back and used to support decision-making, investigate, and respond sooner

Integrating eCEBS into the Rwandan Health System

In Rwanda, MSH performed a detailed situational analysis of existing systems and resources to develop a system tailored to the country's needs and aligned with national policies and plans. The resulting eCEBS program incorporates the Integrated Disease Surveillance and Response framework, National Action Plans for Health Security, emergency preparedness and response plans, and national One Health platforms.
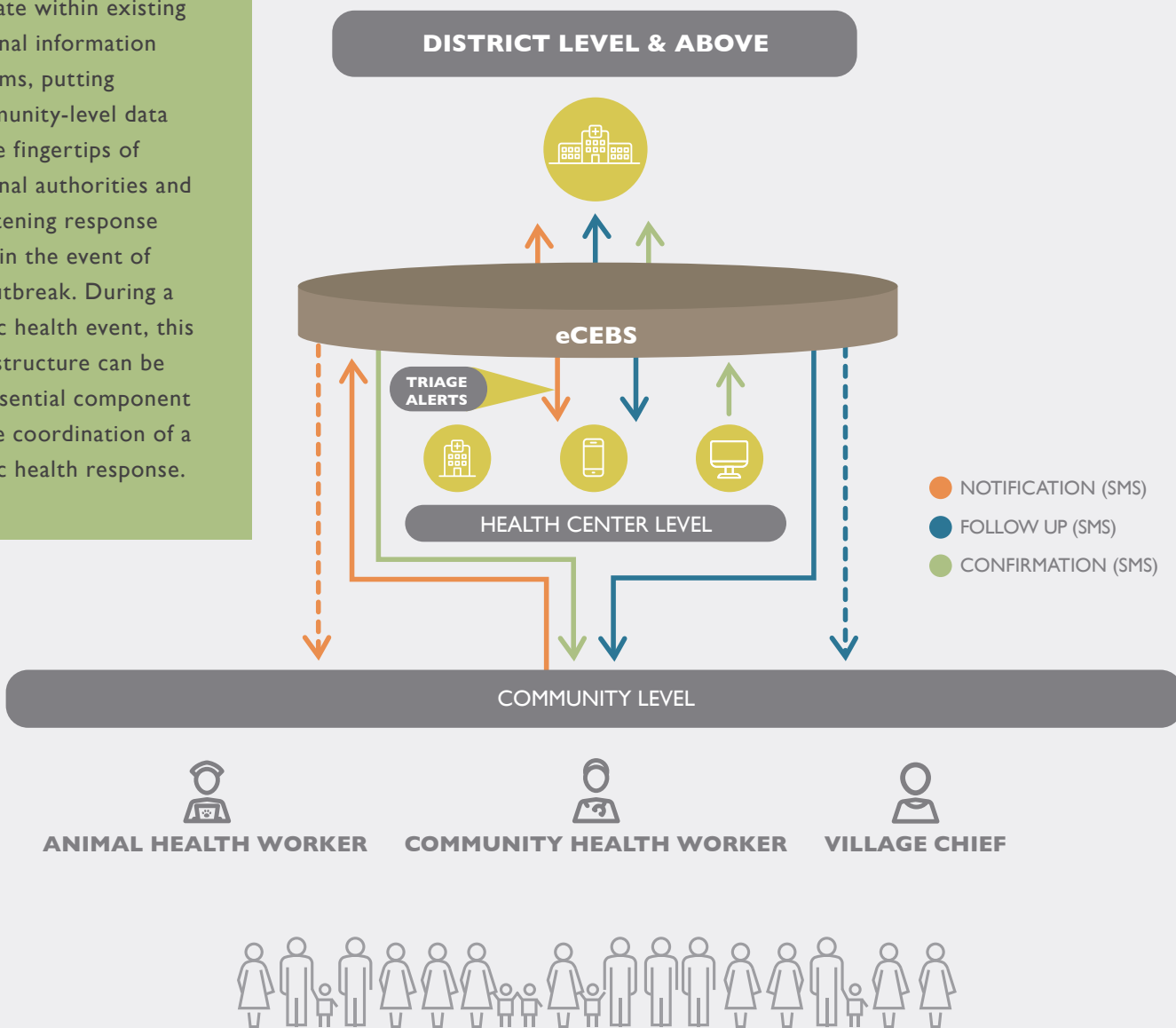
MSH integrated eCEBS into routine health reporting systems and developed technical guidance for establishing and implementing the system and improving capacity to prevent, detect, and respond to events and outbreaks. Based on our years of work in Rwanda and our understanding of the country's context, MSH designed the eCEBS system not as a separate, parallel system but as one that is embedded into DHIS-2—the common web-based database used by national health systems worldwide.

The reporting mechanism created with eCEBS leveraged the rapid SMS messaging that community health workers in Rwanda have been utilizing for nearly a decade and added signal definitions for communities to report instances of infectious disease outbreaks in animals and humans. The reporting system enabled alerts from the community to pass automatically to health and administrative authorities and initiated a workflow that triggers an outbreak investigation or classifies the alert as a false alarm. An example of potential triggers is illustrated in the table below.

POTENTIAL TRIGGERS REPORTED THROUGH ECEBS

CEBS Trigger	Threshold	IHR Conditions
Serious unexplained or unusual illness that appears contagious (infectious) among persons grouped together in a family or community	Cluster (>2 people) within a week	SARS; MERS; Influenza new subtype; West Nile; dengue; pneumonic plague; smallpox; accidental or intentional releases of pathogens
Serious unexplained or unusual deaths that appears contagious (infectious) among persons grouped together in a family or community	Cluster (>2 people) within a week	SARS; MERS; Influenza new subtype; West Nile; dengue; pneumonic plague; smallpox; accidental or intentional releases of pathogens
Suspected case or death of patient with symptoms similar to viral hemorrhagic fever	1 or more case	Viral Hemorrhagic fever syndromes or illnesses (Ebola, Lassa, Marburg, Rift Valley fever, Yellow fever);
Any sudden or unexpected health problem among animals (wild or domesticated) in the same community	Cluster	Viral Hemorrhagic fever syndromes or illnesses; Influenza new subtype.

eCEBS can be adapted to operate within existing national information systems, putting community-level data at the fingertips of national authorities and shortening response time in the event of an outbreak. During a public health event, this infrastructure can be an essential component in the coordination of a public health response.

DISTRICT LEVEL & ABOVE

eCEBS

TRIAGE ALERTS

HEALTH CENTER LEVEL

● NOTIFICATION (SMS)
● FOLLOW UP (SMS)
● CONFIRMATION (SMS)

COMMUNITY LEVEL

ANIMAL HEALTH WORKER

COMMUNITY HEALTH WORKER

VILLAGE CHIEF

Engaging the Community in Reporting

eCEBS relies on three levels of actors:

- Community lookouts in each village (community health workers, village chiefs, or agricultural extension agents)
- Disease surveillance focal points in each health center who triage the alerts
- District and National Disease Surveillance teams who follow up with outbreak investigation and response

The module allows these designated community members to enter information on unusual events such as serious, unexplained illness; death of a group of people; or clusters of death or illness among animals from unknown causes. Serving as an early warning system, these community reports are immediately available to decision makers so they can act quickly to prevent the spread of disease and mitigate the impact on human lives, the economy, and national security.

Simplicity is a key part of the system design. There are three types of messages that are sent via the SMS reporting system:

- Notification of the event by the community focal person
- Follow up investigation of the event by the health facilities (an ID is given to the investigation by the eCEBS system)
- Confirmation if larger investigation is being opened or if it is a false alarm and closed

All messages are logged in the DHIS2-based system, resulting in a robust database for predicting disease hotspots and after action analysis. Once an outbreak investigation begins, individual cases are reported through the national electronic infectious disease surveillance and response system in the same platform.

PHOTO: ALANNA SAVAGE

Ensuring Smarter and Faster Outbreak Response

Investing in preparedness is a long-term strategy that builds local capacity to effectively respond to events rapidly, preventing and controlling infection before it becomes an outbreak. MSH helps countries and communities plan, prepare, and build early warning surveillance systems to secure critical services and ensure business continuity. Using an organized system of groups trained to identify community events that may constitute a potential risk to public health, communities work with national and district authorities to investigate and respond to emergencies. The application of eCEBS as one part of a broad infectious disease preparedness and response model can lead to a smarter and faster outbreak response.

For more information on our electronic Community Event-Based Surveillance system and our global health security work, please contact communications@msh.org.

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