

# Early warning surveillance and response in emergencies

Report of the WHO technical workshop

7–8 December 2009

World Health Organization, Geneva, Switzerland

DISEASE CONTROL IN HUMANITARIAN EMERGENCIES  
GLOBAL ALERT AND RESPONSE





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## Introduction

Humanitarian emergencies caused by conflict or natural disasters are frequently characterized by the displacement of large numbers of people. Those affected are often resettled in temporary locations with high population densities, inadequate food and shelter, unsafe water and poor sanitation. These conditions increase the risk of transmission of communicable diseases and other conditions and lead to increased mortality, particularly from outbreak-prone diseases.

To address this increased risk, specialized systems for disease early warning and response are typically set up in the affected areas in the acute phase of the emergency by ministries of health (MoH), with support from the World Health Organization (WHO) and other partner agencies. These early warning and response systems, or EWARN systems, are designed to detect and respond rapidly to outbreaks and disease clusters of epidemic-prone diseases.

Despite some features in common, EWARN systems set up in response to different emergencies often differ in fundamental ways, with little standardization between systems. The design of EWARN systems is mainly driven by past practices and local feasibility constraints, and less by scientific evidence. Due to the chaotic operating environment and the frequent turnover of staff, systematic assessment or evaluation of implemented systems is unusual. At present, available evidence with which to guide system design and improve function is sparse. There is an urgent need for additional guidance in this area of emergency response.

The Disease Control in Humanitarian Emergencies unit (DCE) within the department of Global Alert and Response (GAR) and the Health Security and Environment (HSE) cluster at WHO-HQ aims to strengthen and guide EWARN implementation in emergencies. The project objectives are as follows:

- To assemble, review and analyse the available evidence and experience regarding the operation of EWARN systems in humanitarian emergencies;
- To develop/update standards, tools, guidelines, and applications to guide and support improvements in the effectiveness, operational efficiency, and sustainability of EWARN systems in emergencies.

As part of this process, DCE hosted a WHO technical workshop on EWARN in emergencies on 7-8 December 2009. Participants from 16 organizations attended, including technical experts and those with field-level experience in EWARN implementation. Representatives from WHO (Headquarters, regional and country offices), governmental aid agencies, international nongovernmental organizations (INGOs), academic and research institutions, United Nations (UN) agencies and other international organisations (IOs) participated in the workshop (see Annex).

## Objectives of the workshop

The objectives and expected outcomes of the meeting were as follows:

- To review the context of outbreak detection and response in emergencies within the broader framework of health information in emergencies, and in relation to the International Health Regulations (IHR) and to routine surveillance;
- To review recent examples of EWARN system implementation and partners' experiences with EWARN systems in emergencies (Afghanistan, Chad, Darfur, southern Sudan, others);
- To gain consensus among stakeholders as to the goals/purpose, principles, and functions of systems for EWARN in emergencies;
- To identify next steps in achieving the overall objective of strengthening EWARN implementation in emergencies.

## **Review of EWARN systems**

Francesco Checchi (LSHTM/Epicentre) presented a summary review of five EWARN systems implemented between 1999 and 2008 (Albania, eastern Chad, Darfur, Iraq, and Myanmar). The findings were based on an MSc thesis by Hannah Pollard, LSHTM.

### **Key points**

- Outbreak detection and response was the most common objective; other objectives were disease trend monitoring and clinical activity monitoring (health unit workload estimation).
- All five systems collected and analyzed aggregate data. Thresholds were used to trigger alerts but specific criteria used to define the thresholds varied among systems. Immediate notification from reporting facilities upon detection of unusual events of epidemic potential (formal alert) was the primary method of detection for most outbreaks. One outbreak was detected only by verification of a rumour.
- The number of diseases/syndromes covered by the systems ranged from 13 to 20 and commonly included non-epidemic prone diseases. There was no evidence that information collected for non-epidemic prone diseases or to monitor health staff workload led to public health actions.
- Although EWARN systems were typically set up as a collaboration between the MoH, NGOs working in the health sector, and WHO and other UN agencies, multiple surveillance systems often existed with little harmonization. The process by which EWARN systems were integrated into the national surveillance system is unknown or not well documented.
- Additional evidence is needed in order to develop more effective and sustainable systems.

## **EWARN systems: evaluations and experiences**

The WHO Regional Office for the Eastern Mediterranean (EMRO), with support from DCE, is coordinating EWARN evaluations in the EMRO region to improve the functioning of current systems, and also to gather additional evidence to guide EWARN system development. Two evaluations were performed in October (Darfur) and November (Southern Sudan) 2009, led by the United States Centers for Disease Control and Prevention (CDC). The results were presented to the group by CDC. Common problems included constraints in the quality of data and analysis, and lack of feedback. Recommendations include standardization of case definition, data collection, and reporting, and improved monitoring/supervision and training. Recent examples of EWARN system implementations and the experiences of partners with EWARN systems were presented to the group.



## Summary of working group consensus findings

The participants were divided into working groups to discuss six important issues specific to EWARN systems during emergencies.

The results are summarized below.

### **1. EWARN definitions, objectives and operational goals**

EWARN is a system established for the detection of acute events. Systems for outbreak detection, early warning and response are generally implemented in response to the increased risk of communicable disease transmission during the acute phase of a humanitarian emergency.

Its primary objective should be to reduce mortality and morbidity through timely detection, confirmation, and response to outbreaks. Monitoring of diseases for programme planning and evaluation is a secondary objective. EWARN should complement existing national systems, while improving mechanisms such as communication and advocacy, training, laboratory capacity, and logistics.

EWARN is a collaborative effort between the MoH, WHO and other UN agencies, IOs and NGOs working in the health sector. Stakeholders involved in EWARN expect a simple and flexible system integrated into existing systems for improved effectiveness and operational efficiency. Partners expect MoH to take a strong coordination and leadership role, and WHO to provide technical advice. Donors also expect rapid implementation of a simple and effective system. Participants also agreed that data collection, verification, analysis, and interpretation should be linked to and guided by the operational response, i.e. data which will precipitate action should be prioritized for collection. Timely feedback is necessary at all levels.

### **2. Minimum essential information required for EWARN**

The type and amount of data collection required to detect an outbreak promptly and to make public health decisions could be reduced given that, the reviews and field evaluations of EWARN systems presented at the workshop showed that most outbreaks were primarily detected through investigation of rumours and formal alerts (immediate alerts of detection of unusual events from reporting units). Data required during outbreak response (for investigation, outbreak monitoring, and control measures) should not be confused with those needed for outbreak detection.

EWARN systems often collect data for diseases and conditions that are unlikely to cause epidemics and for which population prevalence rather than incidence is required for decision-making (for example, malnutrition, injuries, psychological trauma, and certain endemic diseases), or data to support general health planning and programme evaluation (for example, the number of reporting facilities, sex of reported cases, or proportionate burden of disease). Evidence regarding the usefulness of EWARN to influence public-health decisions is limited. Furthermore, mortality data from EWARN are often misleading as only the number of deaths in health facilities are recorded, typically omitting those occurring in communities. Collecting and reporting additional data not used to initiate alerts and public health actions hinders operational efficiency, and therefore, EWARN systems should focus on collecting, analysing and interpreting only information which can influence public health interventions. The collection of any particular data must be clearly justified by the objectives and desired outputs of an EWARN system. Further review of EWARN experiences during emergencies is required to identify which types of data and analysis lead to public health decisions and actions.

### **3. Outbreak detection (rates/trends vs. cases/alerts)**

Despite current EWARN systems' emphasis on weekly aggregate reporting and trend analysis, most outbreaks are initially detected by immediate alerts of rumours (reported by partner agencies or communities, or via reporting facilities), or detection of unusual events from reporting units. Given this, more relative emphasis should be placed on immediate alert and verification, especially when there are resource limitations.

However, weekly aggregate reporting and trend analysis, (and sentinel surveillance) could be useful for the initial detection of outbreaks for certain diseases, such as malaria, if appropriate data are collected and analysed properly. Nevertheless, lack of denominators remains a major challenge and improved methods of systematic population estimation are required for trend analysis. The lack of denominators, however, does not impede the detection of the vast majority of outbreaks – identified through immediate alerts.

Alert thresholds (defined by a specific number of cases of a disease or a certain magnitude increase in disease incidence) are used to trigger actions such as verification, investigation and response. Numbers and types of thresholds, and the actions that result from their use, vary in humanitarian emergencies; there are few universal EWARN alert thresholds. Thresholds must be better defined and validated, tailored to each emergency setting and should be monitored and evaluated to ensure effectiveness.

### **4. EWARN evaluations**

While much experience has accumulated on EWARN in emergencies, to date there is insufficient published evidence regarding effectiveness and efficiency of system implementation. Both prospective and retrospective reviews of EWARN systems in emergencies to gather evidence are needed.

Areas that should be prioritized for evidence-gathering and research include:

- selecting diseases to include in EWARN in emergencies;
- determining the minimum information required to detect outbreaks and monitor diseases, as well as identifying the optimal approaches to surveillance (passive, active, exhaustive, sentinel);
- improving the quality of data and its analysis in terms of population estimation, sensitivity and specificity of thresholds, and signals that influence public health actions;
- balancing system standardization with flexibility;
- determining standard performance indicators;
- cost effectiveness of systems;
- improving techniques and diagnostic tests for laboratory confirmation in emergencies;
- complementing existing surveillance systems during emergencies, and managing the shift back to routine surveillance;
- using new technology for transferring data.

Areas that should be prioritized for the development of adapted standards and tools for EWARN in emergencies include:

- design and implementation of EWARN in emergencies;
- outbreak preparedness and outbreak response;
- monitoring and evaluation;
- training and supervision.

A plan for ongoing monitoring/supervision and evaluation should be incorporated into an EWARN system proposal. Standard EWARN evaluation guidelines in emergencies are also required. Regular evaluation (every 6 months of functioning system and at close) and proper documentation of system implementation and processes, including an alert/response tracking mechanism are recommended. Publication and dissemination of evaluation results are also important to ensure that all partners benefit from lessons learned.

## **5. Use of new tools/technologies to address gaps**

Data transfer is often a major difficulty in EWARN systems in humanitarian emergencies, particularly with mobile populations.

If data reporters could enter data and obtain real-time analysis at the field level, delays in response could be minimized. Improving techniques for laboratory confirmation in emergencies and field level rapid diagnostic tests may assist with identification and management of cases, facilitating a more timely and effective response. Operational research into new technologies that could minimize the time between data collection, outbreak detection/verification, and response is needed.

Research into improved techniques for population estimation was again suggested. Techniques for accurately estimating populations (and the results of these estimations) should be shared across agencies and sectors in order to avoid duplication of data collection efforts.

## **6. Sustainability: EWARN and national routine surveillance**

EWARN systems during emergencies should complement and ultimately strengthen early warning and response components of existing national routine surveillance systems. Although EWARN systems are set up in response to the increased risk of communicable disease transmission during the acute phase of a humanitarian emergency, the function of early warning and response also remains essential in non-emergency settings. Therefore, EWARN systems in emergencies should be set up to complement a broader surveillance network; if there is no pre-existing system, it should be set up only as a stop-gap with an aim to develop a routine system with an early warning and response component. Crisis/disaster-prone areas need preparedness efforts to enhance EWARN function.

Guidelines for implementation of EWARN systems during emergencies should therefore include policy and process goals to facilitate broader surveillance strengthening goals under IHR, rather than EWARN existing as a separate entity. Continuity of resources in personnel, trainings, equipment and funding is required for sustainability.

# **Conclusions and recommendations**

The participants in the WHO technical workshop on EWARN in emergencies shared experiences and lessons learned in EWARN system implementation in different emergency contexts in different countries. Discussion during the workshop was focused on several key issues that are frequently problematic, and consensus was reached on the following points:

- The primary objective of EWARN is prompt outbreak detection and response to reduce mortality and morbidity;
- Monitoring of disease occurrence on an ongoing basis for programme planning and evaluation is a secondary objective;
- EWARN in emergencies should complement existing national systems, while strengthening operational mechanisms;

- A standardized approach to EWARN system implementation during emergencies is needed as part of the broader surveillance goals under IHR;
- Additional scientific evidence is needed for improved EWARN system implementation and effectiveness during emergencies. As part of progress towards evidence-based EWARN implementation in emergencies, partners in attendance agreed to support EWARN strengthening through retrospective reviews and evaluations of previous EWARN implementation during emergencies; to support prospective evaluations of ongoing EWARN systems in various emergency settings including in middle-income countries; to encourage continuous research to explore outbreak detection methods and innovative data transfer methods; and to support accurate documentation of EWARN system implementation during emergencies.
- A WHO-led interagency technical working group is needed to develop standardized policy, guidelines and tools for implementing EWARN during emergencies. The technical working group would address critical areas of EWARN in emergencies including data collection, reporting, case definitions, thresholds, analysis, performance, training, and evaluation. Goals would include strengthening of effectiveness, operational efficiency, and sustainability through the evidence-based standardization of EWARN implementation in emergencies. It should also articulate the role of EWARN during emergencies within the humanitarian aid architecture, including policy and process goals. The guidelines on EWARN in emergencies will be shared with all partners in implementing and supporting EWARN systems in emergencies.

## **Sharing workshop results and agreement**

This report documents the main issues discussed in the workshop. WHO will share this document with all participants and other key health partners, both directly and through the Global Health Cluster (GHC). The participants proposed a follow-up meeting in 2010-2011 to update and review progress.

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