Epidemic-prone disease surveillance and response after the tsunami in Aceh, Indonesia

Ministry of Health, Indonesia; World Health Organization assisted by Global Outbreak Alert and Response Network (GOARN) partners: Centers for Disease Control and Prevention - USA, Epicentre - France, European Programme for Intervention Epidemiology Training (EPIET) - Sweden, Health Protection Agency - UK, Institut de Veille Sanitaire - France, Australian Biosecurity CRC at Curtin University – Australia, Macfarlane Burnet Institute - Australia, Mailman School of Public Health, Columbia University – USA, Universiti of Malaysia - Sarawak; UNICEF. *Correspondence to Asheena Khalakdina (asheenak@whosea.org)*

Aceh Province, Indonesia (population 4.8 million) was the area most severely affected by the earthquake and subsequent tsunami of 26 December 2004. Extensive loss of life, property, and livelihood in 14 of the 21 districts of the province left a large segment of the population without basic needs and vulnerable to epidemic-prone diseases. As of 22 March 2005, Indonesia reported that 126 602 bodies had been buried; 93 638 people were missing; and 514 150 were displaced in 20 districts and cities in Nanggroe Aceh Darussalam Province (NAD) [1]. In the public sector, 53 of 244 health facilities were destroyed or severely incapacitated and 42 of 481 health professionals died. This disaster occurred in the context of 30 years of civil unrest which have already had severe social and economic consequences for the province.

During the acute phase of the emergency, the Aceh Provincial Health Office (PHO) was reinforced by staff from the Ministry of Health (MOH), Jakarta (http://www.depkes.go.id/), and teams from the communicable diseases departments of the World Health Organization (WHO, http://www.who.int/csr/en/), which included collaborating partners from the Global Outbreak Alert and Response Network (GOARN, http://www.who.int/csr/outbreaknetwork/en/). This was to support the PHO to develop a surveillance/early warning and response system (EWARN) for the detection of epidemic-prone diseases; to investigate outbreaks with confirmation of potential pathogen, mode of transmission and individuals at risk, and to prepare for outbreak management and control measures.

Surveillance / early warning and response system

An EWARN system was rapidly established. The target population included both residents and internally displaced populations (IDP). Sources of information were health facilities (fixed/mobile clinics, permanent/field hospitals) and clinical and public health laboratories run by national and international governmental and nongovernmental organisations (NGOs) in affected districts. Diseases with epidemic potential were targeted (acute watery diarrhoea (AWD), bloody diarrhoea, dengue, fever of unknown origin, acute jaundice, measles, meningitis, and malaria), as well as acute respiratory infections (ARI) and tetanus. Data collected on morbidity and mortality were compiled on a weekly basis by age group (<5 years and ≥ 5 years). This was complemented by an immediate alert system based on daily telephone calls, text messages or email reporting of suspected cases of specified diseases. Any alert led to verification, investigation and response, jointly carried out by PHO and WHO. The WHO Indonesia country office in Banda Aceh provided specimen sampling kits and training on sample collection as required.

Data management and analysis relied on an application based on EpiInfo 6, EpiData 3.2 and Epi2000 with a link to HealthMapper 4.1and ArcView 3.2a. Results and actions taken were presented and discussed during a twice weekly health sector meeting where over 50 agencies were represented. A weekly epidemiological bulletin published in Indonesian and English by PHO/MOH and WHO was also disseminated to all partners.

Results

At the height of the emergency phase, between weeks 4 and 10 of 2005, there were between 19 and 27 agencies reporting, comprising between 83 and 123 reporting units from 10 districts. The greatest number of agencies and their reporting units (i.e., health facilities) reported during week 7.

As of 27 March 2005 (week 12), a cumulative total of 184 864 consultations were reported, comprising 33 148 (18%) in those aged 0-4 years and 151 716 (82%) in those aged ≥ 5 years

(data not shown). Of the total, 12 001 cases (29%) were diagnosed in those aged 0-4 years and more than twice that number (28 705) diagnosed in those aged >5 years (Table). ARI (62%), AWD (23%) and other fevers (11%) were the most common conditions diagnosed.

Table. Cumulative morbidity and mortality from epidemic-prone diseases, Aceh Province, at 27 March 2005

Diseases	0-4 years		≥ 5 years		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Acute watery diarrhoea	3589	1	5894	0	9483	1
Bloody diarrhoea	128	0	448	0	576	0
Confirmed malaria	77	0	562	1	639	1
Other fever above 38°	1533	2	3056	0	4589	2
Suspected measles	70	0	75	0	145	0
Acute respiratory infection	6599	3	18613	3	25212	6
Acute jaundice syndrome	4	0	45	0	49	0
Meningitis	1	0	12	1	13	1
Total	12001	6	28705	5	40706	11

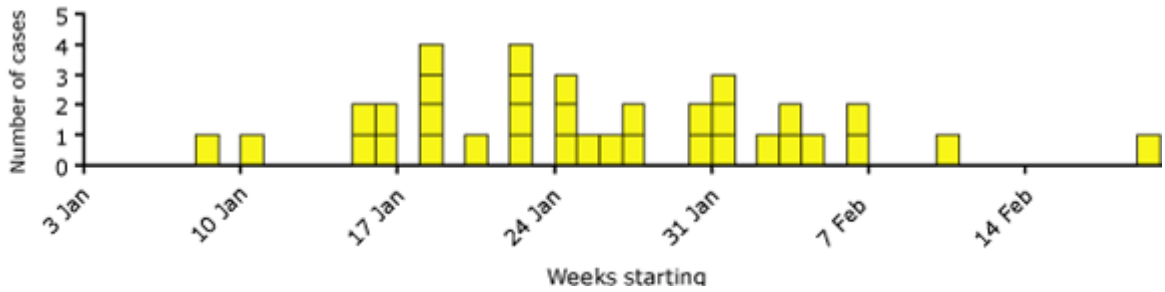
Outbreaks

Reported alerts that were investigated included: bloody diarrhoea (11), acute watery diarrhoea (1), dengue (5), typhoid (3), acute jaundice (11), malaria (4), meningitis (4), encephalitis (1), scrub typhus (1) and measles (24). Investigations revealed false alarms (cholera, malaria, encephalitis) clusters of cases (tetanus, dengue, bloody diarrhoea, typhoid, scrub typhus, hepatitis A and E); and an outbreak of (measles).

A cluster of tetanus cases occurred in the immediate aftermath of the tsunami [submitted for publication]. One hundred and six patients with tetanus infection were admitted to hospital between 30 December 2004 and 26 January 2005 from four districts. There were 39 female and 67 male patients with a median age of 40 years (range: 1 to 70). The case fatality ratio was 18.9% and the peak of case onsets occurred in mid-January.

A measles outbreak with 35 cases in patients aged between 5 months and 15 years was reported from Aceh Utara district, with rash onset between 8 January and 19 February (Figure). Most patients (86%) lived in IDP camps during their incubation period. Sixty per cent of the cases were male and the median age was 4 years. Measles case management guidelines were disseminated to local health centres and NGOs. An emergency vaccination campaign targeting children aged 6 months to 15 years was initiated in Aceh Utara in mid January for all IDPs resident in camps and was later extended to the surrounding communities.

Figure. Measles cases by date of rash onset, Aceh Utara district, Aceh Province, Indonesia, January-February 2005. Source: The Epidemiology and Surveillance Group, Banda Aceh, Indonesia 2005



WHO editorial note

Over 500 000 IDPs resided in either temporary shelters or moved in with host families across Aceh province following the tsunami of 26 December 2004. Although risk factors for transmission of epidemic-prone diseases existed, no large outbreaks occurred in the acute phase of the emergency, similar to previous tsunamis [2]. Waterborne diseases (cholera, shigellosis, typhoid, hepatitis A and E) can result due to limited safe water and sanitation; vectorborne diseases (malaria, dengue) due to increased mosquito breeding sites; and measles, ARI, influenza, and meningitis due to overcrowding [3]. There are several reasons as to why major outbreaks were not recorded. Firstly, large outbreaks of communicable diseases are uncommon following natural disasters and are mainly related to suboptimal living conditions, lack of safe water and sanitation, environmental changes and lack of health care [4]. Secondly, the Aceh population was already accustomed to hand washing and boiling their drinking water before consumption. Furthermore, the population was generally healthy with low levels of malnutrition and infant mortality [5]. The EWARN system detected and rapidly responded to potential outbreaks including improving water/sanitation conditions, distribution of appropriate medications, soap and hygiene kits, health education and follow up of contacts, which may have also played a role in preventing large epidemics. The small outbreak of measles reported was not surprising given the low reported vaccine coverage in Aceh before the tsunami [6].

The key to establishing a successful EWARN system was good cooperation between national and international NGOs, United Nations agencies and the MOH. The regular meetings of the epidemiology and surveillance sub-group and the health coordination group were valuable for dissemination of information and feedback, encouraging timely and complete reporting, and discussing issues of concern and possible interventions. A critical element was the active nature of surveillance conducted by EWARN staff – the system, however, is fragile and needs significant inputs to maintain its intensity.

With a major population displacement, intervention priorities include provision of adequate water and sanitation, housing and food, and re-establishment of primary healthcare, including measles immunisation [6]. Sensitive disease surveillance systems are required to detect and control outbreaks of communicable diseases and to avoid the additional health burden in affected populations [7]. However, several factors make the implementation and maintenance of EWARN systems in emergency situations a challenge: inconsistent weekly reporting by agencies, especially as a result of their short-term field presence; lack of accurate population denominator data because of high mobility of the IDPs; difficulties in reaching rural districts; lack of regular laboratory confirmation of suspected cases; multiple reporting of individual patients because of multiple sources of medical services. In addition, the increased focus on identifying epidemic-prone diseases that are endemic in Aceh is likely to result in detecting more cases than would have been found with the pre-emergency surveillance system. Indeed, the measles cases identified were likely to have been a consequence of the enhanced surveillance and immunisation campaign rather than a true epidemic. It should be noted that the data generated by EWARN reflect more accurately the health situation among IDPs than that of the general population.

The WHO office in Banda Aceh has been strengthened to provide Aceh Province with necessary technical support over at least the next year in the form of capacity building and infrastructure strengthening for surveillance and rapid response to outbreaks. Plans are underway to integrate the EWARN, including the data management component, into the routine surveillance system that was in place before the tsunami. The need for vigilance against outbreaks of shigellosis, typhoid, hepatitis, cholera, measles, malaria and dengue remains a top priority as long as displaced populations are housed in high population-density camps and settlements [8]. Thus the early warning component of the surveillance system must be sustained until the IDPs have been moved into permanent housing.

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Clarification

The authors would like to make a clarification. For the measles cluster investigation in Aceh Utara district, the standard WHO recommended case definition was used: disseminated maculopapular rash and fever plus cough or coryza or conjunctivitis. All 35 suspect cases investigated met this case definition but only one was laboratory confirmed by IgM ELISA.
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