



Epidemic surveillance following the Asian tsunami

The December 2004 tsunami which originated less than 250km off the coast of Sumatra devastated the shorelines of Indonesia, Sri Lanka, Thailand, Myanmar, Bangladesh, India, the Maldives, and other countries even as far away as Africa. It is a potent reminder that the populated parts of the Australian coast and our Pacific neighbours are also at risk. The experience from the Asian tsunami can provide valuable lessons in preparedness and response.

Not surprisingly, in the initial days after the tsunami it was difficult to get accurate information from the affected countries. As reports rolled in, it became clear that the Province of Aceh in Sumatra, Indonesia was the area most severely affected. Approximately 220,000 people died in Aceh in just a few minutes. The extent of the ruin was vast. Even before the tsunami hit, earthquake damage toppled many buildings and destroyed infrastructure such as water supplies, roads and communications. When the tsunami hit about 30 minutes later, hundreds of

Tony Stewart

Centre for International Health
Burnet Institute for Medical Research
and Public Health, Vic
Tel: (03) 9282 2199
E-mail: tonys@burnet.edu.au

kilometres of coastline were affected. On the west coast of Aceh – that part of the coast directly facing the earthquake's epicentre – many villages were entirely swept away. In that short space of time, 480,000 people were left homeless, and looking for shelter wherever they could find it.

In Aceh Province many leaders and government officials were killed, making coordination more difficult. Understandably, only a handful of health workers reported for work in the first week; a quarter of all health facilities were destroyed or non-functional; the provincial health office, the vaccine cold room and provincial public health laboratory buildings were all severely damaged.

Against a background of 3 decades of civil conflict, government services in many areas of the province were not optimal even prior to the tsunami.

The provincial government quickly set up a coordination centre for all sectors, with support from the national level and other provinces. Military contingents were quick to arrive, providing essential aid and situation assessments. Many foreign government teams, international non-government organisations (NGOs) and other volunteers began to arrive. The various UN agencies were delegated responsibilities for securing food, water, sanitation, shelter and health services¹.

The immediate public health needs were to:

- Establish health coordination of the large number of national and international government and NGOs arriving in the affected areas, and liaise with the groups responsible for water/sanitation, food and shelter.
- Coordinate the conduct of rapid health assessments.
- Establish an evolving inventory of available resources.
- Coordinate epidemiological and nutritional surveillance.
- Ensure preparedness for epidemic/disease control.
- Distribute and promote the adherence to uniform treatment guidelines.
- Ensure the availability of essential drugs.
- Manage the psychological and social stress among both the affected population and those providing assistance.

Epidemic preparedness

WHO and the Indonesian Ministry of Health (MoH) took the lead for disease



The potential for outbreaks of vector borne diseases is apparent from this aerial view of Banda Aceh.



surveillance and response². Because local capacity was so severely reduced, this had to be created essentially from scratch.

We quickly implemented an early warning (EWARN) reporting system targeting both residents and internally displaced populations (IDP), and covering diseases of likely epidemic potential. To avoid overwhelming field workers, the surveillance system was focused only on those diseases thought to be of greatest epidemic risk. From a more extensive list (Table 1), the reporting system was initially limited to diarrhoeal diseases (cholera, typhoid, shigella), mosquito-borne diseases (such as malaria and dengue fever), acute lower respiratory infections, measles, hepatitis and meningitis, as well as tetanus and wounds/injury for inpatients.

Because there was no public health laboratory capacity in the early days, we provided simple syndromic case definitions, both in Indonesian and English. Information was gathered from fixed and mobile clinics and hospitals run by government, local, national and international NGOs working in the 14 affected districts. Data on cases and deaths were compiled weekly by age group (<5 years and ≥5 years).



This regular data collection was complemented by a rapid alert system (in-person, telephone, text messages or e-mail reporting of suspected cases of target diseases). Active case finding was conducted in camps wherever possible. Rumours of outbreaks from journalists and the public were also investigated. Once laboratory capacity was established, specimen sampling kits were distributed, along with training on sample collection as required. Laboratory reporting was included in the surveillance system.

Surveillance data

In the first 12 weeks, more than 185,000 consultations were reported³. Of these, approximately 25,000 were acute

respiratory infections, 9,500 were acute watery diarrhoea and 4,500 were other febrile illnesses. Only 11 deaths were reported – ARI (6), diarrhoea (1), malaria (1), meningitis (1) and fever of unknown origin (2).

Outbreak detection

Thankfully, no major disease outbreaks occurred. In part this was because most of the displaced population settled into small camps, schools, mosques, sporting grounds and other areas with at least rudimentary sanitation. There were no especially large camps that would have supported the rapid spread of disease.

Measles

Measles is known to have case fatality rates up to 30% in stressed and malnourished populations, making it a high priority for detection and response. A single case should stimulate an immediate response. We detected several individual cases of measles throughout the province. The suspected measles cases were quickly confirmed by surveillance staff; this information was used to prioritise areas for mass immunisation. Concurrently, UNICEF and MoH coordinated a province-wide measles program for under-15s, including vitamin A supplementation for under 5s.

One measles outbreak was reported from the Aceh Utara district³. Most of the 35 identified cases (86%) lived in IDP camps during the incubation period; the median age was 4 years. Measles case

Table 1. Diseases of epidemic potential in tsunami affected areas.

Disease of immediate concern	Diseases related to over-crowding
Diarrhoea	Acute lower respiratory infections
Cholera	Measles
Typhoid	Meningococcal disease
Shigella dysentery	Tuberculosis
Hepatitis A & E	
	Others
Diseases posing threats in the first month	Tetanus
	Rabies
Malaria	Diphtheria
Dengue fever	HIV/AIDS
Dengue haemorrhagic fever	Leptospirosis
Typhus	Rabies



management guidelines were disseminated to local health centres and NGOs and an emergency vaccination campaign targeting children aged 6 months to 15 years was initiated. This was later extended to the surrounding communities. There were no measles fatalities.

Tetanus

Many thousands of people were wounded on the day of the tsunami; a lot of these wounds were not adequately treated. As a consequence, there were over 100 cases of tetanus, mostly in adults. Once health workers realised the extent of this problem, tetanus prophylaxis and management guidelines and drugs were distributed. Identifiable groups such as workers involved in cleanups and burials were immunised and provided with protective boots and gloves.

Malaria

The situation in the camps was made worse by the arrival of monsoonal rains in January, the peak time for mosquito-borne diseases (see the photograph on page 159). MoH gave approval to use ACT (artemisinin combination therapy) and rapid diagnostic tests so that malaria could be quickly diagnosed and effectively treated. A large vector control project was established. As a result, the number of malaria cases was no greater than in previous peak seasons.

Other diseases

There were many small clusters of dysentery (11), dengue (5) and jaundice syndrome (11) detected. WHO and MoH staff deployed staff to assist with the response to notifications and rumours. Some of these turned out to be false alarms on further investigation (cholera, malaria and encephalitis).

Lessons learned

There were many lessons learned from the Asian tsunami and its response. One of the hardest tasks was to assess the extent of the need and match the generous international response to that need. As often happens in disasters, the need for critical clinical care was greatest in the first 1-2 weeks then quickly reduced. After the initial crisis period, the needs quickly move to re-establishing primary health care, with an emphasis on promoting access to clean water, good sanitation, adequate nutrition, and access to health workers for treatment of common conditions such as diarrhoea, malaria, respiratory disease and reproductive health needs. This assistance should be provided with a longer-term development perspective.

Another important lesson was the need to establish strong multi-sectoral coordination at lower levels, such as

districts and within camps, to ensure that each area receives adequate support across the full range of needs.

Finally, when the international community hears of such overwhelming humanitarian disasters, there is a natural and admirable desire to want to help in whatever way we can. It is vital to determine from the affected communities what the real needs are and then ask ourselves if the skills and resources we have to offer are really what are most needed.

References

1. Connolly MA (Ed) (2005). *Communicable disease control in emergencies: a field manual (WHO/CDS/2005.27)*. Geneva: World Health Organization (<http://www.who.int/infectious-disease-news/IDdocs/whocds200527/whocds200527full.pdf>).
2. Wisner B & Adams J (Eds) (2002). *Environmental health in emergencies and disasters: a practical guide*. World Health Organization.
3. Epidemic-prone disease surveillance and response after the tsunami in Aceh Province, Indonesia. *Weekly Epidemiological Record* 2005; 80(18):160-164.

Tony Stewart worked in Aceh with the WHO epidemiology team and MoH to establish an immediate surveillance and epidemic response capacity. He currently works as a medical epidemiologist at the Burnet Institute for Medical Research and Public Health in Australia. He has previously worked in Indonesia on maternal and child health activities.