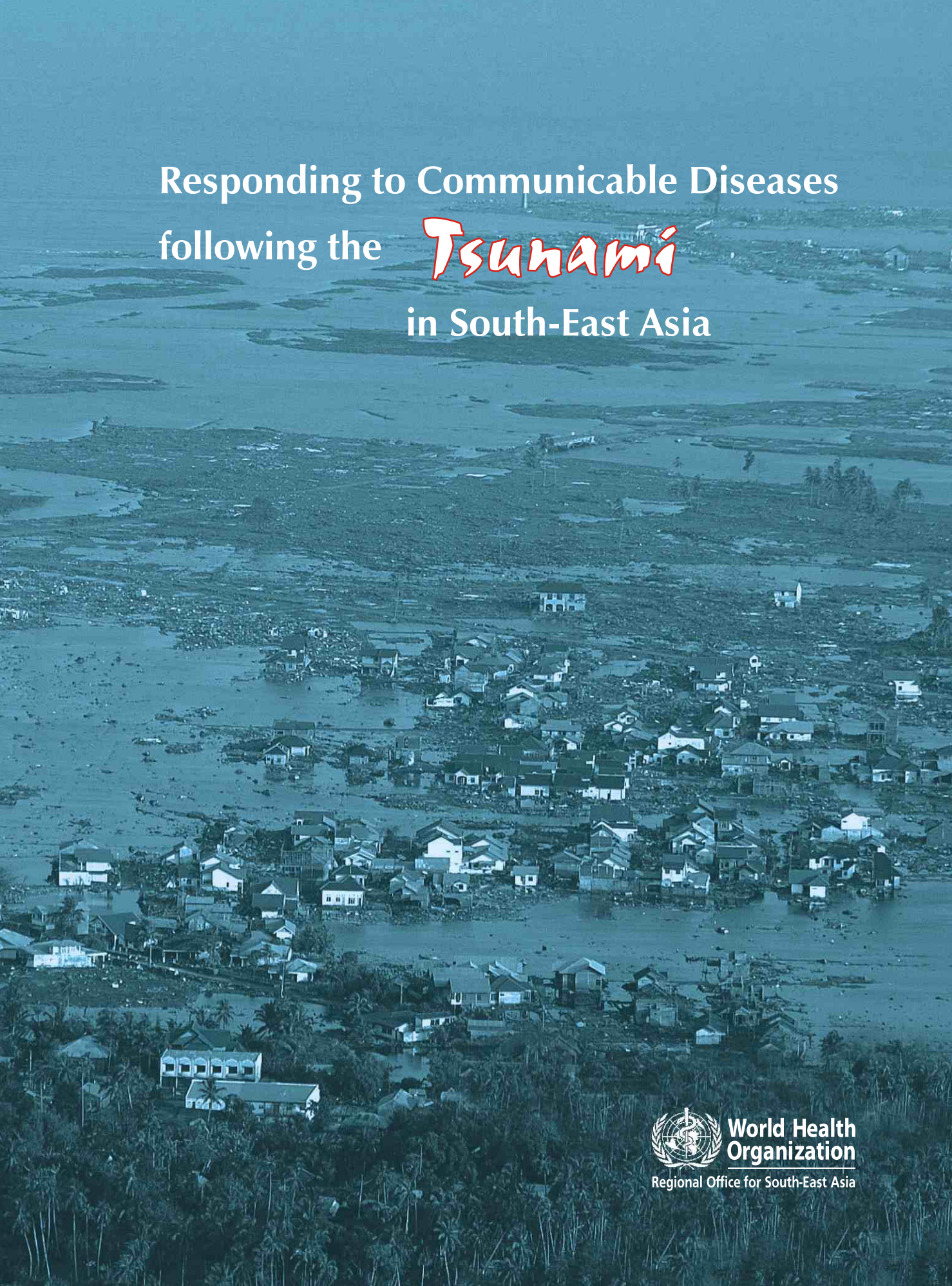
Responding to Communicable Diseases following the Tsunami in South-East Asia



World Health Organization
Regional Office for South-East Asia

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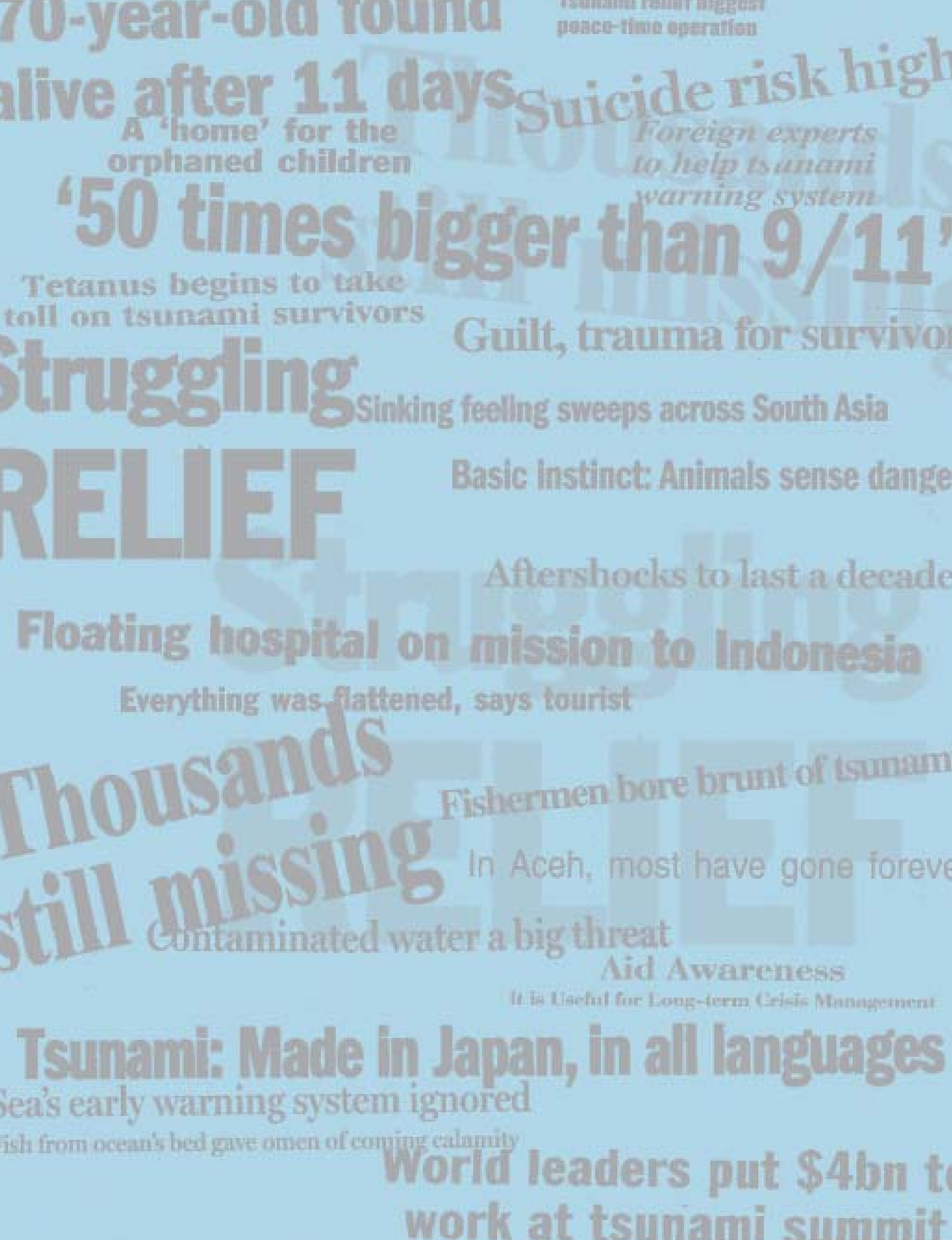
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‘Utter destruction, mile after mile’

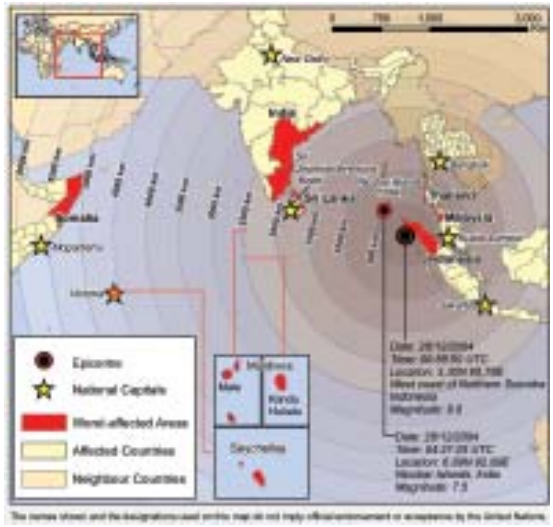
1

Introduction

Triggered by severe earthquakes off the northwest tip of Indonesia, early on Sunday 26 December 2004, a tsunami brought catastrophe and, on an unprecedented scale, disaster to six countries of the WHO South-East Asia Region. Walls of water moving at high speed pounded coastal communities from Indonesia to Maldives, leaving thousands dead and more than two million displaced. The death toll was the highest in Indonesia – followed by Sri Lanka, Thailand, India, Maldives, and Myanmar. The images of the utter devastation shown on television and other media, brought an outpouring of concern and international support. More than 200 different agencies offered help and were involved in the response. From the initial reports on that fateful morning a few people dead, the toll rose steeply in the following days and weeks to more than 275 000 in the affected countries.

Like the loss of life across the Region, the consequences to public health were also uneven. In the hard-hit region of Aceh, Indonesia, for example, more than half of the public health infrastructure was destroyed. In other areas, such as Sri Lanka, they remained largely intact. Six countries in the Region (see Fig. 1) were affected to various extents. Each had unique problems to contend with, and each has unique lessons to guide us the next time. Each country had its own level of infrastructure, its own level of preparedness, its own level of destruction.

***Figure1*:** Tsunami-affected areas in WHO SEA Region



Produced by the ReliefWeb Map Centre

Implications for communicable diseases were immediately anticipated. For example, during the first week, together with water contamination, injuries and infections were expected as the most urgent health threat. During the second week, the anticipated health risks included respiratory infections, measles and water-borne diseases such as diarrhoea and dysentery (including shigella and cholera) resulting from overcrowded conditions and poor sanitation. Vector-borne diseases were expected afterwards due to collection of stagnant water resulting in mosquito breeding and required measures to avert dengue and malaria.

WHO moved quickly to assist Member Countries from the start of the crisis, with initial support provided by WHO country offices, reinforced by the WHO Regional Office for South-East Asia (SEARO). An operations room was set up working round the clock with technical support provided by various programmes fully engaged under the banner of the Tsunami Technical Group (TTG). This comprised members of the Communicable Diseases department (reinforced by HQ in Geneva) as well as of other WHO/SEARO departments including Immunization and Vaccine Development, Noncommunicable Diseases and Mental Health, Emergency and Humanitarian Action, Health System Development, Family and Community Health and the department for Sustainable Development and Environment. In addition, GOARN (the Global Outbreak Alert and Response Network) was mobilized to assist in outbreak detection, verification and management

Weeks after the disaster, the health situation remained under control, with no major outbreaks identified. Many clusters of cases were investigated and rumours verified. The rapid institution of an early warning and response network (EWARN) system for outbreak alert and response, in addition to the establishment of mobile laboratories, deployment of staff and consultants for technical support in communicable diseases, psychosocial support, water and sanitation, and nutrition, made a tremendous difference to safeguarding public health across the Region. The remarkable job done by public health workers in averting any significant communicable disease outbreaks is a testament to the strength of the public health community's emergency response systems.

This publication covers the activities undertaken by SEARO to help prevent and control outbreaks of communicable diseases. Other publications in the Tsunami series cover other areas of health.

2

Devastating Impact of the Tsunami

In terms of lives lost, the Tsunami's death toll in the Region exceeded 275 000. The majority of these were in Indonesia where 222 000 people including women and children perished, followed by Sri Lanka (some 31 000 deaths), India (16 389) and Thailand (5394). In the Maldives, 82 deaths were reported, and 61 in Myanmar.

The total population affected and displaced in South-East Asia was 4 351 286 (Table 1). It was the displaced populations who were at greatest risk from communicable diseases. Expected risks included respiratory infections, measles, and food and water-borne diseases such as diarrhoea and dysentery that are easily transmitted in overcrowded conditions with poor sanitation. All affected countries suffered disruption and contamination of water supplies, sanitation facilities and sewage

Damage caused by the Tsunami in Banda Aceh in Indonesia.

Table 1: *Population and Infrastructure affected*

Country	Population affected and displaced	Deaths	Health facilities damaged or destroyed
India	2 880 468	16 389	Total = 100, including: 13 primary health centres 80 sub-centres 7 district hospitals (partially damaged)
Indonesia	540 000	222 000, of which 700 were health staff	363 of varying levels totally damaged, including 27 private facilities
Maldives	11 568	82	47 health posts and family centres at regional / atoll level
Myanmar	2600 homeless	61	nil
Sri Lanka	850 000	31 141	92
Thailand	66 650	5394	6 provinces were affected, overloading health facilities
Total	4 351 286	275 067	602

treatment works, which was anticipated to contribute to diarrhoeal disease outbreaks. Diseases such as salmonellosis, typhoid, cholera, hepatitis, and shigellosis were expected to peak after three weeks.

Vector-borne diseases (e.g. malaria, dengue) were expected to peak after four weeks when mosquitoes had bred in stagnant pools of water.

Initially, injury-related tetanus was found to be a serious threat in Indonesia. The tsunami also left behind individual and social distress which will require long-term attention.

The public health infrastructure took a heavy blow in Indonesia, where 363 health facilities were destroyed or severely incapacitated, and 700 health professionals died. In Aceh province alone, less than half the public health professionals had reported back to work two months after the disaster.

Damage and destruction caused by the passage of the Tsunami in the Maldives.

The economic impact of the Tsunami varied according to each country's available resources and economic strength. Houses, commerce, agriculture, fishing and tourism industries, vehicles, roads, railways, power, telecommunication – all were damaged to a greater or lesser extent in different countries. In India, due to the size of its economy, the macro impact was expected to be minimal. For Indonesia and Sri Lanka, despite the scale of devastation, none of the key economic infrastructure was damaged. For these countries and Thailand and Maldives, the tsunami would particularly affected the tourism industry – leading to job loss and reduced earnings. In Maldives, while loss of life was mercifully low, damage to many islands was great, and the tourism industry, the lifeblood of these islands, was especially hard hit. More than 11 000 people were affected. Fifty-three of the 198 inhabited islands in the archipelago were severely damaged, and 10% were totally destroyed, while schools, clinics and pharmacies were destroyed on some 50 islands. Of 87 tourist resorts, 19 were severely damaged and had to be closed down, while 14 others suffered major partial damage.

The Tsunami also caused considerable damage to the environment; in Indonesia, to coral reefs and mangrove swamps.

3

Planning Response to Communicable Diseases at SEARO and in the Countries

Soon after the disaster struck, WHO moved quickly to assist the countries from the start of the crisis, with initial support provided by country offices, reinforced by SEARO and later HQ and other Regional Offices.

Dr Samlee Plianbangchang, WHO Regional Director for South-East Asia, second from right, visits a hospital in Sri Lanka.

Overall WHO response was coordinated by the Emergency and Humanitarian Action unit. An Operations Room was set up in SEARO to work round the clock with technical support provided by various programmes fully engaged under the banner of the Tsunami Technical Group (TTG).

Tsunami Technical Group and working groups

The Tsunami Technical Group (TTG) provided overall guidance and coordinated WHO's technical assistance to affected countries, which included mobilizing expertise, guidelines, tools and other required resources (Figure 2). The Group chaired by Dr Jai P Narain, Coordinator SEARO, was comprised of technical experts from the Communicable Diseases department, various departments in the Regional Office including the Immunization and Vaccine development unit, the Noncommunicable Diseases and Mental Health department, Department of Sustainable Development and Environment including water and sanitation, Family and Community Health department, health promotion unit, and department of Health Systems Development. A regional strategy on the health response to Tsunami was prepared which formed the basis for Regional Office response post-Tsunami (Annex 1).

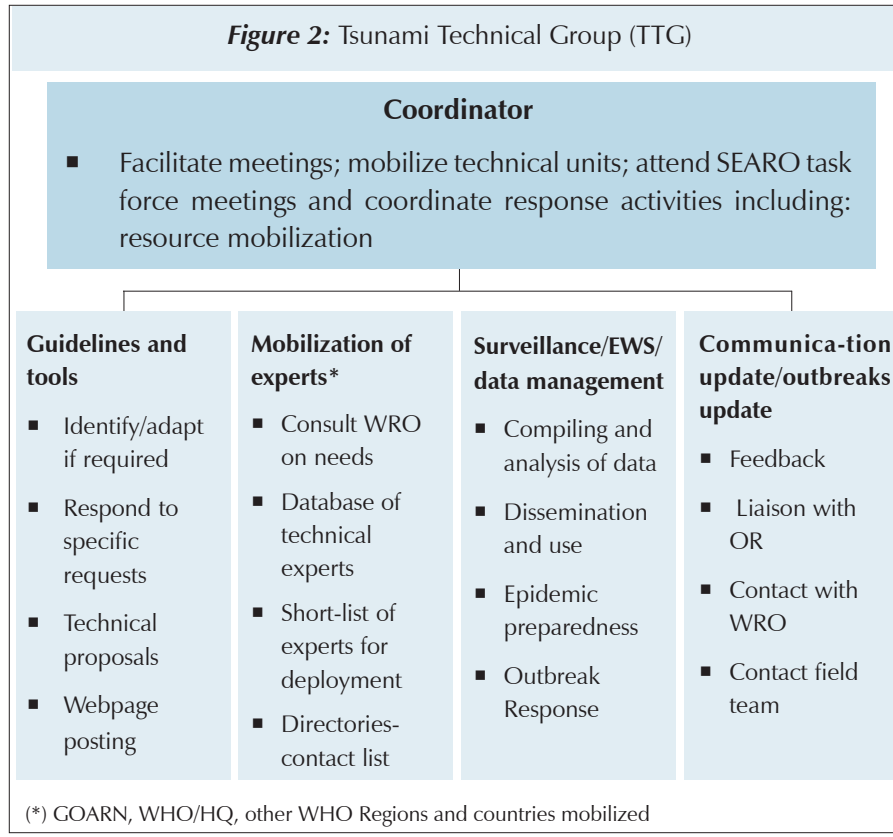
The terms of reference of the TTG were:

- to support a coordinated and prompt response to the health needs of Tsunami-affected populations by anticipating health problems and responding to health needs
- ensuring rapid detection, investigation and response to epidemics
- providing technical support to other public health needs (e.g. psychosocial, mother and child health).

The TTG immediately anticipated implications for health of the affected populations including the threat of communicable diseases. During the first week, injuries and resultant infections together with water contamination were perceived as the most urgent health threats. During the second week, estimated health risks included respiratory infections, measles, and water-borne diseases e.g. diarrhoea.

TTG was linked to the Operations Room set up in SEARO for coordination purposes. The OR was operational 24 hours at first. In addition, there was also a separate operations room focusing on surveillance of communicable diseases. If there were outbreaks, immediate response with technical input could be provided.

Daily meetings were convened, and the needs and response in terms of technical assistance to Member States monitored (Annex 2 shows an example



OR – Operations Room
WRO – WHO country office
EWS – early warning system
GOARN - Global Outbreak Alert and Response Network

of a TTG meeting Note for the Record). The TTG regularly monitored the disease situation (Annexes 3 and 9), developed guidelines and tools for technical advice, assigned technical staff to the affected countries, and procured emergency supplies and equipment. A Tsunami Health Bulletin was produced to keep everyone informed of the realities on the ground as well as to alert everyone to disease outbreaks or any urgent needs (Annex 4 shows an example of a Tsunami Health Bulletin).

A profile of communicable diseases (baseline rates and risk for outbreaks) in Indonesia was produced by WHO within the first two weeks, allowing assessment of where to focus operations. This provided a useful reference document. Similar profiles for other countries were also planned. A risk assessment for communicable disease outbreaks was developed on the basis of available information (Table 2).

Table 2: *Risk assessment for possible commuicable disease outbreaks*

	Sri Lanka	Indonesia	Maldives	Thailand	India
Cholera	+	+	–	+	+
Typhoid	+	+	–	+	+
Shigellosis	+	+	–	+	+
Hepatitis A & E	+	+	+	+	+
Dengue fever	+	+	+	+	+
Malaria	+	+	–	Unlikely in south	+
Scrub typhus	+	+	+	+	+
Leptospirosis	+	+	?	+	+

Key: + : At risk
– : Not at risk
? : No information available/potentially at risk

Four technical working groups were established to cover:

- mobilization of technical experts for deployment to Tsunami-affected countries
- development and adaptation of guidelines and tools
- data management
- communication and updates.

These groups worked with all technical units in SEARO, WHO/HQ and the WHO country offices. Some 90 technical guidelines, outlining best practices to be followed were produced, transmitted to the field and posted on the internet and were used by WHO experts and consultants in the field (list of guidelines in Annex 5).

The TTG anticipated health problems that may emerge as the days went by, which was very helpful in planning and implementing measures for communicable disease prevention and control. Simple, user-friendly, ready to use guidelines were developed as "ready reckoners" for various health problems (Annex 6).

In collaboration with the WHO Health Action in Crisis (HAC) and Emergency Health Action (EHA) groups, more than 250 WHO staff, consultants, and other experts were mobilized and deployed for relief work in Indonesia,

Table 3: *Anticipated health problems and interventions in sudden impact disasters*

I. Days 1-3	Drowning/trauma/ deaths Injury/trauma Snake bites	Safe disposal of corpses Injury management/medical care Needs assessment for health
II. Days 3-5	Psychosocial problems Diarrhoeal diseases Acute respiratory infections psychosocial problems	Psychosocial support Health promotion (sanitation, environment water purification, personal hygiene, etc.) Immunization (measles) Oral rehydration salts Emerging disease surveillance (morbidity/ mortality) and early warning systems
III. Days 5-10	Above plus: Dehydration Pneumonia Conjunctivitis Skin infections	Above plus: Antibiotics for pneumonia Drugs for skin infections and conjunctivitis
IV. > 10 days	Above plus: Vector-borne diseases (malaria, dengue, scrub typhus) Typhoid fever Measles Malnutrition	Ongoing surveillance Health education Measures for vector control Antimalarial drugs Supplementary feeding programme Rebuilding health infrastructure

Maldives, Sri Lanka, Thailand, and in the Regional Office in New Delhi, India (see Annex 7). This involved identifying country specific needs; compiling a list of experts to be on standby throughout WHO, GOARN, and many countries; and liasing with the Tsunami Operations Room for deployment of these experts.

Surveillance data were compiled and analysed on a weekly basis and used to signal any likely disease outbreak or unusual health event. There was also regular communication through teleconferences and electronic communication across all levels. The TTG also mobilized and stockpiled vaccines and life-saving drugs and supported laboratory strengthening through supply of reagents and technical support.

As a result of TTG efforts, early warning systems were strengthened and enhanced in affected areas enabling early recognition of epidemic-prone diseases and initiation of appropriate interventions. Many clusters of cases were investigated and rumours verified. The rapid institution of an early warning and response network (EWARN), and the establishment of mobile laboratories, deployment of staff and consultants for technical support in communicable diseases, psychosocial support, water and sanitation, and nutrition, contributed significantly to safeguarding public health across the Region.

In many areas, WHO staff were involved in nutrition and vaccination programmes for children and pregnant and vulnerable women. WHO headquarters procured urgent supplies, and as these poured in, logistical support was provided to manage them efficiently. Within a few days, mental health was recognized as a serious problem and SEARO officials, collaborating with some local hospitals, set up psychosocial training sessions for medical personnel and NGOs.

Another major concern was the disposal of bodies. SEARO offered support in forensic identification and strengthening of forensic infrastructure to countries such as Thailand, which had few resources in this area.

Information flow was also organized so that both donors and the public could be kept abreast of the health situation in all affected countries. Health bulletins and regular press releases helped to cater to the tremendous media interest, while the accuracy of information helped curb rumours and panic.

Survivors of the Tsunami in a relief camp in Indonesia.

Guidelines

Nearly 90 technical guidelines outlining best practices to be followed were distributed immediately after the disaster struck. If not available, new guidelines were quickly developed and printed. The main technical issues covered by these guidelines were:

Pointing to the level of the Tsunami, Tamil Nadu, India.

- Responses to disease outbreaks
- Surveillance and early warning, rapid assessment, outbreak investigation, case management, etc
- Immunization
- Disposal of dead bodies
- Water quality
- Sanitation
- Chemical threats
- Management of chronic diseases
- Management of health care waste
- Psychological support
- Food safety
- Health promotion.

For a full list, see Annex 5.

Ready Reckoners

In addition to full length guidelines, two-pagers or ready reckoners on various aspects such as malaria, measles, diarrhoea, cholera, etc were developed as ready reference on managing various health problems. An example of a ready reckoners can be seen in Annex 6.

Missions to countries

The Regional Office prepared a list of experts available to be deployed to assist Member Countries affected by the Tsunami and were put on stand-by basis based on country needs. Ultimately, not all who expressed interest and availability could be accommodated. While in the beginning experts were recruited for short-term basis, it soon became clear that for sustainability and to reduce time for familiarization etc, experts must be recruited for upto six months or beyond. Among the many areas that experts were able to help and contribute to included emergency surveillance, early warning system and rapid response to potential outbreak. This was often preceded and supplemented by Risk Assessments for outbreaks such as dengue and the situation was monitored closely (Annexes 8 and 9). The success of communicable disease response was acknowledged internationally including by media such as Time (Annex 10).

‘No epidemic in tsunami-hit areas’

4

Country Experiences in Responding to the disaster

Emergency surveillance, early warning and response

At the outset, SEARO mobilized its own staff or consultants to go to countries to assist in communicable disease prevention and control post-Tsunami. In addition, the Global Outbreak Alert and Response Network (GOARN) was mobilized by SEARO and HQ to assist in outbreak detection and management. Early warning systems (EWARNs) to detect, investigate and respond to outbreaks of communicable diseases were established in the affected areas; teams of experts were dispatched from different parts of the world to set them up.

Health officials distribute health information to survivors of the Tsunami in a makeshift camp in Galle town in Sri Lanka.

The principal objectives of the early warning systems were to detect epidemic-prone diseases occurring in the population based on symptomatic diagnosis followed by laboratory confirmation, and to institute necessary interventions to contain further spread of disease. Cases of diarrhoea, typhoid, hepatitis, viral fever, dysentery, malaria, dengue, and measles were identified and promptly addressed (see Table 3 for anticipated problems and interventions). Some country experiences in emergency surveillance, early warning and response are described below:

Indonesia

In Banda Aceh, where facilities were badly damaged and many health staff directly affected, surveillance was virtually nil at the beginning. By the second week in February, the epidemic and alert response team in Banda Aceh (consisting of six GOARN expert epidemiologists) had, in collaboration with the Provincial Health Office, developed a weekly surveillance system that included NGOs, hospitals and laboratories in Banda Aceh and other towns. A standardized form for recording epidemic-prone diseases was designed (tailored to local conditions) and distributed to health workers, who were asked to notify authorities. The next step was to manage and analyse the reams of data coming through, and establish communications capability including computer networks with geographic information system (GIS) software, etc. WHO tracking systems were established to provide 'real-time' information and support comprehensive reporting. Health workers were also trained on protocols and guidelines.

Child being adminsitered medicines at a relief camp.

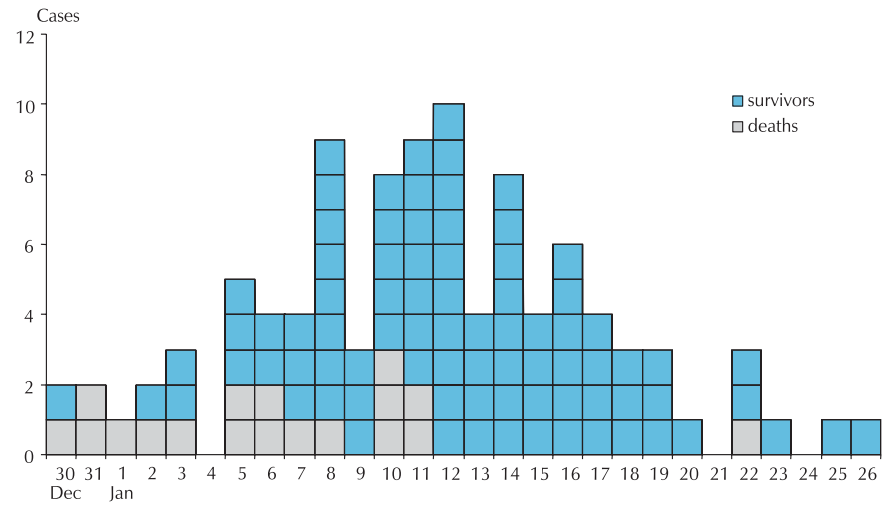
Surveillance was targeted at diseases with epidemic potential based on syndromic reporting (cholera, shigellosis, ARI, malaria, dengue, measles, meningitis). Also, tetanus and wound/ injury for inpatients were included. This system was complemented by a daily early warning system based on SMS, telephone and e-mail reporting of suspect cases. Data management and entry was computerized and provincial health staff personnel trained in how to use the system.

Reported alerts from Aceh that were investigated included bloody diarrhoea, acute watery diarrhoea, dengue, typhoid, jaundice, tetanus, and measles. Results indicated either false alarms (cholera, typhoid, and jaundice), small clusters of cases (dengue), or an epidemic (measles, tetanus). Large-scale field measures were instituted for measles (vaccination campaigns) and dengue/malaria (vector control).

Responding to measles

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. Most patients (86%) lived in internally displaced population (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. The measles cases identified were likely to have been a consequence of the enhanced surveillance and immunization campaign rather than a true epidemic.

Figure 3*: Cases and deaths of tetanus by date of admission to hospitals, Aceh province, 30 December2004 to 26 January 2005



Tetanus cases

A number of tetanus cases occurred in the immediate aftermath of the Tsunami. One hundred and seven cases were admitted to hospitals between 30 December 2004 and 26 January 2005 from four areas: Banda Aceh, Meulaboh, Sigli and Tapak Tuan/Blangpidie . There were 40 female and 67 male patients with a median age of 40 years (range: 1 to 70). The case fatality rate was 18.7% and the peak of the epidemic occurred in mid-January. The decline in these deaths since the immediate aftermath of the tsunami are indicative of the shift from the acute to the late phase of the emergency.

Clusters of cases of tetanus may be anticipated following natural disasters. The number of cases seen in Aceh perhaps represents the largest cluster ever described. It reflects the extremely high number of injuries incurred during the Tsunami and the overall poor immunization status of the Acehnese. Lacerations, burns and trivial or unnoticed wounds were contaminated by spores of *Clostridium tetani*, present in the soil. Most cases were infected on the day of the Tsunami, and some may have been infected in the debris afterwards.

Initially, situation reports were put out every day to inform all levels of WHO (HQ, SEARO, the Indonesian country office) regarding the events, activities, alerts and movements among the epidemiology group in Aceh. These reports were later issued weekly.

Survivors come to see and search among the pictures of missing persons that are posted at the Government's relief centre in the Prvincial hall in Phuket.

Thailand

In Thailand, the Ministry of Public Health (MOPH) mobilized a team of 200 surveillance and response officials to investigate outbreaks. Since 1970, the MOPH had operated a national surveillance system for infectious diseases using a standard reporting form which, by 2000, had 68 diseases. Twenty of these diseases were brought under active surveillance after the Tsunami, as were wound infections and electric shock. Surveillance team members visited each of the 77 health centres, 22 public

hospitals and 4 private hospitals each day, collecting forms (including age, sex and nationality) that were then analysed.

India

In India, WHO helped strengthen disease surveillance systems in affected areas – four surveillance units were equipped with supervision and training from WHO and the National Institute for Communicable Diseases, New Delhi.

While surveillance mechanisms were being set up or strengthened, authorities in affected areas began spraying large areas with insecticides to prevent vector-borne diseases such as malaria, dengue, Japanese encephalitis (JE). Fogging machines were sent to the Andaman and Nicobar islands, and wells and stagnant pools of water were checked for larvae. Insecticide-treated bednets were also sent.

Rapid diagnostic tests for malaria were provided by UN and donors to affected areas, as well as 150 000 courses of artemisinin-based therapy.

Checking stagnant water to control spread of diseases.

For vaccine-preventable diseases, non-routine immunization campaigns – for measles, typhoid, JE and meningitis – were targeted to children and vulnerable adults.

Laboratory support

Some country experiences are described below:

Indonesia

While most health laboratory buildings remained intact, equipment and reagents were extensively damaged. Many laboratory staff members, or their close relatives, perished in the tsunami, bringing laboratory services to a standstill, particularly in Banda Aceh and Meulaboh.

Recognizing laboratory services to be critical for surveillance and early detection of communicable diseases, all-out efforts were made to restore the

Injured survivors of the earthquake and tsunami. Medical staff - many of them directly affected by the disaster – work with only basic equipment and supplies.

functioning of the laboratories. It was a huge challenge in Aceh because of the massive destruction. Utilizing a portable laboratory was an alternative that could provide early services. Offers to bring in portable laboratories were received from several countries including Australia, Canada and Malaysia. The proximity of Malaysia and the familiarity of experts with the diseases prevalent in Aceh were considered important factors for preferring Malaysia over other countries.

The first team of three microbiologists moved into Banda Aceh in the second week of January 2005 along with a portable laboratory which was assembled in Malaysia. Shipment of the container of this laboratory (measuring 20ft x 8ft x 8ft, and weighing 2.5 tonnes when loaded with equipment and supplies) was another challenge since the ingress of UN Cargo Aircraft was smaller than the container. This needed a cut and weld job at the airport itself. The laboratory was used to perform diagnostic tests on specimens collected by epidemiologists. The laboratory experts also helped in restoring the local laboratory to undertake surveillance functions. The team of laboratory experts was shifted to Meulaboh in the third week of January to commence basic laboratory services in the General Hospital, Meulaboh.

The second Malaysian team arrived in Meulaboh on 30 January 2005. In addition to strengthening the diagnostic services, this team also imparted training to local technicians in basic bacteriological techniques and to local pathologists in undertaking supervisory functions. The training resulted in establishment of diagnostic services for malaria, cholera, typhoid fever, shigellosis, tuberculosis and bacterial meningitis. ELISA-based serodiagnostic services for measles, rubella, dengue and Japanese encephalitis were also established.

Consequent to the visits of three teams from Malaysia, a WHO staff member was posted in Meulaboh for two months to provide technical support and to assist the local authorities in effective use of laboratory services for clinical and public health services.

The basic laboratory services provided critical inputs in disease surveillance for diarrhoeal and other epidemic-prone diseases.

Sri Lanka

WHO team at a relief clinic in aid Tsunami survivors in Sri Lanka.

The topography and extent of damage in this country warranted a coordinated approach and hence WHO established three field offices. All three offices were staffed with laboratory experts, recruited by WHO, who assessed not only the immediate needs but also the needs from a long-term perspective. Necessary equipment and reagents were procured quickly through the WHO mechanism, and laboratory technologists were trained in all aspects of laboratory services in collaboration with the Medical Research Institute, Colombo (the national public health laboratory). WHO professional staff provided technical support for six months post-tsunami and, with the help of considerable equipment and reagents procured through WHO, restored the laboratory services to efficiency.

India

Here, the WHO national consultant for laboratories coordinated support to laboratories in Tsunami-affected areas. Since equipment and reagents were available, the focus of WHO support was on training and promoting laboratory-based disease surveillance. Training was conducted on-site and post-training support was extended till normal laboratory services became operational in the entire Tsunami-affected areas.

Maldives

In the Maldives, the laboratory infrastructure did not suffer much damage but, to respond to surveillance needs, equipment and reagents were supplied by WHO.


Laboratory technicians analyzing samples.

5

Personal Experiences and Impressions

Communicable disease surveillance in India

Based on our experiences with post-disaster disease surveillance from previous disasters, it was possible to establish an effective functioning surveillance system within two weeks of the disaster. This was an improvement compared to setting up of a surveillance system after the Orissa cyclone in 1999, which was established in four weeks, and after the Gujarat earthquake in 2001, which took three weeks to establish. In the recent earthquake in Jammu & Kashmir (October 2005), a functioning surveillance system was also established within two weeks of the disaster.

What were your first impressions when you reached there?

The need for a simple, effective and coordinated disease surveillance system taking into account:

- Strengthening of existing surveillance mechanisms with all agencies supplementing government activities, not setting up parallel systems
- Simple, practical field solutions
- Proper disease reporting using simple formats

- Strengthening of lab surveillance to support effective public health response
- Graded response:
  - the State should respond first and immediately
  - then national level support
  - specific requirements from international agencies
  - use of Armed Forces
  - NGOs could play a major role, provided they are channeled.
- Capacity building for delivering disease surveillance on the field
- Rapid and effective control measures.

Environmental sanitation, especially water supply and water quality monitoring, disposal of the dead, sewage disposal, garbage disposal, integrated vector control etc.

What did you find lacking in terms of help / other amenities / facilities?

- Pre-disaster preparedness
- Immunization campaigns for emergencies, all children from 6 months to 14 years of age should be immunized
- Effective handling of the media - risk communication
- State/district ownership/self-reliance
- Provision of safe water
- Water quality monitoring
- Health promotion-community awareness

Do you think that your help and interventions, were effective?

Yes. Though the effort involved should be sustained, we were effective in implementing all the interventions recommended. This was evident by the fact that no major communicable disease outbreak were reported from the affected areas.

One thing that you still remember distinctly?

While visiting the camps, we observed massive vector breeding sites which we brought to the notice of the health authorities, who immediately (within hours) carried out anti-larval measures.

What were the challenges/difficulties you faced?

The authorities were overwhelmed with advice from different agencies which was a hindrance to implementation of disease surveillance and control measures. However, the authorities were willing to listen to simple and practical solutions which were offered by WHO and implemented them unhesitatingly.

How did it change you personally?

It taught me the importance of being compassionate towards health authorities dealing with natural disasters of such magnitude and at the same time persistent in achieving the common goal.

Based on your experiences, could you list down two things that could help us in handling such disasters in the future?

- Pre-disaster preparedness including training in post-disaster disease surveillance
- Rapid health assessment with necessary capacity building to carry out the same, as below:

Following any disaster a rapid health assessment (RHA) should be carried out after 2 weeks. The first 2 weeks are required for rescue and relief purposes. Ideally, a multidisciplinary team of 3-4 specialists should carry out RHA or, in the event of restriction of movement, 2 specialists who have experience in carrying out cross-cutting assessments should visit the site of the disaster. Our experience both in the Tsunami and in Jammu & Kashmir highlighted the following areas of assessment as vital:

- Immunization needs
- Risks of epidemics particular to the type of disaster and terrain
- Disease surveillance reporting
- Laboratory strengthening and support
- Environmental sanitation, especially water supply and water quality monitoring, disposal of the dead, sewage disposal, garbage disposal, integrated vector control etc.
- Risk of HIV infection
- Disruption of routine public health activities like routine immunization, treatment for leprosy, TB, anti-retroviral therapy.

Other areas affecting communicable disease prevention and control such as damage to health facilities, requirements of basic and specialist medical care, injury surveillance, need for psychosocial counseling, nutritional deficiencies.

WHO- India Country Office Team

Sri Lanka

I volunteered and was sent to Sri Lanka six days after the Tsunami. My first experience of the disaster was an encounter with a Sri Lankan co-passenger who was returning on hearing that the Tsunami had killed three of her family members. Until then, I had not realized how helpless one feels in consoling someone who has lost three family members in a single day.

On reaching Sri Lanka, I was sent to conduct a rapid assessment of the surveillance system in two of the worst affected districts, Ampara and Kalmunai. As part of the assessment team, I visited several health centres and shelters. I was impressed to note that the Ministry of Health had already instituted an outbreak notification, investigation and response system. Although this paper-based system was somewhat ad-hoc in those early days, it seemed to be sensitive enough to pick up major conditions and respond to them. Over the next weeks, WHO supported formalization of this system of outbreak notification, investigation and response, and built capacity in the local epidemiology units and laboratories.

In Ampara, what struck me most was the way the community had mobilized itself to take charge of the situation. The affected families had been given shelter by the neighbours and, while on the one hand, bodies were still being pulled out of the rubble, at the same time, their efforts had already begun to clear the debris and start reconstruction of houses. Less than ten days after the disaster, people had started to move on.

The lessons I carry back from the Tsunami are that in an acute disaster, it is the local community and the local health system which can maximally help and do damage control. The local communities were the first ones to help the affected; the local hospitals were able to save and care for several hundreds of Tsunami survivors. Much of the outside help came a few days or a week later. Hence, for the future, we should invest in building the capacity of the communities and the health systems.

Dr Renu Garg,
HIV unit, SEARO

Thailand

What were your first impressions when you reached there?

I was shocked by the destruction, especially at the fishing village of Baan Nam Khem, much of which was totally obliterated, and at Khao Lac Beach, where dozens of beach resort hotels were destroyed. But equally surprising was the speed of the recovery. By five days after the disaster, people were re-building their houses and the army was re-installing electricity supply.

What did you find lacking in terms of help / other amenities / facilities?

Initially there was a problem – not surprisingly – with coordination. A UNDAC (United Nations Disaster Assessment and Coordination) team was quickly mobilized, and while the Government quickly established local overall coordination, UNDAC (with WHO Thailand serving as the health advisors for the team) backed up local and national authorities in several key areas, for example for identification of dead bodies. There were a large number of fatalities among foreign nationals, and forensic (body identification) teams arrived over the first few days and weeks from 39 countries! At first there was total chaos, but UNDAC was able to establish a forensics coordination group which met daily, and finally Interpol forensic standards were adopted, replacing a large number of inconsistent international standards.

Do you think that your help and interventions, were effective?

Certainly – see above question. But much more happened *before* and *after* the immediate disaster response which WHO can be proud of. I often tell my colleagues that WHO started preparation for the Tsunami 25 years earlier, in 1980! This was when we collaborated with the Ministry of Public Health and the US Centers for Disease Control to establish the FETP (Field Epidemiology Training Programme). Former Thai trainees of this programme were the MoPH staff who first arrived on the scene, assisted in the restoration of health services, and quickly established surveillance and rapid response teams which were deployed throughout the devastated areas to detect disease outbreaks and control any possible epidemics. And now, after the Tsunami, WHO has continued to support recovery, for example, by giving technical support and sending Thai experts to learn more about earthquake and flood-resistant health facility construction, to evaluate and improve community-based community mental health interventions, and assist in revision of emergency guidelines.

One thing that you still remember distinctly.

One thing was the sight of a little girl sorting through the wreckage of her house, trying to recover her toys and treasured objects. Another was seeing a twisted and broken bicycle at Ban Nam Khem village, knowing that the entire family has almost certainly perished. A third was the horrifying sights at the Temple Yat Yai, where thousands of bodies were brought for identification. Another sight I will never forget was a small Buddha image placed on an up-turned bucket – the world's smallest temple.

Little girl trying to save something.

How did it change you personally?

The experience made me feel good about how WHO works with countries. Our job is not to rush about and save people during disasters. Other organizations, or local people themselves, can do that better. Instead, what we do well is to build and strengthen health systems, give our national colleagues opportunities to learn and develop as public health professionals, and work (far in advance of a disaster, and continuously) to ensure high standards of health care.

Dr William Aldis
WHO Representative, Thailand

6

Some Success Stories

No significant outbreaks were reported from any country

No major disease outbreaks occurred in any country, and small outbreaks were taken care of – the surveillance and early warning systems functioned well. WHO credits this to the resilience of the public health systems and the response capabilities of affected countries, the hard work by local communities, and national and international support in instituting interventions to prevent spread of diseases and vaccinate against measles, etc. Disease surveillance and outbreak early warning systems were put in place in all affected areas early on in the emergency, as also were laboratories to diagnose epidemic-prone diseases and water quality.

Young child with mother.

Coordination of communicable disease surveillance and early warning in Aceh was a "star"

Young infants protected by bednets.

An early warning and disease surveillance system for targeted epidemic-prone diseases was established jointly by WHO's Epidemic Alert and Response team and the Provincial Health Office in the first week of January 2005. The excellent collaboration and coordination between all agencies - international and local NGOs, UN agencies, military relief operations and district and provincial MOH - operational in providing health care to the affected populations allowed for rapid response to disease alerts, including field case investigations and institution of appropriate interventions.

Reports of 40 dengue cases received in the month of August enabled a coordinated response through the provincial and district health offices, which included spraying of neighbourhoods where the cases came from and distribution of bednets.

A total of 107 alerts involving more than 380 disease events had been received and investigated up till December 2005.

Cumulative alerts and response as of 1 December 2005

Disease	Number of alerts	Number of cases
Acute flaccid paralysis	13	10
Jaundice	14	19
Acute watery diarrhoea	5	162
Bloody diarrhoea	12	130
Dengue haemorrhagic fever	10	28
Malaria	5	37
Meningitis	6	6
Suspected measles	36	128
Tetanus	1	1
Typhoid	4	9
Total	**107**	**530**

Critical role played by the Field Epidemiology Training Programme in Thailand

Thailand has operated a national surveillance system since 1970, and established a training programme – the Field Epidemiology Training Programme (FETP) – with support from WHO and the US Centers for Disease Control in the early 1980s. New field epidemiologists have been created every year since, and these became the backbone of the country's rapid response in handling SARS and avian flu, and ultimately the Tsunami emergency. Altogether, 77 surveillance points were located at health centres, 22 at government hospitals, 4 at private hospitals, 14 at temporary shelters, and 2 at the Tsunami Victim Identification Center. Surveillance and Rapid Response Teams (SRRTs) visited each site daily and collected case report forms. Each day, the data were analysed and events requiring further investigation and preventive measures were identified. Using this strong surveillance system, there was no sign of any outbreaks of disease in Thailand following the tsunami.

In addition to the teams at local level, nearly 80 doctors were mobilized by the Thai authorities and arrived in Phuket within 24 hours of the disaster.

GOARN partners made the difference

The Global Outbreak Alert and Response Network (GOARN) is a mechanism for technical collaboration whereby institutions and networks pool human and technical resources for rapid identification and confirmation of, and response to, communicable disease outbreaks of international importance. WHO immediately activated the GOARN. As a result, over 120 of the world's best disease surveillance and response experts were posted to Tsunami-affected communities within days. Others were placed on standby. Key people included team leaders, communicable diseases managers, laboratory experts and technicians, logisticians, data mangers and risk communication experts in outbreak response.

WHO staff collecting samples during field investigations.

WHO staff and GOARN partners were deployed to Aceh Province in Indonesia, Sri Lanka and Maldives to help the ministries of health establish supplemental surveillance and early warning alert and response systems.

(India and Thailand, which were not as extensively affected and had more robust epidemic response capacities, were supported by WHO country offices as needed.)

Rapid information dissemination and sharing helped

WHO is central to the coordination of health aid and organising the deployment of a Rapid Health Assessment Team comprised of different agencies.

A variety of situation reports, daily and weekly reports including daily outbreak updates and the Tsunami Health Bulletin were produced throughout the emergency phase and afterwards. Examples can be found in annexes 8 and 9. These helped to keep everyone informed in a timely manner.

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Lessons Learnt from Post-Tsunami Response

A number of lessons were learnt as a result of having to cope with this terrible disaster.

Leadership at all levels is key

Leadership at all levels is indispensable in a disaster situation. WHO is mandated as a leader in the field of health; through the TTG and Operations Room, WHO was able to provide immediate technical input when and where needed.

At country level, the importance of leadership was demonstrated in Thailand, where the Prime Minister and Minister of Health took care of the situation personally and promptly. This gave impetus to mobilization of multisectoral cooperation and national resources, while leadership by medical institutes and charity organizations drew thousands of volunteers from across the country. This quality of leadership was critical in the relatively fast recovery seen in Thailand.

A clear chain of command is necessary. In the Tsunami experience, an ambiguous chain of command hindered mobilization of human resources (from HQ, other regional offices, neighbouring countries, other organizations).

Local action by the community must be recognized and appreciated. In most disasters they are the first responders and have the advantage of local knowledge.

Public health infrastructure and ability to respond go hand-in-hand

During the disaster, countries that had a better health infrastructure were able to respond better.

In Thailand, the well developed health infrastructure, especially at local level, proved to be the best preparation, particularly during the initial response. Despite the huge influx of patients, the system functioned well. Contributing to this success were the good local health services, surveillance, and disease control; the battery of trained epidemiologists (from the FETP) who played a leading role in disease surveillance, investigation and control; the good laboratory services network; and the regional and central operations centres (Department of Disease Control, Department of Health, Department of Medical Sciences) and response teams (for SARS, avian influenza, emerging infectious diseases).

Cold chain used for vaccine and supply storage and health facilties.

To better tackle similar situations in the future, strengthening and reorganization of health care systems at country level is needed so disaster management teams can be mobilized at short notice. Every national health system has a different system for responding to emergencies. In some it is decentralized, in others, control and command rest with national health authorities. The roles that other government agencies (apart from ministries of health), e.g. military authorities play in delivery of health services also varies. So the case for forming disaster management teams and strengthening health care delivery systems must be treated on a country-by-country basis.

The Tsunami disaster provided an oppurtunity to strengthen health system capacity and infrastructure in the affected places, and perhaps to make it better than it was before

Coordination is critical to maximize input from various partners

The massive mobilization of resources and international support required an enormous amount of coordination, communication and logistical support in order to ensure that all actors worked in a coordinated manner.

In Aceh, where there was an open door policy for NGO assistance, coordination of responses became one of the most important elements for the success of the surveillance system. At the height of the emergency phase, up to 27 agencies were reporting, comprising up to 123 reporting units from 10 districts. Syndromes with epidemic potential were reported variously to WHO, the district health offices, or to health centres. Coordination was seen in the agreement by 31 agencies to use the same reporting format.

A hospital responding to the needs of affected people in Sri Lanka.

Collecting and using surveillance data for action at local level

A strong health surveillance system is needed for effective response.

In Aceh, a number of issues were found to hamper surveillance and early warning systems. These included:

- multiple reporting of individual patients because of multiple sources of health services
- incomplete or limited reporting which prevented adequate follow-up of patients
- inconsistent weekly reporting by agencies, especially as a result of their temporariness
- lack of data allowing estimation of the population at risk, especially due to the high mobility of IDPs and the large number of dead and missing
- physical difficulty of reaching the affected areas
- lack of regular laboratory confirmation of suspected cases.

Thailand, on the other hand, has a strong surveillance system. The backbone of the country's response were the field epidemiologists, created by the Field Epidemiology Training Program (FETP), which had recently become the backbone of the country's rapid response in handling SARS and avian flu. All countries affected by the Tsunami indicated that the FETP is an integral part of such a disaster response.

Sharing information with the media

Information for the media must be objective and factual (Annex 10). While transmission of correct and accurate information to all involved stakeholders is important, in particular, transmission of the message to be given to the public (through the media) to prevent panic and fear is of top priority. Fortunately, major confusion caused by rumours did not occur, although there were rumours that dead bodies would spread infectious diseases, and that seafood was contaminated because fish ate dead bodies. Since the media has such an important role to play in natural disasters, in mobilizing resources for health and dealing with rumours, it is important to have objective coverage, and success stories.

Preparedness for disaster: national coordinating committee command and control

Disaster preparedness within the health system as a whole, at both national and local levels, is essential for an effective response to any disaster. In all countries affected by the tsunami, there was limited capacity to handle such a major disaster. What was lacking were:

- a preparedness plan, including training in its use
- a pre-planned coordination and command system
- a stockpile of essential items
- standard operating procedures and orientation in their use.

Medical supplies consigned to WHO are loaded onto a truck at Colombo International Airport.

WHO: Measles vaccine must for kids up to 14

8

Applying Lessons and Planning for the Future

Together with death and disease, the Tsunami taught some lessons. First and foremost, to effectively respond to any disaster, preparedness is essential. It was clear that countries which had a better health infrastructure were able to respond better. Furthermore, the massive mobilization of resources required an enormous amount of coordination, communication and logistical support in order to ensure that all actors on the ground worked in a joint and coordinated manner. The key challenge in many areas is the rehabilitation and re-establishment of the health system at all levels. WHO's strategy focuses on building public health capacity, establishing surveillance and laboratory back-up, strengthening logistic management and communication, and refining monitoring and evaluation systems.

Every disaster, however unfortunate, provides an opportunity to set the system right. After mass destruction and killing thousands of people, Tsunami now offers a chance, with international support, to strengthen the health system capacity and infrastructure, even better than what was available before the disaster struck.

The importance of building human resource capacity for communicable disease surveillance cannot be stressed enough. A good, routine surveillance system that is well planned, well coordinated and connected, and is functional at all levels of the MOH will be able to respond to any unexpected events. It has been universally accepted that this crisis created a unique opportunity to develop more effective and responsive surveillance systems, with all the improvements required for disaster response as well as for routine activities. Better trained personnel in routine systems also mean they are better able to handle emergencies with less input from outside sources.

Rebuilding after the Tsunami.

In planning for improved surveillance systems at country level, the EWARN methodology should be reviewed for relevance and appropriateness, and for possible inclusion of mental health conditions and nutrition.

Building public health infrastructure including laboratory capacity and improving linkages to routine surveillance activities will be a priority, and a Field Epidemiology Training Programme will be a vital element in this. Training and re-training of the human workforce in surveillance must remain a priority in order to keep it appropriately responsive to future unexpected events.

Technical support from international agencies such as WHO can contribute to training personnel and in better equipping surveillance systems.

Each country needs to develop an emergency preparedness plan, and build capacity to implement such plans rapidly in the event of an emergency. Strategic stockpiling of essential items such as of life-saving medicines for specific epidemic-prone diseases and of diagnostics and vaccines should be part of the preparedness plan along with a mechanism for mobilizing a multisectoral response in a more ccordinated manner. Also essential in this context is establishing a pre-planned command and control system. As revealed during the Tsunami, coordination is a problem as effective response to a disaster involves a series of activities and requires the involvement of diverse teams of people, including volunteers, local residents, experts, and government authorities.

Stock of medicines.

Finally, building relationships with the media will also be addressed. (reactive/ proactive). There is room for health professionals and organizations to more effectively communicate key messages and information to the media. During the Tsunami, media coverage was dominated by NGO operations. In the first two months, health received just 7% of coverage. When there was coverage of health issues, it did not always reflect the reality of the situation or the health risks in the field. For example, although mental trauma affected the majority of survivors, it received only one-fifth of health coverage, with the risk of malaria and cholera receiving most coverage. This suggests that health agencies did not communicate basic information on the extent and importance of health risks effectively.

So communication needs should be part of the operational plan, and the news agenda set with analysis and facts. Since the media has such an important role to play in natural disasters, e.g. in mobilizing resources for health and dealing with rumours, it is important to have objective coverage. While there was plenty of coverage that communicable diseases could take the lives of many Tsunami survivors, there was no report of how well the surveillance system functioned and that there was no outbreak at all – this success story went unnoticed by the media.

Govt to set up disaster control authority soon

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Conclusions

The health community was able to mount a successful response to the communicable diseases threats after the Tsunami. The prompt response and range of activities undertaken helped stave off outbreaks that had the potential to make the tragedy even worse. In addition, lasting measures have been introduced. However, while millions of Tsunami survivors throughout South Asia escaped the horrors of major epidemics of communicable diseases in the aftermath of the disaster, affected communities still face enormous challenges including the continued presence of well-documented health threats and psychological trauma from the loss of loved ones. So, the situation calls for sustained international support to prevent risk of epidemics and diseases in vulnerable populations served by fragile health systems.

Lessons have been learnt on how we can do better in the future. The energy unleashed by the Tsunami can be used to put in place better and more capable health systems, ready for next time.

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Country Reports

India

Based on India's experiences with post-disaster disease surveillance from previous disasters, it was possible to establish an effective functioning surveillance system within two weeks of the tsunami without additional external assistance. This was an improvement over setting up of the surveillance system after the Orissa cyclone of 1999, which took four weeks to establish, and after the Gujarat earthquake in 2001, which took three weeks to establish. In the recent earthquake in Jammu & Kashmir (October 2005), also a functioning surveillance system was established within two weeks of the disaster.

The Ministry of Health undertook several actions in communicable diseases surveillance and response with assistance from the WHO country staff. Some of the highlights include:

- Establishment of four disease surveillance units in Tamil Nadu in Nagapattinam, Kanyakumari, Cuddalore and Kancheepuram.
- Provision of supervision and training by a team from WHO and the National Institute for Communicable Diseases (NICD):

- Sensitization meetings on disease surveillance for medical officers and paramedical workers in Kanyakumari, Cuddalore and Chingleput districts of Tamil Nadu.
- Training workshops in Integrated Disease Surveillance Programme (IDSP), held February/March, at Prakasam, Nellore, Cuddalore, Nagapattinam, Kanchipuram, Karaikal, Alapuzha district in Tamil Nadu and Krishna and Guntur districts in Andhra Pradesh; 368 medical officers and 390 health workers trained till date.
- adaptation and use of IDSP manuals for training of medical officers and health workers.

- Weekly reports on disease surveillance collated from 14 districts of Tamil Nadu. Action taken at district level on the basis of these reports and analyses. No outbreaks due to communicable diseases reported from the districts.
- Work contract initiated with the community medicine and microbiology departments of Madras Medical College to strengthen disease surveillance in Kancheepuram district.
- Surveillance officers of IDSP states (including the affected states of Andhra Pradesh, Tamil Nadu and Kerala) briefed on 4 February in Delhi about steps to be taken to strengthen disease surveillance.

In the area of immunization, activities undertaken by the Ministry of Health with WHO support included the following:

- Provision of technical assistance to Tamil Nadu, Kerala, Andhra Pradesh, Pondicherry and Andaman & Nicobar for measles and polio vaccination and vitamin A supplementation campaigns.
- Vaccination of 71 338 children till date in Tamil Nadu, with support from WHO and UNICEF.
- Support for treatment of acute respiratory infection/

Relief material being distributed to the aged.

gastroenteritis (ORS/co-trimoxazole) as per integrated management of neonatal and childhood illnesses (IMNCI) guidelines.

- Provision of technical assistance in Cuddalore, Nagapattinam, Kanyakumari and Kancheepuram to re-establish outreach services for reproductive and child health and immunization in temporary shelters and affected villages, in collaboration with the Integrated Child Development Scheme (ICDS) Department, by establishing health and nutrition centres.

In the area of HIV/AIDS, technical assistance was provided to affected districts in Tamil Nadu for awareness generation on the risk of HIV/AIDS and promotion of use of condoms for prevention. These activities are being packaged with routine health care and psychosocial support services.

Actions for disease surveillance include laboratory and epidemiology support to Nagapattinam district by the Thanjavur Medical College and to Cuddalore district by JIPMER, Pondicherry; and training in IDSP for Ernakulum, Kanyakumari, and Kollam.

Actions undertaken by the Indian DGHS included deputation of more than 350 doctors (physicians, psychiatrists, general duty medical officers, public health specialists, health administrators) and 100 paramedics (technicians, sanitary inspectors, fumigators) from central government institutions to the affected areas. About 50 000 patients were treated by the central medical teams. All children, six months to five years of age in relief camps were vaccinated for measles and given the recommended dosage of vitamin A supplement. Adequate stock of measles vaccine was ensured in all the affected areas.

A technical committee under DGHS assessed requirements for medical manpower and supplies. Emergency supplies in the area of communicable diseases included 45 fogging machines, with manpower and insecticides/ larvicides for vector control.

On early detection of increasing incidence of falciparum malaria in Car Nicobar, Teressa and Katchal islands, the rapid response team of the surveillance unit along with officers from NVBDCP undertook vector control measures; the situation was brought under control and an outbreak was prevented.

NICD teams (of epidemiologists, microbiologists, clinicians) provided technical support especially emphasizing prevention and control of water- and vector-borne and vaccine preventable diseases. Other NICD activities were to:

- Develop and distribute guidelines on disposal of dead bodies during disasters, and to prevent water, vector-borne and vaccine preventable diseases.
- Establish a central surveillance unit to assist the Andaman & Nicobar Administration in strengthening surveillance of epidemic-prone communicable diseases: a central surveillance team at Port Blair and six mobile peripheral epidemiological teams based in the six worst affected islands.
- Distribute field kits, containing survey forms, formats, personal protection wear, chlorine level monitoring equipment and laboratory materials, etc.

The central surveillance unit including the mobile teams functioned for more than six months in Andaman & Nicobar Islands. No post tsunami disaster outbreak was reported from the affected areas. In addition, on the mainland, the disease surveillance system was strengthened for prevention and containment of outbreaks at district borders of the affected states.

To strengthen disease surveillance and response, NICD in collaboration with WHO India Office, conducted two-day training for medical officers and one-day training for paramedical workers from affected areas during February and March.

NICD, as a recognized WHO Collaborating Centre for Epidemiology and Training, organizes a three-month Regional Field Epidemiology Training Programme (FETP) every year. The tenth Regional FETP, August to November 2005, focused on strengthening of post-tsunami epidemiological surveillance activities. Five candidates from tsunami affected states deputed by the Government of India were trained at NICD.

Laboratory facilities were strengthened at the G.B. Pant Hospital, Port Blair, by deputing microbiologists from NICD, Delhi and All India Institute of Hygiene and Public Health (AIIH&PH), Kolkata, to facilitate laboratory work, and supplying laboratory reagents, chemicals and media from NICD.

Indonesia

WHO's response to communicable disease threats

The challenge in the health sector response in Aceh was to coordinate all the local and international NGOs and other agencies involved in providing medical care to the displaced populations. WHO served as the bridge between the health care agencies and the MOH, particularly in the early days when over 200 agencies were operating in the province of Aceh.

WHO coordinates the Global Outbreak Alert and Response Network (GOARN), a technical partnership of institutions around the world that provides rapid international multidisciplinary technical support for outbreak response. GOARN members were called in to provide support to Aceh Provincial Health Office and MOH Indonesia during the acute phase of the tsunami emergency. Teams of epidemiologists, laboratory experts, logisticians, and database experts were mobilized for deployment to locations in Banda Aceh and along the west coast in Meulaboh, Calang and later on the island of Nias. The objectives of these missions were to:

- Strengthen epidemiological surveillance for epidemic-prone diseases
- Develop an early warning and alert system for epidemic-prone diseases
- Investigate alerts and initiate appropriate control measures
- Prepare for outbreak management and control.

The tsumani on the 26th Dec 2004 devestated Banda Aceh, Indonesia.

Some key activities undertaken during the early response phase are outlined below; these are still ongoing with full leadership from the provincial health authorities and support from WHO:

(1) *Establishment of epidemiological surveillance for epidemic-prone diseases*: a weekly surveillance system for epidemic-prone diseases was established and data on morbidity and mortality (disaggregated for ages under- and over-five) collected. These data originated from all health care

providers, including fixed and mobile clinics and in- and outpatient departments from Banda Aceh and the 14 surrounding districts affected by the Tsunami. The target population included both residents and internally displaced population (IDP) serviced by the national health care system and by local and international NGOs. A weekly bilingual epidemiological bulletin was established and disseminated to all concerned agencies. An electronic database with geographic information system (GIS) capabilities was developed.

The weekly report also included the total number of weekly consultations and deaths, pregnancy-related deaths and neonatal deaths and weekly number of consultations (for under fives, and five years and above) of acute watery diarrhoea, bloody diarrhoea, laboratory-confirmed malaria, other fevers > 38.5 C, acute lower respiratory tract infection, acute jaundice syndrome, and meningitis.

(2) *Establishment of an early warning and alert system for epidemic-prone diseases*: Based on daily telephone, SMS or email reporting of suspected cases of the list of specified events. Any disease alert leadS immediately to verification, investigation and response in terms of intervention and control, as needed. The response was jointly carried out by the MOH staff and WHO epidemic alert and response team. The system is complemented by daily active hospital and laboratory surveillance.

(3) *Strengthening of public health laboratory capacity for diagnosis of epidemic-prone diseases*: This included procurement of rapid diagnostic tests for specified diseases, development of sampling kits and sample transport arrangements. Laboratories report the number and types of specimens received and the pathogens identified to the surveillance system.

(4) *Preparedness for outbreak management and control*: This included stockpiling of essential drugs, personal protection equipment, development of standard treatment guidelines, identification of cholera treatment centre in Banda Aceh.

(5) *Development of a six-month activity plan for rehabilitation of provincial and district health offices in Aceh Province*.

Epidemic Alert and Response Team conducting field investigation interviews.

Recommendations for WHO to ensure that, for the next six months:

- adequate capacity in disease surveillance and outbreak response continues to exist in Aceh province. This includes assistance with human resources (1 medical coordinator, 1 epidemiologist, 1 laboratory expert) and infrastructural rehabilitation (office space, computers, fax, etc) at provincial and district level.
- provincial laboratory can resume its public health function and Meulaboh laboratory can carry out basic services for diagnosis of epidemic-prone diseases.

Main activities for WHO's support to surveillance and response after the initial few weeks and in support of the longer-term recovery efforts included:

- strengthening dedicated public health surveillance and response units in the affected areas, and supply data management and communications capability.
- performing training of public health workers on protocols, guidelines and standards for implementation of the surveillance and response system.
- restoring public health laboratory services in Banda Aceh and Meulaboh.

Communicable diseases outbreak situation

Surveillance data have been useful in demonstrating trends in case occurrence and for targeting interventions. For example, reports of 40 dengue cases received in the month of August enabled a coordinated response through PHO and DHO which included spraying of neighbourhoods where the cases came from. Locally relevant information has helped in planning distribution of bednets, antimalarial drugs, water purification kits for wells and sweeping measles vaccination campaigns. Furthermore, consistently low measles coverage found during response and investigation of alerts of clusters of measles cases has added impetus to efforts being made by UNICEF, WHO, MOH and other partner agencies to review and improve routine immunization activities.

Capacity building, training and knowledge transfer to PHO and DHO staff is conducted formally and informally. Informal settings include joint surveillance data analysis for weekly health coordination meetings, joint response and investigation of outbreak alerts. Formal training sessions have

been conducted for district surveillance officers. These include two in Medan and Lhoksewmawe. Provincial CDC staff have also been sponsored to attend national diseases surveillance workshops Medan and more recently in Makassar.

A total of nine disease surveillance training workshops were conducted between October and December; 275 health centre (puskesmas) and district surveillance officers from all the 21 districts were trained (25"35 officers trained per session). Resource persons from CDC MOH and CDC PHO supported WHO trainers in all the workshops.

Prevention, treatment and control of vector-borne diseases

Technical support and coordination has been provided for immediate vector control operations.

Photographer: Dermot Tatlow

WHO holds a meeting of NGO's and the various military medics in Aceh to coordinate the dispensing of health care.

Specifically, support to MOH in national malaria treatment protocol change to artemesinin-based combination therapy (ACT) has included quantification, costing and procurement of supplies for malaria and dengue control in the affected population. Besides the initial malaria and dengue risk assessment in tsunami-affected areas, assistance was provided for assessment of the long-term health impact of the post-tsunami environmental changes in relation to vector-borne diseases and development of long-term control plan.

Appropriate technical guidance was provided on insecticide-treated materials for personal protection against malaria, including bednet distribution conducted in collaboration with PHO, DHO, UNICEF and international and local NGO partners (e.g. International Rescue Committee (IRC/CARDI), International Medical Corps (IMC), Oxfam, several country chapters of Medicins Sans Frontiers (MSF)), on the tsunami affected west coast districts of Aceh Province. Approximately 20 000 long-lasting insecticide-treated nest (LLINs) provided to displaced persons in Aceh province.

Field investigations have been conducted for malaria and dengue alerts including case investigation and collection of larval specimens. Rapid response

was conducted in collaboration with MOH and NGO and other government partners for Indoor Residual Spraying (IRS) of insecticides and appropriate case management for malaria and fogging as well as environmental management for dengue.

Improved management of common and endemic childhood infections in displaced populations, including diarrhoeal and acute respiratory infections

Nineteen experts in areas of entomology, disease surveillance, outbreak control, logistic management, telecommunication, general administration and programme management were recruited by WHO to provide assistance. Health care workers were given technical support in recognition, emergency triage, and treatment of endemic communicable diseases of childhood through dissemination of evidence-based guidelines. Basic drugs and materials for specific anti-infective therapy and supportive care were provided to NGOs and local health care facilities. Provincial health staff and partner agencies have been familiarized in protocols for notification of infections/syndromes with epidemic potential to the surveillance/early warning and response unit. There is a plan to conduct integrated management of childhood illness (IMCI) trainings in Aceh in three districts.

Epidemic-prone vaccine-preventable diseases (e.g. measles, typhoid, Japanese encephalitis, meningitis)

Technical and coordination support provided to the provincial health authorities and UNICEF for implementation of measles immunization campaigns in children aged 6 months to 15 years in the affected areas to prevent outbreaks of measles. Emergency mass measles immunization campaigns conducted from January to March in districts of Banda Aceh, Kota Banda Aceh, Aceh Besar, Aceh Jaya, Aceh Barat, Pidie, Bireun and Nagan Raya by the provincial and district health offices in collaboration with WHO and UNICEF. Vaccination coverage in Banda Aceh and Aceh Besar has reached over 83%.

Polio national immunization days (NIDs) were conducted on 30 August, 27 September and 30 November due to importation of wild virus cases into the country. One wild virus case was identified in Medan (North Sumatra) and two in Aceh province.

Restoration and improvement of public health laboratory services

Laboratories are important tools for patient management and support of surveillance and investigation of outbreaks of communicable diseases. Before the tsunami, Provincial Public Health Laboratory (LabKesda) was the only laboratory in Aceh province to provide basic microbiology culture for clinical diagnostic purposes but has no involvement in surveillance of communicable diseases. Public health laboratories do not exist at district level and hospital laboratories do not provide public health services.

During the crisis period, a number of laboratories arrived from Singapore, Australia and Russia and operated in Aceh along with the national laboratory service from Jakart, LitBangKes for assistance to the LabKesda. A basic microbiology laboratory has also been established at the General Hospital of Meulaboh by a Malaysian team. The laboratory is able to conduct bacteriology and serology and test for enteric pathogens of epidemic significance, dengue fever, malaria and tuberculosis. Inputs included training of local staff, provision of necessary equipment and supplies, development of standard operating procedures (SOPs), and networking and linkages with national laboratories.

Achievements

Overall disease prevention and control efforts have been a great success. Major disease outbreaks have been averted. The weekly surveillance data show that disease occurrence has largely stabilized. The recently concluded national polio immunization campaigns achieved over 90% coverage of under 5 year olds in Aceh Province, and so far Aceh had been spared the recent polio outbreak in Indonesia. A total of 107 alerts involving more than 380 disease events have been received and investigated to date.

Early partnerships between key stakeholders, agreement between WHO and Provincial Health Office on key issues, active NGO participation and their wide recognition of the importance of communicable disease surveillance are some of the reasons that have made our disease prevention and control efforts in post-tsunami Aceh so successful.

The response generally has been very good with timeliness and completeness of weekly reporting consistently above 80% and 90% respectively. Occurrences of diseases of potential epidemics have been reported promptly

by SMS or phone call. Initially a joint MOH/WHO response was mounted, with more and more response and case investigation activities being conducted over time by PHO including with close support from the WHO Alert and Response Team as part of capacity building and knowledge transfer.

Provincial CDC office has been equipped with computers, printers and fax to enhance the quality of surveillance data management. All the 21 district surveillance offices have been equipped with fax machines to enhance timely reporting of surveillance data and exchange of surveillance information; 18 district CDC units have been provided with motorcycles dedicated for disease surveillance to improve field investigations, outbreak alert and response capabilities. Meulobah hospital and Provincial Food and Drug Agency laboratories have been fully equipped as part of WHO's effort to strengthen public health laboratory network in the province.

Maldives

One of the noted strengths during the tsunami response was the communicable diseases surveillance system, in operation with daily reporting of 14 notifiable communicable diseases. Immediately after the tsunami, a parallel system to monitor water quality and outbreaks of communicable diseases, in particular diarrhoea, viral fever and acute respiratory infection, was established. This system detected an apparent increase in diarrhoea immediately post-tsunami but Department of Public Health data from previous years allowed comparisons which showed there was no real increase. This new parallel system was discontinued after a few weeks as the existing system was fully operational with complete reporting from all islands by the end of January.

Reconstruction underway in the Maldives.

There were no outbreaks of communicable diseases detected immediately after the tsunami.

However, during the year a measles outbreak with over 1000 cases was reported, with no related deaths. Control measures taken included supplementary immunization activities in areas with localized outbreaks, vitamin A administration, measles vaccination for 6-

month olds (instead of usual 9-month olds), WHO provision of laboratory test kits for confirmation of outbreaks, and awareness raising among health care professionals.

There was also an increase in mumps throughout the country. Maldives does not currently have mumps in its national immunization schedule.

More than 700 cases of dengue were notified up till Nov 2005. Control measures included spraying and messages to the public and private sectors.

UN agencies initially focused on meeting the emergency needs of affected populations by providing inputs into food, shelter, safe water and sanitation. WHO provided technical support to the country in a number of areas: epidemiology, water and sanitation, environmental health, logistics, emergency preparedness and response. The consultants worked closely with MOH counterparts assessing the situation and identifying areas that needed support.

After the immediate emergency needs were fulfilled, activities mainly focused on capacity building. Communicable diseases activities included:

- Training of national level epidemiology staff and community health workers in field epidemiology – 40 staff trained in 2005
- Training of community health workers and vector borne disease control staff in vector larval surveillance, and scrub typhus entomology
- Re-establishment of acute flaccid paralysis (AFP) active surveillance in the two major national hospitals
- Training of clinicians in dengue fever/dengue haemorrhagic fever case management
- Introduction of a web-based data management system for communicable diseases to facilitate data collection and analysis throughout the country
- Procurement of laboratory equipment for the main national hospital and public health laboratory
- Procurement of equipment for public health units in atoll and regional hospitals, health centres and health posts, the port health unit, and vector borne disease control unit
- Development of a national emergency preparedness plan

- Water quality surveillance workshops for community health workers and family health workers, in use of equipment and data collection, recording and reporting to central level
- Workshops on logistics standards supplies software to manage flow of supplies during emergencies as well as day-to-day management of warehouses and storerooms. As the MOH supply and procurement system is currently being upgraded, this will be a useful tool for store keepers and managers of the proposed central medical store.

Myanmar

Myanmar was one of the countries least affected by the tsunami, yet 61 lives were lost and several thousand people affected, some of whom lost their homes and access to safe water and medicines. There was disruption to basic community services in some of the affected areas.

The UN and partners estimated some 10 000 people were affected in the Irrawaddy delta area and that several thousand more in Tanintharyi division were in urgent need of food, water, basic health assistance and shelter. Some 200 villages spread over the southern coast of Myanmar may have suffered economically as they rely on fishing. Fishermen and fishing equipment such as boats and nets were worst hit.

A tsunami assistance coordination group chaired by the International Federation of Red Cross and Red Crescent Societies (IFRC) was formed immediately post tsunami. The group concluded that Myanmar had been spared to a large extent and that the initial emergency needs had been met by the government and aid community. Longer term needs were in the areas of clean water sources, damage to soil and crops, destruction or damage to houses, fishing boats and nets.

Destroyed buildings in Laputta, Myanmar.

Based on government and international agencies' assessments in affected areas, the following health and social needs were identified as priorities:

- Restoration of basic public health services, which were already precarious before the tsunami
- Provision of safe water for drinking and hygiene purposes, linked with public health education and social mobilization
- Ensuring and maintaining food security
- Provision of shelter, adequate sanitation (latrine pits) and clothes for the displaced.

The Ministry of Health also put together a proposal for disaster preparedness and response, for which SEARO allotted USD 575 000 and UNOCHA (Turkey) supported recruitment of a consultant. Priorities include provision of supplies and equipment, strengthening disease surveillance, setting up operations rooms at the Ministry of Health and the WHO country office along with other measures to strengthen national capacity in order to respond to any major incident.

Activities undertaken include:

- Renovation of affected health infrastructure
- Development of a national disaster preparedness plan
- Production of information, education and communication (IEC) materials for basic health staff and the community
- Procurement of personal protective equipment
- Procurement of rapid test kits and other laboratory items
- Operations room support for the Department of Health
- Provision of basic units of new emergency health kits (NEHK) and supplementary kits
- Provision of drugs, insecticides, bednets, fogging machines and rapid diagnostic tests for malaria control.

The WHO Country Office designated a focal person and formed a Tsunami Response Group. WHO's response is closely coordinated with the UN Disaster Preparedness and Management group and with the international NGOs through the Red Cross-led Tsunami Liaison Group. WHO provides technical support to the Ministry of Health and the coordination groups. WHO also regularly updates the diplomatic and international community through distribution of situation reports and WHO press releases.

WHO is focusing its efforts on disease surveillance and providing emergency medical supplies as requested by the Ministry of Health.

As part of this effort, five sets of new emergency health kits (NEHK98) were mobilized and handed over to the Ministry of Health.

Novartis donated 22 680 treatment courses of antimalarial drugs (CoArtem) to assist with the potential risk of malaria epidemic in coastal areas.

Sri Lanka

In all affected areas, communicable diseases threats included vector-borne diseases such as malaria, dengue/dengue hemorrhagic fever (DHF), fly-borne bowel infections and Hepatitis A.

In alignment with government priorities, WHO identified six areas of post-tsunami support, of which two are relevant to communicable diseases response:

- Strengthened surveillance and laboratory capacity
- Communicable diseases control.

Reporting from camp populations took place daily during the emergency surveillance phase; this has now reverted to routine weekly reporting from in-patient facilities as occurred pre-tsunami.

Guidelines for outbreak response were produced with WHO financial and technical support, and further training is planned. There is a need to develop public health laboratory capacity to support outbreak investigation and rapid diagnostics at the district level.

Damage and destruction caused by the Tsunami at the government hospital in Kalmunai in Sri Lanka.

Efforts to strengthen lab capacity focused on provision of supplies and equipment for clinical based diagnostics at base and general hospitals. Two of three proposed training sessions for medical lab technicians (MLT) have been completed, with additional emphasis on biosafety precautions. A major concern is follow-up

supervision of MLTs and maintenance and sustainable supply of reagents for sophisticated equipment.

In response to the vector-borne diseases risk due to the tsunami, 50 000 long-lasting impregnated mosquito nets (LLINs) were provided, and sufficient fogging equipment and insecticide to last for the next two years. WHO also contracted an entomologist to support the activities.

The tsunami offered the opportunity to WHO to work closely with the decentralized health system. It revealed a serious lack of capacity to deal with vector control, partly due to lack of entomologists in critical locations. With dengue and cutaneous leishmaniasis on the rise, this is an opportunity for WHO to strengthen vector control by helping to develop sustained capacity, beyond the tsunami project interventions and the recently established dengue unit.

It was anticipated that the environmental conditions and disruptions created by the tsunami would enhance breeding of vector mosquitoes and flies, and there was a need for continuous and rigorous surveillance of environmental changes, vector densities and disease incidence, especially since transmission seasons were at their peak during and after the tsunami.

Activities to reduce the density of man-biting vectors and flies included, for all tsunami-affected areas:

- adulticiding for rapid reduction using thermal fogging with synthetic pyrethroids
- adulticiding for sustainable effects using indoor residual spraying (with hand compression sprayers)
- larviciding for house fly control, with spraying of breeding sites once every 10 days (with hand compression sprayers or knapsack mist blowers)
- larvicide spraying for mosquito control in drinking water containers every 2-4 weeks and in wells every 10 days
- logistical support to district health institutions
- technical assistance including provision of an entomologist and several vector disease control experts
- provision of training manuals for spraying and vector control in complex emergencies.

Damage and destruction caused by the Tsunami on the coast of Sri Lanka.

To protect affected populations from vectors, activities included:

- distribution of LLINs, and re-impregnation of 150 000 nets with permethrin
- preparation and delivery of key health messages (through MOH) on use of LLINs and covering of water sources
- logistical support, technical support, and pre and post intervention assessment.

To increase capacity to diagnose and treat communicable diseases, activities included:

- supply of drugs e.g. antimalarials, and vaccines e.g. for Japanese encephalitis, as well as rapid diagnostic tests and laboratory equipment to key institutions.
- production and dissemination of the national treatment schedule and guidelines for malaria diagnosis and treatment.

WHO's specific mandate in the tsunami-disaster response regarding Universal Precautions was to assist local health authorities in strengthening infection control within the health care services and to encourage use of personal protective equipment and improved handling of clinical waste. Activities included:

- a facility survey, with dissemination of results
- logistical and technical support to health institutions in tsunami affected districts
- provision of personal protection for staff
- training of health and agency staff
- preparation of an information, education and communication (IEC) package
- advocacy to national and district level authorities.

The tsunami presented Sri Lanka and the health community with a unique opportunity to rebuild the healthcare system in general, especially with respect

to management of communicable diseases which remain a major scourge in the country. This will benefit the whole population.

Thailand

Expected health risks after the tsunami included respiratory infections, measles, and food and water borne diseases such as diarrhoea and dysentery (including shigellosis and cholera) that result from overcrowded conditions and poor sanitation.

On December 26, the Ministry of Public Health (MOPH), Bangkok, set up a central command centre to coordinate rapid response activities for communicable diseases. This was the Operation Centre for Handling Contagious Diseases and Natural Disasters. Operations were based on channels already in use for SARS and avian influenza, with units on coordination and monitoring, international coordination, technical support and coordination, logistics support, surveillance, outbreak control support, and public information.

The main field operations centre was located in Phuket, and was chaired by the Deputy Permanent Secretary, MOPH. Command centres were also set up in each of the affected provinces. Health assessments were conducted rapidly, helping to identify the immediate health needs and prioritize public health interventions.

The MOPH rapidly activated mass casualty plans and deployed personnel and resources to meet local health care needs. For communicable diseases, 5 teams conducted active surveillance and investigated potential outbreaks. Regional teams were mobilized to the six affected provinces.

Spraying campaign for vector control in Thailand.

The active surveillance system for tracking and responding to possible outbreaks of SARS was built on so that outbreak risks and sanitation, environmental, and community mental health needs could be rapidly assessed and addressed. Laboratories used for disease surveillance were supplemented with additional staff and equipment. Data were collected on a daily basis from all hospital and health units using a WHO rapid assessment tool.

Surveillance and rapid response teams (SSRTs) (consisting of epidemiologists and public health workers) assessed impact and needs, outbreaks and risk, set up surveillance, conducted case/outbreak investigations, initiated and coordinated disease prevention and control, and assessed response.

Vector control teams had the role of spraying insecticides, reducing breeding sources, and providing health education. They assessed risk of contagious disease, and began active surveillance, prevention and control. Vector control was implemented at affected sites, corpse collection sites, and around relief centres/shelters. In total, in the six provinces, 2238 sites were surveyed for fly control and 10 038 sites for mosquito control.

After the tsunami, the MOPH implemented active surveillance for 20 diseases plus wound infections and electric shock in all 20 districts in the six affected provinces. This was based on the national passive surveillance system for infectious diseases.

Altogether, surveillance teams visited 119 surveillance sites daily and collected and analysed case-report forms.

The diseases most often found were diarrhoea, infected wounds, atypical pneumonia. Also reported were: pyrexia of unknown origin, dengue, malaria, jaundice, conjunctivitis, chicken pox, and mumps. Cases of diarrhoea were increased in comparison to the same period the previous year but this was attributed to active rather than passive reporting of cases. There were no abnormal increases in the reported number of cases of respiratory disorders, mumps, measles, or chicken pox.

Assistance from WHO was requested in monitoring communicable diseases outbreaks, sanitation and water safety, among other areas including forensic operations, psychological and mental health, and health promotion. In collaboration with other UN agencies, WHO provided active support to the Thai government, especially MOPH, in conducting rapid health and needs assessments using WHO rapid assessment tools for emergencies.

WHO's biggest contribution can be attributed to the organization's past contributions to training and strengthening of public health infrastructure in the country, in particular to training of field epidemiologists (under the Field Epidemiology Training Program) and capacity building in the area of disaster preparedness. This has resulted in a public health sector capable of responding quickly and appropriately to disasters.

Annex 1

Strategic Plan for Emergency Health Response to Tsunami Disaster in Asia

1. Background

On Sunday 26, December, 2004, the Tsunami hit major cities along the coast of South Asia with enormous ferocity causing unprecedented havoc. The intensity of tsunami has been unparalleled and the devastation it caused is one of the worst in living memory. The South-East Asia Region has been the most severely affected. As of 03, January, 2005, more than 140, 000 people are reported dead. These include more than 80,000 in Indonesia, 28,551 in Sri Lanka, 9,063 in India, 4,798 in Thailand, 74 in Maldives, 59 in Myanmar, and 2 in Bangladesh and many more are suffered injuries and missing.[1] In addition to the huge toll of lives lost, it has destroyed houses, properties and most of basic infra-structure in affected areas, rendering millions homeless and displaced.

The initial phase of the emergency is crucial for the survival of victims. Thus, the urgent concerns of survivors are related to management of injuries, shelter, food and water. This initial phase is likely to be followed by increased morbidity and mortality due to communicable diseases associated with disruptions of sanitation services and poor water quality, and overcrowded conditions – creating an environment for disease spread and conditions for disease outbreaks. The immediate risks are posed by waterborne diseases mainly diarrhoeal diseases like cholera and bacillary dysentery. Overcrowding of displaced populations in temporary camps lead to an increased risk of outbreaks of measles, meningitis, and acute respiratory infections and increased

[1] Tsunami and Health Situation Reports, SEARO; 3 January 2005.

tuberculosis transmission. From the initial stage to several weeks, cholera, typhoid fever, shigellosis, hepatitis A and E are serious threats. Vector-borne diseases such as malaria and dengue fever can also pose significant threats.

Based on assessment of these likely health problems and possible disease outbreaks which are associated with this disaster situation, it is of paramount importance to strengthen appropriate public health interventions (Annexes 1 and 2).[2]

This unprecedented disaster situation requires immediate response from health point of view. These include setting up of emergency surveillance system for early detection and management of outbreaks, mobilization of health personnel to the affected areas, availing simple guidelines on management of illness, emergency procurement of life saving medicines, diagnostic kits and vaccines, and monitoring of trend of diseases. These activities must be organized systematically.

This regional strategy provides a frame work and action plan of the health response to the tsunami disaster. The proposed activities, which emphasize on control of communicable diseases, will complement the ongoing activities of WHO's response to the disaster; namely;

- supporting needs of country offices and Ministries of Health in disease surveillance;
- providing technical advice to countries on good practice in outbreak situations and to reduce environmental and public health risks;
- supporting needs assessment and proposal development for present and medium term restoration and protection of the health and well-being of the affected population;
- providing guidelines on disposal of dead bodies, psycho-social needs and protection of vulnerable groups, especially women;
- mobilizing resources and supplies such as essential drugs and water purification tablets/chlorine; and
- Coordinating and managing information requests for technical issues and public and media information.

[2] Sudden Impact Natural Disasters. In: Rapid Health Assessment Protocol for Emergencies; WHO; 1999.

2. Objectives

- Monitoring public health to provide early warning of emerging health treats and to enable the timely organization of any necessary response, by providing technical expertise to health authorities to enable key gaps to be filled.

3. The Strategy

(1) To strengthen emergency surveillance by efficient data collection on communicable diseases and other health problems for quick analysis and use for planning interventions and logistics management.

(2) To plan and implement an effective response by mobilizing human resources and logistic system from national or international sources.

(3) To start thinking about rebuilding health infrastructure. (this plan would focus only on emergency response only and not only recovery or reconstruction aspects)

4. Instruments of broad activities

(1) Establish Early Warning/Surveillance system and strategic information

- Focusing on diseases of public health significance and cause of morbidity and mortality – to detect outbreaks early and respond effectively[3]
- Simple guidelines, case definitions, reporting forms (in hard copies)
- Outbreak daily update for dissemination
- Laboratory support for confirmation of diagnosis (desirable but not essential in all situations)

(2) Human resources and deployment

- Within SEARO, within CDS, from country offices, Ministry of Health, other regional offices, WHO Headquarter, and other UN agencies and partners including Global Outbreak Alert and Response Network (GOARN).

[3] Guidelines on emerging health problems during floods, cyclones [final draft]; SEARO; 2004

- Plan their deployment in a matrix and with country request
- CVs of health personnel according to background
- One page briefing note plus kit to carry for field use.

(3) Guidelines and tools

- Assess what guidelines are needed; what guidelines are available, what guidelines need to be duplicated for distribution for field use.
- Prepare relevant guidelines as a part of investigation team kit including WHO policies on various aspects such as vaccination i.e. measles, cholera, typhoid
- Prepare standardized reporting forms for surveillance of communicable diseases
- Distribute hard copies, send by e-mail, website updating of the situation

(4) Procurement and distribution of life saving medicine / vaccine

- Plan for what may be needed at various phases post disaster (see guidelines)
- Stockpiling, local/regional procurement of water purification tablets, ORS packets, antibiotics, Vitamin-A capsules, measles vaccine, antimalarial drugs, bednet, etc.
- Coordinate with member countries of the need
- Resource mobilization including adjustments within CDS activities
- Coordinate with DAF on resources and procurement

5. Coordination and management

WHO works within the frame work of the UN, and under overall coordination of national governments of the affected countries. As outlined in this strategic document, CDS/SEARO function is to help country offices, respond to country urgent and emerging needs in the area of health by mobilizing technical support in disease surveillance and response, providing guidelines on simple ways of diagnosing, treating and preventing illnesses in emergency situations, preparing appeal for resources and articulating the health needs.

While EHA/HAC is responsible for the overall coordination of emergency response in for this crisis situation, the department of CDS provides technical lead for disease surveillance, early warning, preparedness and response. CDS collaborates with EHA and other units in the Regional Office such as IVD, HSD etc. It will also further strengthen coordination of its activities with other regional offices and HQ to identify the support needed and to have epidemiologists on a standby basis to mobilize at short notice at government request. CDS will also closely work with the Global Outbreak Alert and Response Network (GOARN) mechanism to coordinate international support for and assist affected countries with disease surveillance and outbreak response.[4]

To ensure that response efforts are based on country needs and to coordinate these with WR offices and other agencies, CDS will further enhance its communication and feedback to/from WHO country offices. Moreover, WRO/CDS focal points in affected countries and CDS/SEARO will closely work and collaborate, including in supporting disease surveillance, early warning, investigation and response to outbreaks. Feedback and daily update on disease outbreaks will be provided to all countries.

6. Action plan

This strategic plan includes a plan of action for the 3-month period of the immediate and intermediate post-disaster phases (Table 1). However, it is clear that the health effects of the disaster will last a long time, including those arising from the destruction of health facilities and basic water and sanitation services, disruption of medical care and disease surveillance system. There fore, it is essential to support longer-term efforts to develop and establish these services and systems. Accordingly, a longer-term (beyond the 3 month phase) plan of action will be developed and incorporated to the ongoing country support activities. The main emphasis of the next phase activities will be on strengthening communicable disease surveillance and response system, including capacity development and laboratory strengthening. Moreover, there may be a need to develop a plan of action to address specific country/local needs in the areas of disease surveillance and control.

[4] Global Outbreak Alert and Response Network: Strategic Plan. WHO; 2004

7. Monitoring of implementation

The CDS unit in collaboration with WR offices of affected countries and SEARO Task Force will monitor the progress of implementation of activities. Regular health situation updates, mission reports, and number and type of responses to country requests will be compiled. Likewise, availability of stocks of essential and life saving drugs and supplies, and laboratory support will be monitored. Regular reviews including on status of implementation, situation updates and evolving needs will be made to decide on appropriate response.

Table 1: *Implementation plan-health response for Tsunami Disasters; CDS/SEARO*

Activity	When	Who	Remarks
1. Disease early warning/ Surveillance system and strategic information			
1.1. Adapt and avail simple surveillance forms/guidelines	First week (1 Jan 05)	CDS	Available
1.2. Produce daily outbreak update for dissemination	ongoing	CDS	Ongoing
1.3. Enhance communication with CDS focal points in WR offices	First week/ongoing	CDC/CDS	Contact established, ongoing
1.4. Monitoring of disease trends	First week/ongoing	WRO/CDS	Reports from WR offices
1.5. Technical support for investigation of rumors and suspected disease outbreaks	As required	WRO/CDS	Based on country needs
2. Human resources and deployment			
2.1. Prepare and update personnel on standby for deployment	First week	CDS / RDO	Initial list of more than 50 experts ready by 1 Jan 2005 To be updated as required

Activity	When	Who	Remarks
2.2. Provide technical support to affected countries as required	Second week (from 2 Jan 05) onwards	CDS/WRO	Sent to Sri Lanka, Indonesia
3. Guidelines and tools for communicable disease surveillance and response			
3.1. Assess required surveillance and assessment guidelines/tools	First week	CDS	Completed in first week (SEARO/HQ/CSR/HAC tools)
3.2. Prepare/collate/ compile a set of practical guidelines and matrix on managing health problems in various post-disaster phases	First/second weeks	CDS	Completed
3.3. Prepare list of guidelines available and put on web-page	Second week	CDS / ISM	List completed and available on SEARO Webpage
4. Procurement and distribution of life saving medicine / vaccine			
4.1. Identify needs and resources	First week	CDS / DAF	List of essential drugs and supplies identified
4.2. Stockpile essential and life saving drugs and supplies	Second week		Procurement in process
5. Coordination and communication			
5.1. Establish a coordination mechanism with WR offices of affected countries, HQ and EHA	First week/ongoing	CDS/ Regional Task Force	Regional Task Force established
5.2. Strengthen information and communication/situation updates and needs in disease surveillance	First week/ongoing	CDC/CDS/WROs	CDS daily meetings

Annex 2

Note for the Record Tsunami Technical Group meeting (example)

10 January 2005

Present:

CDS: Jai P Narain (chair), A.S. Abdullah, Asheena Khalakdina, Petra Heitkamp, Ying-Ru Lo, Laksami Subesaeng, Rajesh Bhatia, Ayana Yeneabat, KB Kamara

NMH: Sawat Ramaboot, Vijay Chandra, J Leowski,

HSD: Adik Wibowo, K Weerasuriya, T Walia,

IVH: Nalini Withana

FCH: S. Malhotra

HQ: Dick Thompson, and Ruwan De-Mel

While situation relating to Tsunami is getting better, coordination, communication and logistical support are critical for effective delivery of technical support to the Tsunami-effected countries. At SEARO and as a part of the Tsunami technical Group, focal points for liason with three most effected countries for information/communication have been established which include Dr Adik Wibowo (RPC) , Dr K Weerasuriya (EDM), and Dr Samad Abdullah (CDC) for Indonesia, Sri Lanka and Maldives respectively. In each of the counries, Tsunami has resulted in unprecedented damage to national economies and to Health Infrastructure; many health facilities have been damaged and health care workers themselves have died. Water supply has been severely damaged in many countries such as Maldives which may take years to be brought to normalcy.

The following issues were discussed for follow up:

- Surveillance reports have now started to come in from most countries. These include reports from Aceh sent in by Dr Jean Michel Tassie, and from Srilanka from Dr Renu Garg, So ar, no major outbreaks have been reported. However, one case of measles each from Banda Aceh and Moulbeu city have been reported, besides 10 cases of tetanus. Measles immunization campagne is underway in Banda Aceh while cases are being investigated in Boulebou. The risk of vector-borne diseases is high especially malaria and dengue. In Srilanka, surveillance system is in place; the reports show only sporadic cases of diarrhea. In Maldives, reports are yet to be made available. The report of black bird deaths from three atolls is being investigated by the health authorities, actively assisted by WHO epidemiologist, Dr Nyoman Kandun. The samples from crows and humans have been taken and are being transported to a lab in India or Australia.
- An oprations room email address has been created in Indonesia. This will us forward our message to our colleagues there and also to obtain information by sending email to the operation room address.
- The Tsunami technical group's assistance would consist mainly of: developing and disseminating widely the technical guidelines and tools (2) coordinating mobilization of human resource for deployment according to country needs (3) collecting, compiling and analyzing surveillance and other health data, and (4) dissemination of information through outbreak updates, Tsunami health bulletins, web update etc. The need for establishing emergency surveillance and early warning system, lab capacity, strengthening outbreak investigation and disease prevention and control are topmost priority, besides provision of psychosocial support in many countries. In Aceh, a mobile lab will be established and will become functional with help from Malaysian lab experts (a WHO CC) by Wednesday- in another two days!
- The new staff deployment include Dr Tom Grein (already reached Indonesia) while Drs Alain Marin, Dominique Legrow will be arriving today. Dr Ali Khan, CDC/GOARN will also leave for Indonesia shortly. Drs Michelle Gayer and Angela Marionos, both HQ are arriving Srilanka today. Services of Brad Woodruff have been sought from CDC. Srilanka has requested for WHO support in the area of mental

health. The name of Dr Shekhar Saxena, HQ has been sent to opsroom for making necessary administrative arrangements. Global funds officials are going to Sri Lanka and Indonesia during this week, while Mr Dick Thompson, Media Expert from HQ has joined SEARO to assist PIO in communication activities.

The procedure for deployment of technical staff has been revised. From now on, all names will be proposed by Dr Narain and forwarded to Operations room for follow up action. The procedure to be followed would be communicated by opsroom soon.

In terms of resources, in situation where resources are limited and if Global Fund proposals have already been approved with resources available in the country, the Fund would be flexible and agree to reprogramming at the country level. This information should be provided to all relevant countries so that they can avail of this provision

- Dr Tej Walia has prepared a draft on "Strategy for rehabilitation of health systems" and has sent it to all members for comments.
- To widely disseminate Tsunami-related health analytical information, it is proposed to prepare a Tsunami Health Bulletin. HQ assistance could be obtained since SEARO technical staff are fully engaged in other Tsunami-related activities.

Annex 3

Key Status of Tsunami-affected Countries of SEA Region

Update on 5 January 2005 (1500 hours)

Tsunami affected countries	Key Status				Any outbreak reported	Key contact person	New Remarks
	# deaths	# missing	# displaced	District/Sub distt affected			
Indonesia	94,081	1351	271,908	172 Sub-Districts	Nil	Dr Steven Bjorge BjorgeS@who.or.id	MoH with technical support from WHO & other agencies has developed a plan of action for epidemiologival surveillance and early warning for outbreaks.
Sri Lanka	30,196	3846	834,849	12 Districts	Nil	Dr S Warusavithana supriya@whosrilanka.org	Major focus of work is on health coordination with Government, UN agencies and NGOs. WHO water and sanitation specialist is working together with UNICEF and the Water Board.
India[1]	9571	5914	627,119	4 States, 2 Union territories	Nil	Dr Sampath Krishnan KrishnanS@whoindia.org Mobile: 9810471121	Surveillance is being undertaken by the MoH and FW. An Operation Room is functional in WR Office.

[1] Source: Ministry of Home Affairs, Government of India.

Tsunami affected countries	Key Status				Any outbreak reported	Key contact person	New Remarks
	# deaths	# missing	# displaced	District/Sub distt affected			
Thailand[2]	5187	3810	–	Phuket, Phangnga Krabi, Trang, Satun, Ranong	Sporadic cases of acute diarrhoea, food poisoning, pneumonia, malaria, dengue	Dr S Peerapakorn somchai@whothai.org	Disease surveillance is functioning through public and private hospitals and all health centres, relief center mobile medical units with the support from the central MOH. A 24 hours Operation Centre is functional in WR office.
Maldives	82	26	8352	2/3 of the Islands	A few cases of acute diarrhoea, viral fever reported	Dr Ohn Kyaw ohnkyaw@who.org.mv Mobile: +960 787 796	
Myanmar	59	3	3205	5 Divisions	Nil	Dr Anshu Banerjee banerjeea.whomm@undp.org	No significant change in the disease pattern has been observed so far
Bangladesh	2	None	None	20 Districts	Nil	Dr KAH Akram akramk@whoban.org Mobile: 011 816016, 0173004166	
Total	**139,178**	**14,950**	**1,745,433**	**–**			

[2] Figures obtained from the Department of Disaster Prevention and Mitigation, Ministry of Interior.

Tsunami Health Bulletin
WHO/SEARO

WHO

Report: 1
17 January 2005

Overview

Background

Triggered by 9.0 earthquake off the northwest tip of Indonesia, a historically unprecedented tsunami was unleashed early Sunday morning, 26 December 2005. Walls of water moving at high speed pounded coastal communities from Indonesia to Kenya, leaving (as on 16 January) 157,526 dead, 27,266 missing and two million displaced.

Like the loss of life across WHO's South-East Asia Region (SEARO), the consequences to public health were uneven from location to location. In the hard hit region of Aceh, Indonesia, for example, more than half the public health infrastructure (heath facilities etc.) were lost. In other areas, such as Sri Lanka, the public health infrastructure remained largely intact.

Current assessment

At Day 22, the epidemiological information system is still evolving and, like the damage done by the tsunami itself, it varies from country to country. Among the hardest hit areas, Sri Lanka and Maldives have a good epidemiology monitoring and reporting system in place. In Aceh, on the other hand, the system is functioning at a 50% level but improving quickly.

Millions are still living in overcrowded and unsanitary conditions. Water and sanitation is inadequate in some areas. Diarrhoeal diseases remain a high concern.

In Indonesia, Sir Lanka, India and Myanmar, conditions have been created which increase mosquito breeding, heightening the risk of malaria and dengue. Vector control measures are being implemented for malaria and dengue.

Mental health trauma remains a major concern across all affected areas.

Most acute care needs are being addressed, although people in areas such as Aceh remain at high risk of injury-related tetanus which will require administration of tetanus toxoid.

Communicable diseases are under control presently but the risk is very high and, in vulnerable populations (i.e. children, injured, pregnant women and the elderly), potentially life threatening. Access to medicines (such as oral rehydration salts for treating diarrhoea and preventing dehydration, and antibiotics for management of pneumonia) remains a priority. Immunization campaigns to prevent measles outbreaks must be undertaken where coverage is low. All these efforts require a comprehensive and coordinated approach for disease prevention and control based on evidence generated through effective surveillance and early-warning systems.

Outbreaks

No outbreaks of communicable diseases identified, although many clusters of cases have been investigated.

Health Picture at a Glance

- Indonesia – Sporadic measles and malaria cases have been identified but these are not above normal range. Measles vaccine campaigns have been conducted. Measures to control mosquitoes include spraying (fogging) and the use of insecticide treated bed nets and plastic sheeting.
    - Health assessments: This activity has increased with assessment teams being flown into remote areas by military helicopters.
    - Surveillance: Daily reporting begins today through hospitals (inpatients) and laboratories.
    - Laboratories: One provincial public health lab is physically intact but one-third of personnel lost during the tsunami. Assistance is being supplied by Malaysian, Singaporean and Australian lab teams, but there is an urgent need for supplies and media reagents to begin operations. Malaria service will reopen Tuesday with a capacity to examine 20 to 30 slides a day. Dengue service should begin Thursday.
    - Malaria: Sporadic cases being identified through EWARN (emergency surveillance and early warning) system. Three cases of laboratory confirmed P falciparum at one IDP camp; two are pre-tsunami treatment failures who have relapsed. A third case has been identified, possibly local transmission. All are being treated with quinine and are recovering. Twelve thousand rapid diagnostic tests arrived today.
    - Cholera: No cases. Rumours being reported. Many have been investigated and found to be unsubstantiated. Preparations underway to prepare a cholera isolation facility in Aceh's provincial hospital.
    - Measles: Two cases reported so far from Aceh. Large-scale immunization programs of children between the ages of 9 months to 15 years have been conducted. Target population: 1.16 million. (It takes ten days following immunization for protection.)
- Thailand:
    - Disease surveillance reports are being provided daily.
    - No significant outbreaks of GI and respiratory infections such as cholera, measles, influenza or encephalitis detected. There are some sporadic diarrhoeal cases among volunteers in one province
    - Dengue cases reported but not above expected levels
- India
    - Measles immunization campaign completed in affected Tamil Nadu districts (except Pudokottai) with 75,338 children 6 to 59 months vaccinated.
    - Nothing above background levels of acute diarrhoeal syndrome , typhoid and chickenpox reported in the affected districts of Kerala
- Sri Lanka
    - Measles: one case confirmed in a small camp and all 56 people in the camp have been vaccinated.
    - Water supplies are sufficient but sanitation problems continue.
- Maldives:
    - Daily reporting of 12 communicable diseases from all the atolls and regional hospitals has started.
    - There is a slight increase in the reported incidence of diarrhoea, ARI (acute respiratory infection) and viral fever but this increase is still within the normal range.
    - Public health laboratories are being established to diagnose epidemic-prone diseases and test water quality.

WHO's public health goals and actions

WHO support is being provided within the framework of a strategic plan for the health response to the tsunami. This includes emergency surveillance and early warning (EWARN) system for outbreak alert and response, establishment of mobile laboratories, deployment of staff and consultants to provide technical support at the ground level in communicable diseases, psychosocial support, water and sanitation, and nutrition. GOARN (the Global Outbreak Alert and Response Network) has been mobilized to assist in outbreak detection, verification and management.

Initial support was provided immediately by WHO country offices, reinforced by the WHO regional office for South-East Asia—SEARO. In the emergency phase, the response was coordinated by WHO's Health Action in Crisis and SEARO's Emergency and Humanitarian Action. Now WHO technical support activities are largely provided by its Communicable Diseases department in the South-East Asia Regional offices in New Delhi (and reinforced by HQ in Geneva) as well as by all other WHO departments including the Immunization and Vaccine Development, the Noncommunicable Diseases and Mental Health, EHA, Health System Development, Family and Community Health and by the department for Sustainable Development and Environment.

The public health challenges in the wake of the tsunami change over time.

Emergency phase:

Immediately after the disaster, injuries including the resultant infections, and water contamination were the most urgent health threats. Other needs included body disposal and rapid health assessments to determine planning and resource allocation. Anticipated health risks included respiratory infections, measles, and water borne diseases such as diarrhoeal and dysentery (including cholera) resulting from overcrowded conditions and poor sanitation. A system of monitoring and evaluation on an ongoing basis was needed to help identify operational difficulties, refine strategies and modify actions. Also required were effective coordination of efforts among partners on the ground, streamlined logistics management and transparent communication.

Other essential activities include identifying persons at special risk such as pregnant women and children with diarrhoea and ensuring that their health is protected. Also critical is establishing surveillance networks to monitor, verify and respond to outbreaks especially in concentrations of displaced persons whose health may already be fragile. While these risks will continue because of the environmental conditions, such as overcrowding still persist in many areas where people having to live in makeshift settlements and camps, concerns are emerging with regard to collection of stagnant water resulting in mosquito breeding creating a risky environment for vector-borne diseases. Strategic stockpiling of drugs for epidemic-prone diseases such as dysentery or cholera is also necessary

To date, more than 70 WHO staff and consultants are fully deployed in the relief work at the three most effected countries namely Indonesia, Srilanka and Maldives. 78 technical guidelines, outlining best practices in the situation, have been produced, transmitted to the field and posted on the web. Vaccines and life-saving drugs have been procured and stockpiled in the field.

Reconstruction phase:

Now that the emergency phase is passing, WHO has been leading the health response to Tsunami. More elaborate health assessments are being conducted and, with the aid of helicopter support, health assessments are being conducted in areas, earlier inaccessible. Increasingly comprehensive surveillance systems are being established in all countries. Laboratory capacity is being strengthened, availability of equipment, drugs and vaccines to support outbreak containment is increasing. These actions have started providing epidemiological data to identify outbreaks early and respond rapidly.

WHO is moving to provide technical guidance for the rebuilding of the public health infrastructure. The access to health care, referral and transportation of life saving medicines and vaccines has been profoundly disrupted in many areas, where substantial numbers of health care workers either dead or left the area. Re-establishing the capacity of health system to provide basic services and interventions in core areas such as communicable disease control, maternal and child health, water and environmental sanitation, and immunization now remains the top most priority.

WHO is informing and educating the public on issues like personal hygiene, environmental sanitation, and use of health services established for disease prevention and treatment, which would reduce mortality and morbidity, particularly among the most vulnerable, such as children.

For further information

Relevant websites:

http://www.who.int

http://www.whosea.org

WHO Public Communication Contacts

WHO Geneva: Mr. Iain Simpson at simpsoni@who.int and 4122 791 3215

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Annex 5

A Short List of Guidelines

Communicable Diseases

WHO Control of Communicable Disease and Prevention of Epidemics in Emergencies

WHO Guidelines for Outbreak Control

Guidelines for Collection of Specimens for Laboratory Tests

WHO Case Investigation Form

WHO Weekly Health Assessment

WHO Case Management of Epidemic Prone Diseases

Managing a Diarrhea Disease Outbreak

Cholera in complex emergencies

Cholera outbreak response

WHO Guidelines for Control of Shigella in Emergencies

WHO: Vector and Pest Control in Emergencies

WHO: Malaria in Emergencies

Malaria Epidemiology and Control in Refugee Camps and Complex Emergencies

WHO Fact Sheet on Dengue

WHO Fact Sheet on Malaria

WHO Fact sheet on Cholera

WHO Fact sheet on Meningitis

WHO Meningitis Guidelines

Rodent Control in Disaster Settings

Guidelines For Control Of Flies Closely Associated With Humans

Management of Dead Bodies

WHO Mortuary Service and Handling of the Dead in Emergencies

Disposal of dead bodies

Management of Hazardous and Infectious waste

Four steps for the sound management of health care wastes in emergencies

Practical Guidelines for Infection Control in Health Care Facilities

Management of solid health-care waste at primary health-care centres

Managing hazardous wastes: Asbestos and building materials

Hazardous Waste Management in Tsunami-Affected Areas: Emergency Phase

Water

WHO Water Supply in Emergencies

Sanitation

WHO Sanitation in Emergencies

Planning Emergency Sanitation

Solid Waste Management in Emergencies

WHO Checklist of Hygiene Practices that Protect Health in Emergencies and Disasters

Vaccines

Joint WHO-UNICEF recommendations for Cholera Vaccine

Measles

Joint WHO-UNICEF recommendations for Cholera Vaccine

Tetanus / use of human Immunoglobulines

Logistics and Supplies

WHO Emergency Health Kits

WHO Supply List for Emergencies

Annex 6

Communicable Diseases
An Example of "Ready Reckoners"

MEASLES FACT SHEET FOR TSUNAMI AFFECTED POPULATIONS

Failure to deliver at least one dose of measles vaccine to children under 15 years of age in emergency settings remains one of the main reasons for high child mortality and morbidity

1. Measles disease:

Measles is a highly infectious RNA viral infection transmitted by aerosol drops. Humans are the only reservoir.

Incubation period: 10–12 days and measles is communicable one to three days before the onset of fever, rash and cough. Secondary attack rate I sup to 80% in susceptible household contacts.

Complications: Up to 75% children may develop complications which include diarrhoea, otitis media, pneumonia, laryngo-tracheal bronchitis (croup) and encephalitis. Measles also depletes Vitamin A status that results in severe eye complications and blindness. Measles can lead to longer term brain damage and deafness. Low vitamin A status is associated with an increased risk of complications.

Death: Case–fatality ratios for children under one in emergency settings: 3–30%. The three major causes of high case–fatality rates are pneumonia, diarrhoea and croup. Children may also die from measles infection or its sequelae including encephalitis and malnutrition. Measles infection often leads to a prolonged suppression of the immune system, increasing susceptibility to secondary bacterial and viral infections.

Increased risks: Crowding, displacement, exposure at a young age and malnutrition.

Treatment: There is no specific treatment for uncomplicated measles infection, other than supportive care including fluids, antipyretics and nutritional therapy. However, antibiotics may be indicated for secondary bacterial infections such as pneumonia.

Vitamin A: Administration of vitamin A has been demonstrated to reduce measles mortality by 30–50%.

2. Measles vaccine:

Vaccine: A safe and effective monovalent measles vaccine is made from live attenuated virus. It costs about US$ 0.26 per dose (including safe injection equipment). Vaccine effectiveness is estimated to be 85% when administered at nine months of age. It comes as a freeze dried form and must be reconstituted with measles diluent / solvent from the same manufacturer.

Storage and reconstitution: Vaccine should be kept at temperatures below 8°C and sheltered from light. Central stores should store the vaccine (not the solvent) at – 20°C. At room temperature (22–25°C) reconstituted vaccine loses about 50% efficacy in one hour; at 37°C inactivation occurs within one hour. It is therefore extremely important to keep reconstituted measles vaccine cool and protected from sunlight. The vaccine, once reconstituted, should be used by the end of the session or within six hours, which ever is soonest.

Dosage and administration: The vaccine is given subcutaneously as a single dose of 0.5 ml, in the outer part of the upper arm. It should be administered from the age of nine months, but in high risk situations such as overcrowded camps, the vaccine could be given from six months.

Contraindications: Measles vaccine can safely be given to children with mild febrile illnesses and malnutrition. There are only three main contraindications to measles vaccine a) Previous severe allergic reactions (hives, swelling of the mouth or throat, difficulty in breathing, hypotension, shock) following a prior dose of measles vaccine or vaccine component (e.g., gelatin, neomycin); b) severely immunocompromised for any reason should not be given measles vaccine; and c) pregnancy.

Reactions: Commonly observed adverse events following immunization (AEFIs) include 1-2 days of fever after 7-12 days (temp>37.6°C) in 8% vaccinees and a maculopapular rash lasting for 1-2 days after 6-14 days in 1-2% vaccinees. There may also be some transient slight enlargement of cervical and occipital lymph nodes.

Very rare AEFIs include convulsions, encephalitis and subacute sclerosing panencephalitis. It is important to note that the rate of serious AEFI is very low compared to that of complications observed after measles disease or natural infection.

3. WHO position on measles control:

Delivery of measles vaccine, together with vitamin A supplementation, to all children aged 6 months – 14 years is a priority health intervention during and after emergencies. This is regardless of previous vaccination or disease history. At a minimum, children 6 months through 4 years of age should be immunized.

Coverage: It is essential that high coverage (more than 90%) be achieved.

Safety and disposal: Auto-disable syringes and safety boxes should be used. A plan should be drawn up to adequately dispose of used injection materials by incineration, burning (combustion without complete destruction) or burying.

Logistics: Trained personnel, vaccines, cold chain equipment (refrigerators, freezers, cold boxes, vaccine carriers, ice-packs), other supplies (auto-disable syringes, safety boxes, monitoring forms: vaccination cards, tally sheets etc.), vaccine administration sites, surveillance system, other activities (e.g. nutritional supplementation and Vitamin A, treatment of complications), health education and social promotion materials. Vaccine doses required = target population x 1.18; AD syringes required = target population x 1.18; reconstitution syringes required = amount of vaccine doses required x1.18/10; safety boxes required = total no: of AD syringes + disposable reconstitution syringes required x 1.18/100.

Measles outbreak: The presence of several cases of measles in an emergency setting does not preclude a measles immunization or vitamin A supplementation campaign. Even among individuals who have already been exposed to, and are incubating the natural virus, measles vaccine, if given within three days of infection, may provide protection or modify the clinical severity of the illness. Isolation is not indicated, and should be treated symptomatically. Cases should receive two doses of vitamin A 24 hours apart.

Clinical case definition: Any person in whom a clinician suspects measles infection or any person with fever and maculopapular rash (ie. non-vesicular or without fluid) and cough, coryza (ie. runny nose) or conjunctivitis (ie. red eyes).

Laboratory criteria for diagnosis: At least a fourfold increase in antibody titre or isolation of measles virus, or presence of measles specific IgM antibodies.

4. Further WHO website references and guidelines:

http://w3.whosea.org/EN/Section23/Section1108/Section1835_8188.htm#ceMMMDIS
WHO guidelines for epidemic preparedness and response to measles outbreaks:
http://www.who.int/csr/resources/publications/measles/WHO_CDS_CSR_ISR_99_1/en/

Annexe 7

List of Experts/Staff Assigned*

Sno	Name	Post Title	Country Visited
1	Abdullah, Dr Samad A	Communicable Diseases	SEARO
2	Adhikary, Mr Sharad	Water and Sanitation	Indonesia
3	Aggarwal, Mr Ashutosh	IT Specialist	Indonesia
4	Ahmad, Ms Maimunah	Laboratory Technician	Indonesia
5	Ait-Ilkhlef, Mr Kamel	Logistician	Sri Lanka
6	Akiyama, Dr Jun	Entomologist	Sri Lanka
7	Alam, Mr Abu Mohammad Zahirul	Water and Sanitation Engineer	Indonesia
8	Anand, Mrs Jasmine	Nursing Service Development	Sri Lanka
9	Annunziata, Dr Guiseppe	Medical Officer	SEARO
10	Arbani, Dr Poerwokoesoemo	Malariologist	Indonesia
11	Arnold, Miss Virginia	Technical officer	Indonesia
12	Arques, Dr Ricardo Sole	Medical Coordinator	Indonesia
13	Aze, Mr Jean-Christophe	Logistician	Sri Lanka
14	Azian, Dr Harun	Laboratory Technician	Indonesia
15	Badoy, Dr Timoteo	Drug Supply	Indonesia
16	Banerjee, Dr Anshu	Medical Ofcer / Epidemiologist	Indonesia
17	Barnard, Mr Michael Rene	Logistician	Indonesia
18	Barot, Mr Jagdish	Water and Sanitation	Sri Lanka
19	Benabid, Dr Laurence, Nadia, Isabelle	Medical Officer	Indonesia
20	Bezbaruah, Dr Supriya	Communications	SEARO
21	Bhatia, Dr Rajesh	Communicable Diseases	SEARO
22	Bhugra, Dr Dinesh	Mental Health Expert	Thailand
23	Bittner, Ms Patricia	Programme Management	Indonesia
24	Boerschke, Mr Roy Karl	Water and Sanitation Engineer	SEARO
25	Bradt, Dr David	Epidemiologist	Indonesia
26	Brent, Mr Burkholder	Team Leader	Sri Lanka

*This list includes only experts/WHO staff deployed to the field. It does not include WHO Country Office staff base in the countries

S no	Name	Post Title	Country Visited
27	Bridge, Dr Christopher	Clinical Psychologist	Sri Lanka
28	Burgess, Dr Craig A.	Medical Officer	Sri Lanka
29	Cabirol, Mr Jean-Claude	Logistician	Indonesia
30	Caney, Mr Paul	Logistician	Malaysia
31	Cardosa, Dr Mary Jane	Laboratory Technician	Indonesia
32	Carver, Mr Jon	Logistician	SEARO
33	Causse, Mr Jean-Francois	Water and Sanitation Engineer	Indonesia
34	Chaignat, Dr Claire-Lise	Medical Officer	Indonesia
35	Chambard-Benalleg, Mrs Valérie, Danielle, Claude	Technical officer	Indonesia
36	Chandra, Dr Vijay	Mental Health	Sri Lanka
37	Chataut, Dr B.D.	Public Health Specialist	Sri Lanka
38	Chatigny, Ms Elaine	Communications Officer	Thailand
39	Chaudhary, Dr Sanjay	Food Safety	Maldives
40	Cheng, Ms Maria	Communication Officer	SEARO
41	Chikersal, Ms Jyotsna	ICT Support	Sri Lanka
42	Chitkara, Mr Anil	Administrative support	Maldives
43	Chow, Dr Jack	Assistant Director General	Indonesia
44	Chu, Dr May	Medical Officer	SEARO
45	Cimetiere, Mr Gilles	Logistician	Indonesia
46	Clemensson, Ms Linda	Administrative support	Thailand
47	Collins, Dr Stuart	Medical Officer	Indonesia
48	Cooray, Dr Navadeva	Planning & Coordination	SEARO
49	Coulombier, Dr Denise	Epidemiologist	Indonesia
50	Courtial, Mr Lionel	Administrative support	SEARO
51	Daher, Mr Nicolas	Logistician	Indonesia
52	Dali, Ms Zarina Mohamed	IT Manager	Indonesia
53	Dayal-Drager, Dr Renu	Scientist	SEARO
54	De Buono, Dr Barbara Ann	Scientist	Indonesia
55	De Goyet, Dr Claude de Ville	Emergency Response Specialist	SEARO
56	De Jong, Mr Jan	Logistician	Malaysia
57	De Mel, Mr Ruwan	Finance Advisor	Sri Lanka
58	Deris, Dr Zakuan Zainy	Lab Technician	Indonesia
59	Desai, Dr Nimesh G.	Mental Health Expert	Thailand
60	Devilliers, MS. Susan	Communications Officer	Sri Lanka
61	Dietz, Mr Robert	Communications	Indonesia
62	Diouf, Mrs Marie-Andre	Director	Sri Lanka
63	Dodd, Ms Rebecca	Communications	Indonesia
64	Dora, Dr Carlos	Environmental Health Specialist	SEARO
65	Doran, Dr Rodger	EPR Focal Point	Indonesia
66	Draeyer, Dr Jurg	Medical Officer	Indonesia
67	Drummond, Dr Christina	Epidemiologist	SEARO

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69	Duriau, Mr Alain	Logistician	Indonesia
70	Edwin, Mrs Sundari	Nursing Service Development	Sri Lanka
71	Eon, Mr Gerard	Logistician	Sri Lanka
72	Farid, Mr Mohamed	Human Resources	Sri Lanka
73	Fevre, Mr Michel	Procurement	Sri Lanka
74	Finger, Dr Willi	Water and Sanitation	Maldives
75	Fric, Dr Anton	Public Health Specialist	Sri Lanka
76	Fuster, Mr Christian	Logistician	Indonesia
77	Gaines, Mr Arthur	Security Officer	Sri Lanka
78	Garg, Dr Renu	Epidemiologist	Sri Lanka
79	Gayer, Dr Michelle	Epidemiologist	Sri Lanka
80	Grein, Dr Thomas	Epidemiologist	Indonesia
81	Grigoryan, Ms Nelli	Budget and Finance	Indonesia
82	Grodman, Mr Randy	Communications	Maldives
83	Grunbuhel Mayrhofer, Mr Philipp	Administrative & Finance Officer	Indonesia
84	Halvorsen, Mrs Dorothy	HR Officer	SEARO
85	Hanshaoworakul, Dr Wanna	Epidemiologist	SEARO
86	Hardy, Mr Derek	Technical Officer	Indonesia
87	Hasibul, Mr Amin	Budget and Finance	Indonesia
88	Heimann, Mr Peter	Scientist	Sri Lanka
89	Heitkamp, Ms Petra	Communications	Indonesia
90	Heymann, Dr David	Planning Technical and Public Health Support	SEARO
91	Holden, Mr Rob	Head of Operations	Indonesia
92	Huda, Mr Md. Shamsul	Flash Appeal Actions Plans	Maldives
93	Hyer, Dr Randall N	Liaison	Thailand
94	Isabelle	Technical Officer	Indonesia
95	Issakov, Dr Andrei	Coordinator	Sri Lanka
96	Isse, Dr Abdinasir	Medical Officer	Indonesia
97	Jacquier, Mr Guy	Epidemic Response Logistician	Indonesia
98	Jain, Mr C P	Budget and Finance	Indonesia
99	Jancloes, Dr Michel	Medical Officer	Indonesia
100	Jauhari, Mr Mohan C	Budget and Finance	Maldives
101	Jerome Pierre, Mr Ferri	Emergency Telecoms engineer	Indonesia
102	Johansen, Mr Staale	Field Security	Indonesia
103	Jovic, Ms Ziza	Logistician	Sri Lanka
104	Kama, Dr Akinori	Liaison	Sri Lanka
105	Kamara, Dr Kande-Bure	Epidemiologist	SEARO
106	Kapila, Dr Mukesh	Coordinator	Indonesia
107	Kattel, Mr Umesh	Emergency Preparedness Specialist	Sri Lanka
108	Keene, Dr William E	Food Safety Specialist	Indonesia

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110	Khalakdina, Dr Asheena	Epidemiologist	Indonesia
111	Khan, Mr Ali	Epidemiologist	Indonesia
112	Khaoya, Ms Janet	Administrative support	SEARO
113	Kitsutani, Dr Paul	Tsunami Disaster Support	SEARO
114	Kolokathis, Dr Antonia	Scientist	Sri Lanka
115	Kone, Mr Ibrahima	Logistician	Maldives
116	Koopmans, Mr Peter	Field Security	Indonesia
117	Kumar, Mr Sanjay	Information Manager (Banda Aceh)	Indonesia
118	Kumari, Dr Sudarshan	Senior Laboratory Specialist	Sri Lanka
119	Kyaw Win, Dr Vijay Nath	EHA Focal Point	Indonesia
120	Ladegaard, Ms trine	Medical Officer	Sri Lanka
121	Lee, Dr Jong-Wook	Director General	Indonesia
122	Legros, Mr Dominique	Epidemiologist	Indonesia
123	Lemarchand, Mr Johan	GIS Expert	Indonesia
124	Lewis, Mr Peter	IT Specialist	Indonesia
125	Lohse, Ms Inge	Project Proposal Writer	Indonesia
126	MacKenzie, Prof John	Epidemiologist	Indonesia
127	Magno, Mr Teodoro	Environmental Engineer	Indonesia
128	Mahoney, Dr John	Mental Health	Sri Lanka
129	Maison, Mr Dominique, Antoine	Water and Sanitation Engineer	Indonesia
130	Mala, Dr Peter Omondi	Epidemiologist	Indonesia
131	Mansour, Dr Mohamed	Nutritionist	Indonesia
132	Martinez, Dr Victor	SUMA Trainer	Indonesia
133	Mathai, Dr Matthews	Medical Officer	SEARO
134	Mattei, Dr Indro	Medical Supplies	Indonesia
135	McMinn, Mr Peter	Lab Technician	Indonesia
136	Meddings, Dr David	Scientist	SEARO
137	Mehta, Mr Vishal	ICT Support	Sri Lanka
138	Mehta, Ms Charu	Budget and Finance	Indonesia
139	Merianos, Ms Angela	Epidemiologist	Sri Lanka
140	Minas, Prof Harry	Mental Health	Indonesia
141	Minas, Prof Harry	Mental Health Expert	Indonesia
142	Mittal, Mr Anuj	ICT Support	Sri Lanka
143	Mittar, Mr Jagdish	Budget and Financial nalyst	SEARO
144	Moe, Mr Asbjorn	Field Security	Indonesia
145	Mokbel, Dr	Nutritionist	SEARO
146	Molines, Mr Cyril	Network Administrator	Indonesia
147	Nabarro, Dr David	Director	SEARO
148	Nafo-Traore, Dr Fatoumata	Director	Indonesia
149	Namgyal, Dr Pem	Public Health Specialist	Indonesia

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Sno	Name	Post Title	Country Visited
150	Nangpal, Mr Rajeev R.	Administrative Officer	Sri Lanka
151	Narain, Dr Jai P	Coordinator, Communicable Diseases	SEARO
152	Newgreen, Mr David	Water and Sanitation Engineer	Indonesia
153	Norremark, Mr Erik	Water and Sanitation	Indonesia
154	Noury, Mr Dominique	Logistician	Indonesia
155	Nyoman, Dr Kandun	Epidemiologist	Maldives
156	Omobono, Dr Elio	Disaster & Emergency Management Expert	Myanmar
157	Padmasiri, Dr E. A.	Response activities	Maldives
158	Pandav, Dr Rajesh	Mental Health	Maldives
159	Partow, Mr Ahmad	IT Specialist	Sri Lanka
160	Peeler, Dr Norman	Medical Coordinator	Indonesia
161	Penrose, Mr Mike	Head of Operations	Indonesia
162	Perroud, MS. Valerie	Logistician For Cholera Mass Vaccination	Indonesia
163	Pesigan, Mr Arturo	Emergency Management Specialist	Indonesia
164	Petit, Mr Christophe	Logistician	Indonesia
165	Phaik, Dr Hooi Tio	Dengue Virologist	Indonesia
166	Pierson, Dr Antoine	Laboratory	Sri Lanka
167	Pieters, Mr Jules, Hendrikus	Coordinator	SEARO
168	Pillot, Mr Jean Christophe	Logistician	Indonesia
169	Pinto, Dr Augusto	Epidemiologist	Sri Lanka
170	Podin, Dr Yuwana	Laboratory Technician	Indonesia
171	Pole, Dr Denham	Public Health Specialist	Sri Lanka
172	Pooransingh, Dr Shalini	Epidemiologist	Maldives
173	Pott, Mr John	Logistician	Indonesia
174	Powell, Mr Christopher	Communications	Indonesia
175	Presthus, Mr Garry	Manager	Indonesia
176	Profili, Dr Christina	Epidemiologist	Thailand
177	Prohom, Mr Remy	Logistician	Sri Lanka
178	Prosser, Ms Susan	Mental Health Specialist	Indonesia
179	Puri, Dr S.	Coordinator	Maldives
180	Qiyong, Dr Liu	Epidemiologist	Sri Lanka
181	Raich, Dr Hans Dettev	EHA Coordination	Sri Lanka
182	Rana, Dr Bardan Jung	Surveillance and Reponse	Indonesia
183	Rastogi, Dr Rakesh Mani Mani	Statistical	Indonesia
184	Reddy, Mr Vijayander B.	Administration and Logistics	Sri Lanka
185	Reed, Dr Robert Anthony	Water and Sanitation Engineer	Sri Lanka
186	Riedweg, Mrs Catherine	Human Resources	SEARO
187	Rooney, Ms. Roisin Monica	Water, Sanitation and Environmental Health	Maldives
188	Rosenbauer, Mr Oliver	Communication Officer	SEARO
189	Rosenberg, Mr Hernan	Budget and Finance	SEARO
190	Rosliza, Ms Rahman	Lab Technician	Indonesia

*This list includes only experts/WHO staff deployed to the field. It does not include WHO Country Office staff base in the countries

Sno	Name	Post Title	Country Visited
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192	Rustanowicz, Mr Michal	IT Specialist	SEARO
193	Salunke, Dr Subhash	Medical Officer	SEARO
194	Salvador, Mr Frank	IT Specialist	Indonesia
195	Salvi, Ms Cristiana	Communication Officer	SEARO
196	Santaniello-Newton, Dr Autilia	Communicable Disease Specialist	Indonesia
197	Sanyasi, Dr Antheams	Health Emergency Planning Advisor	SEARO
198	Saraceno, Dr Benedetto	Mental Health	Indonesia
199	Sardana, Mr Satya Paul	Administrative Officer	Thailand
200	Saunders, Mr Andrew	Tsunami Disaster Support	SEARO
201	Saxena, Mr Shekhor	Mental Health	Sri Lanka
202	Say, Mr Colin, Edward, Parrish	Logistician	Indonesia
203	Schmitt, Dr Roger	Infrastructure Planning and Technology Rehabilitation	Sri Lanka
204	Schnitzler, Dr Johannes	Epidemiologist	SEARO
205	Sharma, Dr Anuj	Clinical Microbiologist	Sri Lanka
206	Sharma, Mr Sandeep	IT Specialist	Sri Lanka
207	Sherratt, Ms Della	Nursing and Midwifery	SEARO
208	Shibib, Dr Khalid	Medical Officer	SEARO
209	Siddique, Dr Abu Bakr	Communicable Disease Surveillance	Sri Lanka
210	Sieber, Dr Niklaus	Water and Sanitation	Maldives
211	Skold, Ms Margareta Patricia	External Relations Officer	Sri Lanka
212	Smith, Ms Angela Theresa	Fund Portfolio	Sri Lanka
213	Smyth, Mr Garry	Video Technician	Indonesia
214	Soper, Mrs Paula	Human Resources	SEARO
215	Sorensen, Dr Eigil	Head of Operations	Indonesia
216	Sparringa, Dr Roy Alexander	Food Safety Consultant	Maldives
217	Spivey, Dr Paul David	Essential Medicines	Maldives
218	Sreedharan, Dr Rajesh	Epidemiologist	SEARO
219	Staples, Mr Mark	IT Specialist	Indonesia
220	Starega, Dr Tomasz	Medical Officer	Indonsia
221	Stephenson, Mr Howard William	Administrative Officer	Indonesia
222	Stewart , Dr Antony P	Epidemiologist	Indonesia
223	Subramanyan, Mr Sankaranarayana	Planning & Coordination	SEARO
224	Suebsaeng, Ms Laksami	Monitoring Outbreak of Diseases	Thailand
225	Sundaram, Mr Ganesan	Finance Officer	Sri Lanka
226	Suwonkerd, Dr Wannapa	Entomologist	Sri Lanka
227	Suzuki, Dr Nahoko	Tsunami Disaster Support	SEARO
228	Tacconi, Mr Emanuele	Logistician	Indonesia
229	Tassie, Dr Jean Michel	Epidemiologist	Indonesia
230	Taylor, Mr Anthony	Logistician	Indonesia
231	Tewari, Dr K.N.	Medical Officer	Sri Lanka

*This list includes only experts/WHO staff deployed to the field. It does not include WHO Country Office staff base in the countries

Sno	Name	Post Title	Country Visited
232	Thieren, Mr Michel	Strategy for Strengthening Health Systems	SEARO
233	Thompson, Mr Dick	Communication Officer	SEARO
234	Thwin, Dr Khin	Hospital Management Information System	Sri Lanka
235	Tomaszek, Mr Michel	Logistician	Indonesia
236	Uggowitzer, Mr Steven	Field Office ICT Staff	Indonesia
237	Van Alphen, Dr Dana	Head of Operations	Indonesia
238	Vanquaille, Mr Peter	Logistician	Sri Lanka
239	Vasquez , Dr Roberto Cascante	SUMA Trainer	Indonesia
240	Vaz, Mr Gregory	Administrative Officer	Indonesia
241	Vedanarayanan, Mr S.	Planning & Coordination	SEARO
242	Villedieu de Torcy, Mr Raoul, Tarcicius	Logistician	Indonesia
243	Viputsiri, Dr Ong Arj	Public Health Specialist	SEARO
244	Wadia, Dr Roy	Communication Officer	Sri Lanka
245	Wagenaar, Dr Jacob, Anthony	Public Health Specialist	Indonesia
246	Wah, Dr Lim Teong	Laboratory Specialist	Sri Lanka
247	Waheed, Dr Abdullah	Health Systems Specialist	SEARO
248	Waheed, Dr Abdullah	Administrative Officer	Thailand
249	Waldman, Mr Ronald	Coordinator	Indonesia
250	Watson, Dr John	Epidemiologist	Indonesia
251	Weise Prinzo, Ms Zita	Nutritionist	SEARO
252	Wertsching, Mr. Brian	Team Leader, Human Resources	SEARO
253	Wheeler, Dr Erica	Mental Health	Indonesia
254	Wheeler, Dr Mark	Resource Mobilization	Indonesia
255	Wheeler, Mr David	Medical Supplies	SEARO
256	Woodruff, Mr Brad	Epidemiologist	Sri Lanka
257	Wuite, Mr Roel	Administrative support	Thailand
258	Yeneabat, Dr Ayana	Epidemiologist	SEARO
259	Yonas, Dr Tegegn	STP	SEARO
260	Yoosuf, Dr Abdul -Sattar	Director	Sri Lanka
261	Yusof, Dr Mohd. Apandi	Laboratory Technician	Indonesia
262	Zipperer, Ms Melanie	Communications	Indonesia

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Annex 8

Dengue Fever Risk Assessment: Indonesia, February 2005

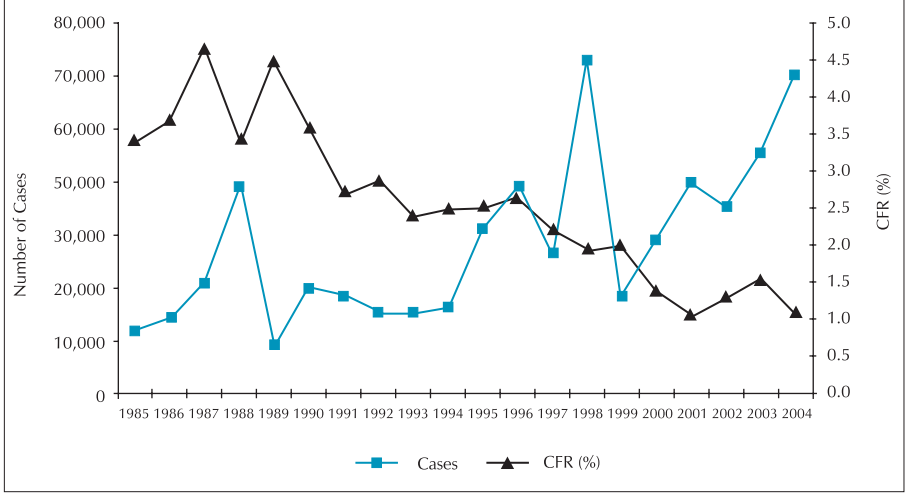
Dengue fever (DF) with its severe manifestations such as Dengue Haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) is currently of major public health concern in the South East Asia region. Global estimates indicate that at least 100 countries are endemic for DHF and about 40% of the world population (2.5 billion people) are at risk in the tropics and sub-tropics. Over 50 million infections are reported annually. About 400,000 of the cases reported are of DHF, which causes high childhood mortality in several Asian countries. All countries affected by the Tsunami are endemic to dengue.

In Indonesia dengue is a major annual public health problem causing cyclical epidemics in urban centres. The disease is a leading cause of hospitalization and death among children. Epidemics have been consistently documented to occur between January and June. Attack rates among susceptibles are often 40 - 50%, but may reach 80 - 90%. The maximum cases recorded during epidemics in previous years were over 40,000 in 1988, 1996,1998,2001,2003 and 2004, reaching 72,133 in 1998 and 69,017 in 2004.

During the inter-epidemic years the incidence varied from 10,000 to 25,000 cases. The case fatality rate was high - up to 4.6 in 1987 and fluctuated between 2 and 3 per cent in 1991-1999. It has been less than 2 per cent since 2000, and lowered to 1.12 in 2004* (data to end of August 2004).

DEN-3 has been observed to be the predominant circulating virus serotype; DEN- 4, DEN-2 and DEN-1 have also been confirmed in samples taken from patients during previous epidemics.

Number of cases reported to WHO/SEARO and
case fatality rates of DF/DHF in Indonesia (1985-2004*)



Laboratory confirmed cases of dengue were reported from the provinces of Aceh, Jambi, Banten, West Java, Central Java, Yogyakarta, East Java, South Kalimantan, Bali, West Nusa and Tenggara East Nusa in 2004.

Prevention and control of epidemic dengue requires effective control of *Ae. aegypti*. These efforts should ideally be intensified ***before*** the transmission season (during and after the rainy season) rather than on response measures. There is no specific medical treatment for the disease. However, fatalities are rare in the absence of the more severe dengue haemorrhagic fever. Without proper treatment, DHF case fatality rates can exceed 20%. Early treatment with intensive supportive therapy can relieve symptoms, prevent complications and reduce death rates from DHF and DSS to less than 1%. There is presently no vaccine recommended for public health use against dengue infection.

Post-tsunami risk for dengue in Indonesia.

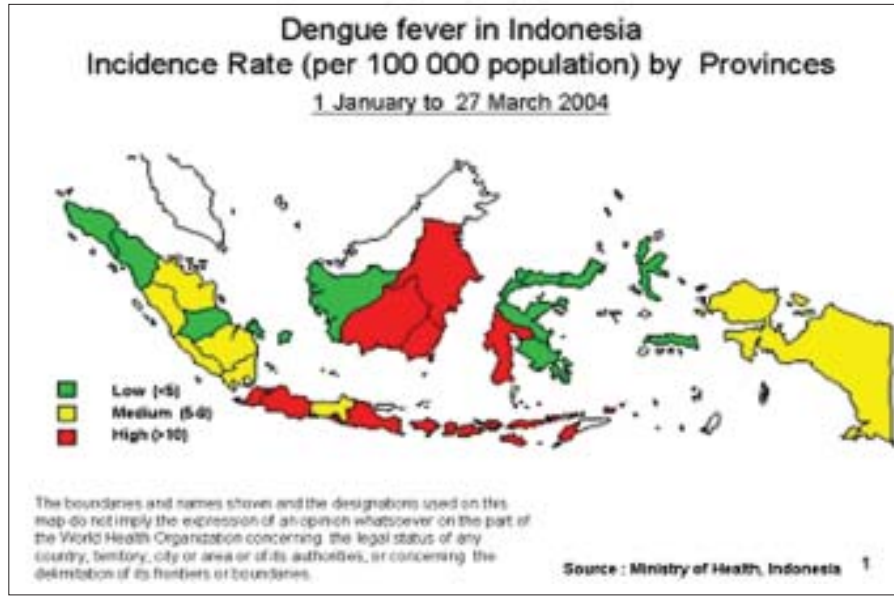
Though ecological and climatic factors influence the seasonal prevalence of the dengue mosquito vectors, factors related to human ecology in internally displaced persons camps determine the extent and intensity of vector breeding. In temporary shelters where drinking water comes from outside sources or from rainwater harvesting, there is an increased tendency to store drinking water in containers that may become breeding places of *Ae. aegypti* (and to a lesser extent of *Ae. albopictus*). Accumulation of rainwater in containers and

other items of debris rapidly become *Aedes* breeding sites. Interruption of vector control activities in the area following the tsunami emergency has increased the risk of the disease.

Cases of dengue are currently being reported to various national authorities in the South Asia region. The Jakarta Health Agency has reported a steadily increasing number of cases in Jakarta. Since December 2004, at least 14 people have died and around 1,000 others fallen sick from dengue haemorrhagic fever in Jakarta, Bekasi, Tangerang, and Depok. Health officials have warned that unless precautionary measures are undertaken, the disease would continue to spread rapidly during this season.

Preliminary field assessments of dengue risk conducted in Banda Aceh by WHO and partners found no significant vector populations in the devastated area, at present attributed to persistent salt water pollution and lack of human hosts in the immediate vicinity. However, at the edge of areas affected by tsunami-related floods. Aedes vectors of dengue were observed biting and larvae were collected from container habitats. The presence of dengue vectors in this environment is as expected; the risk of dengue is ever-present, irrespective of the tsunami event.

Health centers are essential as an alert network and for early diagnosis and treatment of suspected cases. Through reporting by health care agencies



into WHO/MOH Indonesia disease surveillance system established in Aceh two cases and one death have been documented. A case of dengue fever (IgM positive, DEN-4) is presently admitted to German Offshore Hospital with hemorrhagic symptoms from Aceh Utara district (6 hours driving distance east of Banda Aceh).[1]

The control of dengue represents a major challenge to those providing health care services in the tsunami affected areas. While the focus remains on acute relief efforts in Aceh province, rehabilitation and reconstruction are gaining momentum in other tsunami affected areas of Indonesia. WHO is working with local and international health partners to facilitate implementation of recommended vector control measures, promote public health education, strengthen the clinical care systems for dengue case management, improve hospital preparedness, initiate training of health care personnel for clinical case management and provide guidance in dengue fever management in patients.

There is therefore an urgent need to further strengthen disease surveillance and improve rapid emergency response capability to contain outbreaks in the entire country.

- WHO recommended vector control measures should be instituted immediately and rigorously sustained over the main dengue transmission season from January through June.
- Particular emphasis should be placed on enhancing local disease surveillance, epidemic preparedness and response capacities to detect, prevent, control and treat dengue in the tsunami affected areas.
- Health care providers and the general population should be sensitized about the current dengue risk and personal protection measures.
- Administrative efforts should facilitate the population's access to prompt and effective clinical care, particularly for the internally displaced persons in the tsunami affected areas.

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Annex 9

Aceh Epidemic Alert and Response Update 7 April 2005

Surveillance and Epidemic Response

Weekly surveillance

No unusual clusters of communicable diseases in Aceh were evident during week 13 (28 March - 2 April). The incidence of communicable diseases under surveillance appears to be stable or decreasing. During week 13, there were 42 total reporting units participating, reporting 4,817 total consultations. Overall reporting activity is decreasing as the emergency phase concludes.

Alerts

29 suspected **measles** were reported in Lampoh Rayeuk Camp, Aceh Timur (23 cases); Mesjid Samahani Camp (5 cases), Aceh Besar; and Panga, Aceh Jaya (1case). DHO and PHO investigated. Blood samples were collected from 3 new cases and 2 of the samples were Rubella IgM+ve.

1 cases of **acute jaundice syndrome** was reported in Peureeme Camp, Aceh Barat. Blood sample awaiting transportation to Provincial Public Health Laboratory (Libangkes) from Meulaboh.

Nias Island

An emergency system of surveillance for epidemic-prone diseases is being initiated on **Nias Island**. Mohammad Rijadi, John Watson, and David Bradt, have been contributing to this effort. More information will be forthcoming.

Programmatic

CDC/PHO

- WHO Banda Aceh continues to work with WHO Jakarta regarding the PHO surveillance proposal and the Provincial Public Health laboratory proposal.
- Plans are being finalized for Dr. Mohammed Youssef to begin as Provincial Public Health laboratory focal point in Banda Aceh. He will coordinate the laboratory effort in Banda Aceh and in Meulobah.

WHO Disease Surveillance and Prevention Team

Epidemiology group

Banda Aceh

- Nandar (Indonesian medical student; hospital surveillance)
- Laila Kusumawati (Indonesian FETP officer; case investigation)
- Peter Mala (Surveillance, alert and response, data mgmt)

Nias

- Mohammed Rijadi, NPO (data mgmt, MoH liaison)
- John Watson (Team coordinator)

Meulobah

- Norman Peeler (medical coordinator)

Calang

- David Bradt (medical coordinator)

Malaria Control

- Hadi Suwasono (entomology)
- Putut Djokopitoyo (entomology)
- Muhammad Asri Amin (epidemiology)

Staff movements

- John Watson (To Banda Aceh, 9 April)
- Peter Mala (R and R, 8-15 April)

ADEK BERRY—AFP/GETTY IMAGES

ON TARGET: Early fumigations have halted insect-borne disease

A Pound of Prevention

Public-health workers have done a remarkable job of averting epidemics since the tsunami struck

By BRYAN WALSH

THE DEATH TOLL FROM THE ASIAN tsunami rose sharply last week when Indonesia's Health Ministry moved 50,000 of the people on its missing list to the fatalities column, bringing the total there to 166,320. Although the waves have long receded, the tsunami still threatens. For survivors in crowded, unsanitary refugee camps, normally treatable illnesses such as cholera, dysentery, malaria and measles can quickly become mass murderers. So great is the danger that Dr. David Nabarro, the World Health Organization's (WHO) head of crisis operations, initially warned that the death toll from disease could rival that of the tsunami itself.

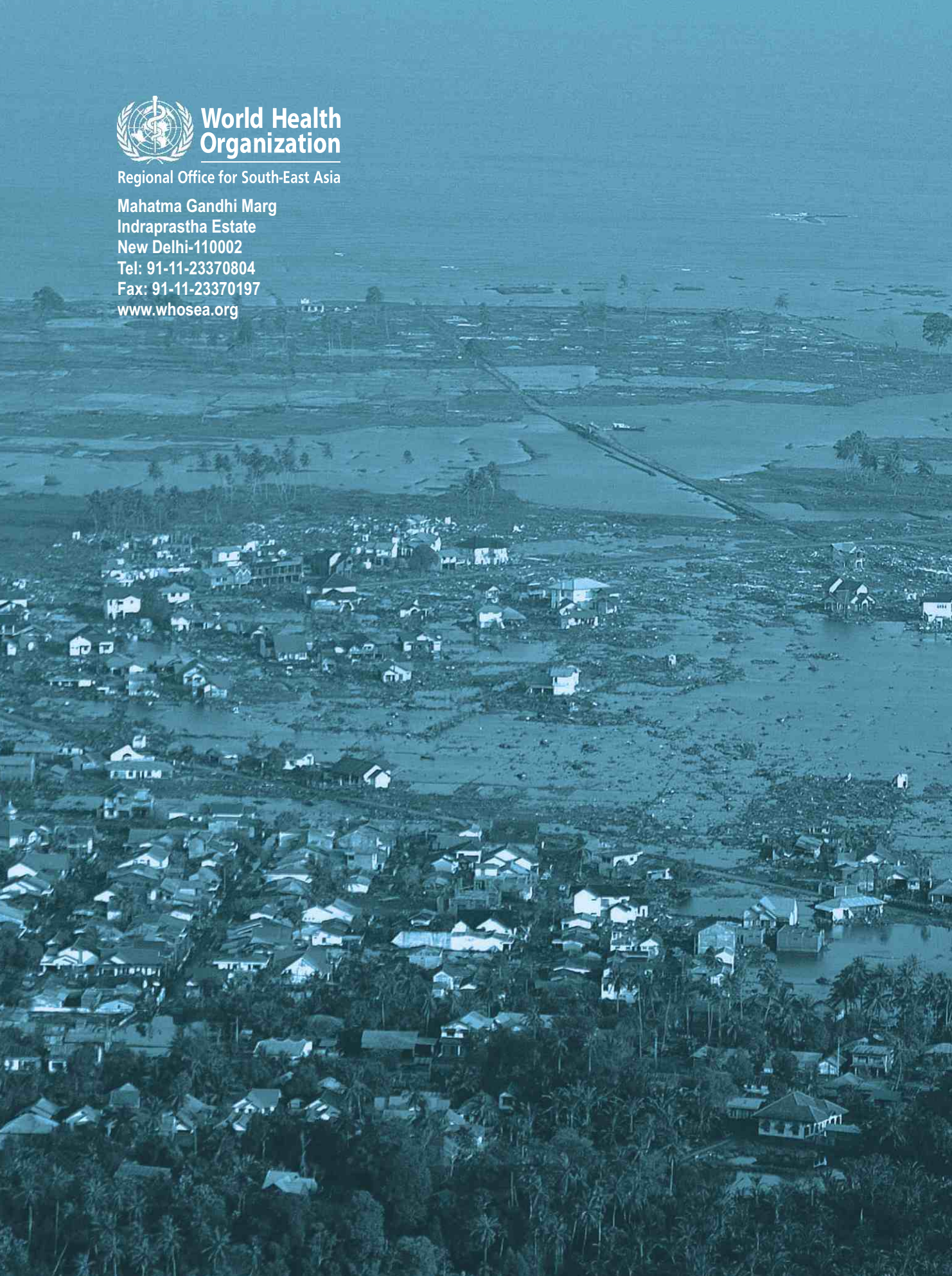
Yet almost a month after the tsunami hit, those feared epidemics have yet to strike. Waterborne diarrheal diseases have been staved off through good sanitation and hygiene, aggressive insecticide use has kept malaria and dengue fever to a minimum, and meticulous surveillance has contained contagious illnesses. The battle against disease isn't over, but the medical response to the tsunami is shaping up to be a surprising success story for the field of emergency public health. "The situation is still evolving, still dynamic, but I think we are well prepared," says Dr. Jai Narain, the WHO's Southeast Asia regional adviser for communicable disease. "Even if an outbreak occurs, we would be able to respond to it very effectively."

In the heroic world of disaster relief, public-health workers are the plumbers. But their line of unglamorous pipe work has saved an untold number of lives. The waves that destroyed entire towns also fractured sewage pipes and fouled drinking water wells, leaving the water supply of tsunami-affected areas contaminated with seawater, garbage and human waste. The first order of business was to ensure a steady supply of clean drinking water, at least 18 liters a day per person, and to create a passable sanitation system—building latrines away from refugee camps, and promoting proper hygiene among survivors—to prevent illnesses like cholera. The disease is transmitted through water contaminated with cholera-carrying human feces. If a refugee camp's water becomes tainted, the disease can spread geometrically, making it one of the great killers of disaster survivors. In the 1994 Rwanda refugee crisis, cholera took some 45,000 lives in less than three weeks. "Water sanitation is and remains priority number one," says Dr. Dana Van Alphen, the WHO's team leader in Banda Aceh. In Aceh, much of which remained partially flooded after the tsunami, teams built raised latrines to prevent waste from contaminating the water used by refugee camps. Medical workers were also quick to spray camps for mosquitoes, which transmit malaria and dengue fever. These diseases are endemic to the region, especially at this time of the year, and the brackish pools of water left by the tsunami are perfect breeding grounds for the insects.

Beyond simple sanitation, the essence of good public health is meticulous data collection—finding and snuffing out the sparks of disease before they become the fire of an epidemic. "You have a heightened need for information," says Dr. Ronald Waldman, an emergency public-health expert at Columbia University who helped set up the WHO's disease surveillance program in Indonesia. Waldman and his team quickly passed out detailed surveillance forms to all health agencies working in Aceh, asking them to report any cases they found of diseases that could turn into epidemics. The morning after the early warning system was set up, Waldman received a report of measles in a refugee camp near Banda Aceh. A highly contagious disease that can spread rapidly, measles was responsible for more than half of the deaths in the Sudan refugee crisis in 1985. Waldman's team confirmed the cases and had scores vaccinated before the end of the day. "We were on top of the trends occurring beneath the radar screen," he says. "The cooperation we got was terrific."

> "THE SITUATION IS STILL EVOLVING, BUT I THINK WE ARE WELL PREPARED."
> DR. JAI NARAIN, WHO regional adviser

Every public-health victory is precarious; the slightest drop in watchfulness can open the door tomorrow for the epidemic that was stymied today. "We don't have measures for success," says Van Alphen. "We only have measures for failure." But for the thousands of survivors still alive today because of those efforts, even a temporary victory is a kind of miracle. Says Waldman: "The fact that nothing has happened so far to worsen the plight of this population that has been so extraordinarily traumatized is something that people should take real pride in." If vigilance is maintained until villages are rebuilt and the camps are emptied, the wave of death will at last recede. ■



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