Communicable Disease Control After Natural Disasters

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A Webber Training Teleclass

Communicable disease control after natural disasters

British Teleclass Lecture Series

Hosted by Paul Webber paul@webbertraining.com

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Programme on Communicable Diseases in Emergencies

WORLD HEALTH ORGANIZATION

Definitions

Emergency:

A serious situation or occurrence that happens unexpectedly and demands immediate action.

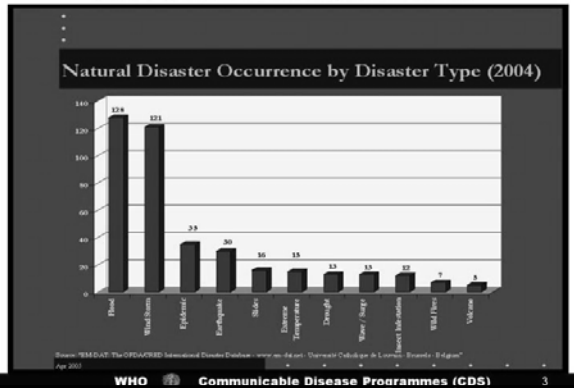
Complex Emergencies

"……are situations affecting large civilian populations, usually involving a combination of war and civil strife, food shortage and population displacement, **resulting significant excess mortality and morbidity**"....(WHO)

Natural disasters

any event or force of nature that has catastrophic consequences, such as avalanche, earthquake, flood, forest fire, hurricane, tornado, tsunami, and volcanic eruption.

Most common natural disasters



FACTS: Disaster deaths

- In the immediate aftermath of a disaster, most deaths are due to trauma and drowning.
- Communicable Diseases (CD) are caused mostly by secondary effects/conditions and NOT by the primary hazard.

The importance of CDs in Emergencies and Disasters

- Disaster-affected people are particularly vulnerable when:
  - Post-disaster living conditions are precarious and unsanitary.
  - The disaster's immediate consequences reduces resistance to disease - such as malnutrition, stress, fatigue.
- The FIVE most common cause of death are diarrhoeal diseases, acute respiratory tract infections, measles, malnutrition and malaria (in endemic zones).
  - All – except malnutrition – are CD and directly related to environmental conditions.

Disaster death tolls

Top 10 by number of deaths

Tsunami (December)	12 countries affected	280,931
Hurricane Jeanne (September)	Haiti	2,754
Flood (May-June)	Haiti	2,665
Tropical storm Winnie (November)	Philippines	1619
Flood (June-August)	India	900
Flood (June-August)	Bangladesh	730
Flood (May-June)	Dominican Rep	688
Dengue Epidemic (January-April)	Indonesia	658
Earthquake (February)	Morocco	628
Meningitis epidemic (January - March	Burkina Faso	527
Cyclone Galifo (March)	Madagascar	363

Most common types of disasters

Top 10 by number of affected

Flood (July)	China P Rep	33,652,026
Flood (June-August)	Bangladesh	36,000,000
Flood (June-August)	India	33,000,000
Typhoon Rananim (August)	China P Rep	8,594,000
Flood (September)	China P Rep	8,253,000
Drought	South Africa	4,000,000
Drought	Kenya	2,300,000
Cold wave (July)	Peru	2,137,467
Typhoon Aere (August)	Philippines	1,058,849
Cyclone Galifo (March)	Madagascar	988,139

The water effect

Most common type of natural disasters have a water effect :

- avalanches
- earthquakes – causing river re-routing and/or damming of rivers
- mud slides
- typhoons
- tsunamis
- volcanic eruptions
- melting glaciers

All of the above result in **FLOODING**

Common consequences of the "water effect" in natural disasters

- **Breakage** of water mains; **overflow** of sewerage systems; **interruption** of electric supplies for water pumping stations; **salination** of water supplies; **stagnation** of water/pools; (**unearthing** of dangerous objects/landmines).
- **Flooding** potentially increase the transmission of the following communicable diseases:
  - **– water-borne diseases, such as cholera and other diarrhoeal diseases, hepatitis A, leptospirosis and typhoid fever;**
  - **– vector-borne diseases, such as dengue and dengue haemorrhagic fever, scrub typhus, malaria, West Nile fever and yellow fever.**

Water borne diseases (I)

Risk is low unless:

1) there is significant population displacement with overcrowding

Of the 14 major floods occurred globally between 1970 and 1994:

- only one led to a major diarrhoeal disease outbreak (Sudan, 1980).
- led to a large cholera epidemic (01,El Tor, Ogawa) (West Bengal, 1998)
- led to an increase in the incidence of diarrhoea (Mozambique, Jan – Mar 2000)

Water borne diseases (II)

Risk is low unless:

2) and/or water sources are compromised

- A typhoon in Truk District, Trust Territories of the Pacific, in 1971 disrupted catchment water sources and forced people to use many different sources of groundwater that were heavily contaminated with pig faeces ⇒ outbreak of balantidiasis.
- In Tajikistan in 1992, the flooding of sewage treatment plants led to the contamination of river water.
- contamination of drinking-water facilities in Iowa and Missouri (USA) in 1993.

Vector borne diseases (I)

- **Standing-water caused by heavy rainfall or overflow of rivers act as breeding sites for mosquitoes**
  → enhance potential for exposure of the disaster-affected population and emergency workers to infections such as dengue, malaria and West Nile Fever.
- **Flooding may initially flush out mosquito breeding, but it resumes when the waters recede.**

• West Nile fever has resurged in Europe subsequent to heavy rains and flooding, with outbreaks in Romania in 1996–1997, in the Czech Republic in 1997 and in Italy in 1998.

Vector borne diseases (II)

Travel note:

Malaria outbreaks in the wake of flooding are a known phenomenon in malaria-endemic areas worldwide.

- an earthquake and subsequent flooding in Costa Rica's Atlantic region in 1991 and flooding in the Dominican Republic in 2004 led to malaria outbreaks.
- Periodic flooding linked to El Nino-Southern Oscillation (ENSO) is associated with malaria epidemics in the dry coastal region of northern Peru, and with the resurgence of dengue in the past 10 years throughout the American continent.

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Factors increasing risk of CDs after natural disasters (I)

1. **Post-disaster living conditions**
   - Loss of shelter
   - Overcrowding
   - Temporary accommodations without adequate ventilation
2. **Minimal provision of basic needs**
   - Disruption of public utilities (e.g. electricity, water and sewage treatment)
   - Lack of sufficient, safe water
   - Inadequate sanitation
   - Lack of food (leading to malnutrition and weakened immunity)
   - Inadequate facilities for personal hygiene
   - Lack of soap

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Factors increasing risk of CDs after natural disasters (II)

3. **Pre-disaster conditions**
   - Population density in cities
   - Absence of poverty reduction/community development initiatives;
   - Relatively low levels of immunity;
   - High proportion of children;
   - High levels of malnutrition;
   - Low levels of vaccination coverage
   - Population displaced from low to high endemic area (eg malaria)
4. **Human behaviour**
   - increased exposure to disease vectors (mosquitoes, fleas, lice) while sleeping outside or in crowded conditions
   - lapse in preventive activities – such as hand washing, boiling of drinking water, vector larviciding, rodent control etc.

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Priority CD control measures in disasters (I)

Short term measures

1. Provide **safe water and sanitation**
2. Provide **food and shelter**
3. Protect susceptible groups through **vaccination**: mass measles vaccination is priority; recommended vaccinations for expatriates.
4. Institute **vector control** measures
5. Control **animal reservoirs**
6. **Health education** re: safe water & food, excreta disposal, hygiene & hand washing
7. **Surveillance / early warning and response system** for rapid detection and response to CD outbreaks
8. Prompt and effective **clinical case management**
9. Appropriate **handling of corpses**

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CDs and Corpses: the real risk

- **The risk that dead bodies pose for public health is very small**
  - **the living pose a greater risk!**
- **Victims of natural disasters usually die from trauma and are unlikely to have "epidemic- causing" infections.**
- **However observe universal precautions for persons involved in close contact with human remains.**
  - **may be exposed to chronic infectious hazards – including hepatitis B, hepatitis C, HIV, enteric pathogens and Tuberculosis.**

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Priority CD control measures in disasters (II)

Long term measures

- **Legislative and administration issues:** disaster committee functions/activities, water quality and quantity regulations.
- **Technical issues**: update and update guidelines/protocols accordingly.

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Preparedness
Key to CD control in disasters

- Risk assessment of disease threats
- Standard & locally adapted guidelines & tools for CD control →
- Strengthening disease surveillance and response systems.
- Raising community awareness among populations likely to be affected by disasters.
- Training of health and outreach staff on CD case identification and management.
- Pre-positioning local stocks of supplies and equipment for CD diagnosis/treatment and outbreak control.

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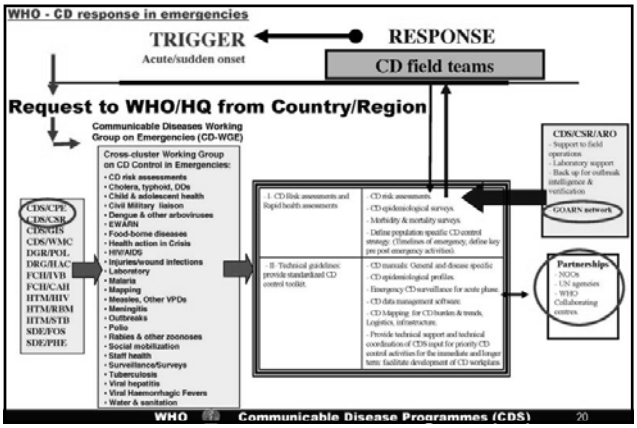

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WHO CD response (I)
Example post-tsunami 2005

1. **Technical guidelines and tools**

available at: www.who.int/infectious-disease-news/ and www.who.int/csr and www.who.int/hac/techguidance/pht/comdisease/en/index.html

- Flooding and communicable diseases – WHO fact sheet
- CD risk assessment and interventions – WHO technical note
- Communicable Disease Control in Emergencies – WHO Field Manual
- WHO CD toolkit for Tsunami-affected areas:
  - *CD profile for Indonesia 2005*
  - Surveillance/EWARN guidelines, Outbreak management and supplies, health assessment forms, guidelines for laboratory specimen collection.
  - Electronic system for data entry & analysis including mapping (Health mapper, Arc View)

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WHO CD response (II)
Example post-tsunami - Indonesia, 2005

2. **CD field teams**
   - Epidemiologists, laboratory experts, logisticians, food safety, disease-specific experts
   - Implement Surveillance/Early Warning and Response, incl. laboratory facilities, conduct outbreak investigation and control activities
   - Technical co-ordination by CD field teams in WHO Country offices
   - Agree appropriate package of CD interventions (eg malaria, dengue) based on CD country epidemiological profiles
   - Technical support for proposal development and implementation
   - WHO/MOH Weekly bulletins: feedback to NGOs, and other international partners.
   - Onsite training

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Disease surveillance – a priority for CD control in emergencies

- As soon as possible
- Only principal health problems during emergency phase
- Limit to public health matters which can and will be acted upon
- Keep simple and flexible to respond to new health problems
- Keep data analysis at level where action occurs (field)

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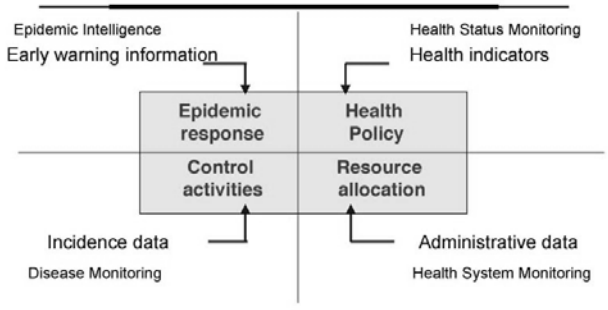
Public Health Surveillance
Different Objectives, Different Data, Different Methods



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Objectives of Disease Surveillance

- Detect communicable disease outbreaks requiring immediate action
- Monitor communicable disease trends in order to take appropriate PH action
- Monitor workload at health facilities to optimise allocation of resources

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Objective of Early Warning Surveillance

- To predict, detect and confirm outbreaks of public health importance in a timely fashion and to disseminate that information to those who need to know so that effective public heath action can be taken

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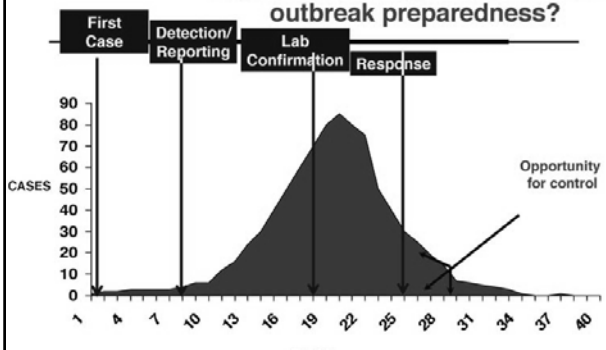
Why early warning surveillance and outbreak preparedness?



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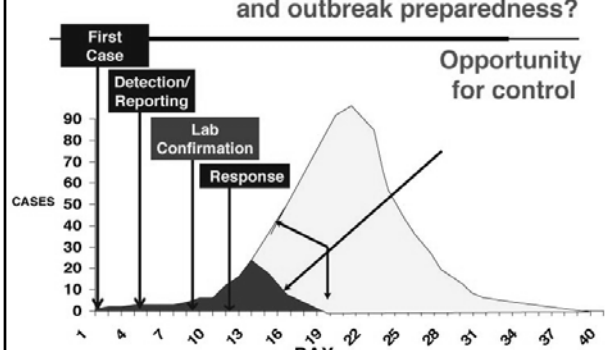
Why early warning surveillance and outbreak preparedness?



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Attributes of effective surveillance/early warning and response system

- Close collaboration with authorities and partners from the start – create network
- Small number of priority diseases
- Syndromic reporting
- Simple case definitions
- Processes for dealing with alerts ("rumours")
- Rapid case investigation and sampling
- Rapid laboratory confirmation
- Standard procedures for information sharing and initiation of response
- Preparedness plans in place

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Before implementing surveillance/early warning and response system

- In collaboration with MOH and partners:
  - Set surveillance priorities
  - Agree on
    - Objectives
    - Case definitions for diseases
    - Thresholds for action
  - Identify responsible persons / tasks

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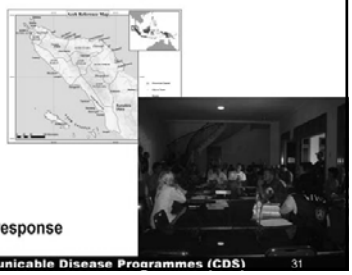
Key components of surveillance/early warning and response system

- Population under surveillance
- Data to be collected / attributes of surveillance system
- Data providers
- Data flow
- Periodicity
- Reporting period/method
- Data analysis
- Feed-back
- Laboratory facilities
- Outbreak preparedness
- Outbreak investigation and response



Post-tsunami surveillance/early warning and response - Aceh province 2005

- Population = Residents and IDPs
- Data to be collected / attributes of system
  - Sensitive:
    - Syndrome-based
  - Simple:
    - Morbidity (cases) and mortality (deaths)
    - Epidemic-prone diseases
    - Diseases of major morbidity and mortality
    - 12 reportable events (+2 additional for IPD) →
    - 2 age groups <5 and ≥5
    - Standardised form with case definitions agreed with PHO and all partners

- Total deaths
- Total consultations
- Pregnancy-related death
- Neonatal death
- Acute watery diarrheoa
- Acute bloody diarrhoea
- Suspected measles
- Confirmed malaria
- Acute jaundice syndrome
- ARI
- Suspected meningitis
- Other fever (>38.5°)
- (Tetanus)
- (Trauma/Injury)

Outpatient weekly surveillance form

A. Outpatient WEEKLY Surveillance Reporting Form
Morbidity (disease) and Mortality (death)
Bring to Provincial MOH or to WHO Office every Monday

Aceh Province District: Sub district:
Town/Village/Settlement/Camp: .....
Population size < 5 years ..... >= 5 years .....
Type of Health Facility: Fixed:
Mobile with fixed catchments
Mobile with varying catchments
Supporting agency: .....
Name and telephone number of reporting officer: .....

Week from Monday: ____/____/2005 to Sunday____/____/2005

	Report the number of CASES	MORBIDITY (cases) <5 years	MORBIDITY (cases) ≥5 years	MORTALITY (deaths) <5 years	MORTALITY (deaths) ≥5 years
A	TOTAL CONSULTATIONS				
B	TOTAL DEATHS				
C	Pregnancy related death				
D	Neonatal deaths (<28 days)				
E	Acute watery diarrhoea				
F	Bloody diarrhoea				
G	Malaria conf by rapid test				
H	Other Fever (>38.5°				
I	Suspected Measles				
K	Acute respiratory infection				
L	Acute jaundice syndrome				
M	Meningitis				

- Write 0 (zero) if you had no case or death during the week for one of the syndrome listed in the form.
- Deaths might have occurred in the health facility or might have been reported from the community.
- Be careful to report only the deaths that occurred during the week.
- Deaths should be reported only in the mortality section. NOT in the morbidity section.

Case definitions for surveillance are presented on the back.

B. OUTBREAK ALERT

At any time you suspect any of the following diseases, you should alert the Surveillance Coordination by sending an SMS or phone to 0813 1716 7965 (Indonesian) or 0813 1949 6754 (English), with maximum information on time, place and number of cases and deaths.

Acute watery diarrhoea / Cholera Bloody diarrhoea Measles Increase in malaria

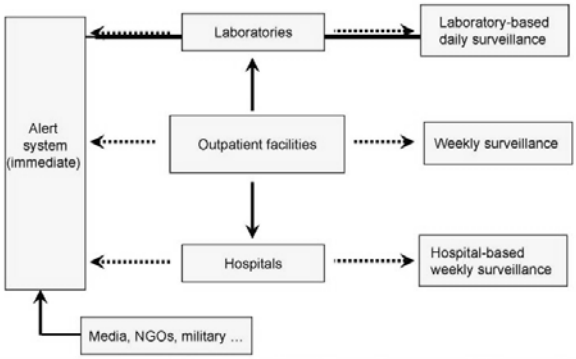
English and Indonesian

Case definitions provided on the back

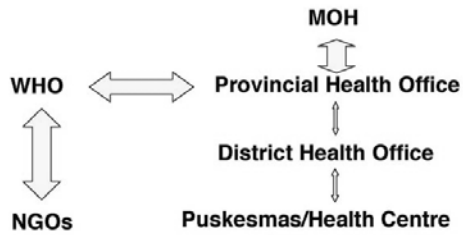
Post-tsunami surveillance/early warning and response - Aceh province

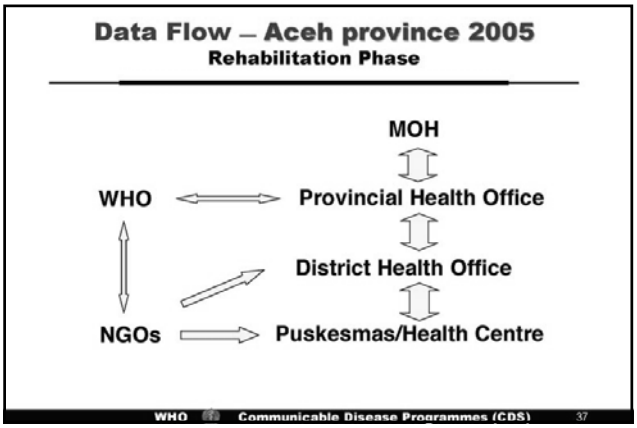
- Data providers
  - Clinics
  - Hospitals
  - Laboratories
  - Alerts (from above but also public, media, NGOs, military, religious organizations etc)
- Periodicity
  - Weekly (clinic, hospitals)
  - Daily (laboratory)
  - Immediate alert system (phone/sms)

Schematic representation of surveillance system



Data Flow – Aceh province 2005
Emergency Phase




Data Flow – Aceh province 2005
Rehabilitation Phase
MOH
WHO
Provincial Health Office
District Health Office
NGOs
Puskesmas/Health Centre
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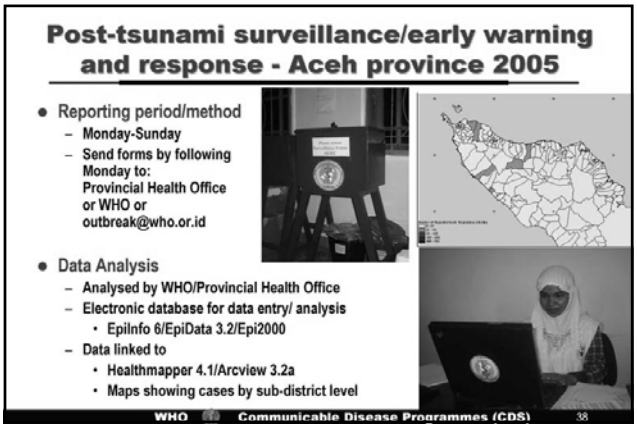
Post-tsunami surveillance/early warning and response - Aceh province 2005
Reporting period/method
Monday-Sunday
Send forms by following Monday to: Provincial Health Office or WHO or outbreak@who.or.id
Data Analysis
Analysed by WHO/Provincial Health Office
Electronic database for data entry/ analysis
Epilnfo 6/EpiData 3.2/Epi2000
Data linked to
Healthmapper 4.1/Arcview 3.2a
Maps showing cases by sub-district level
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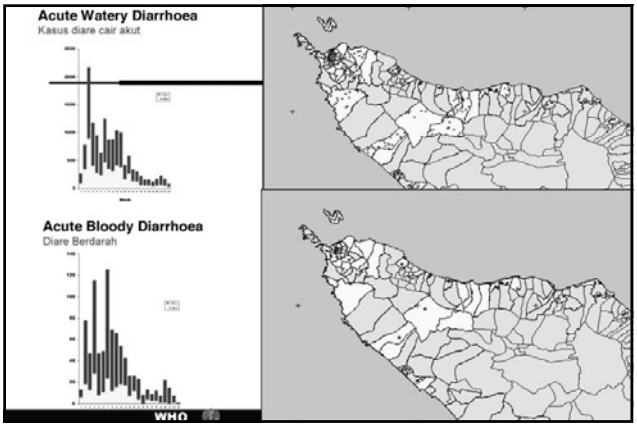
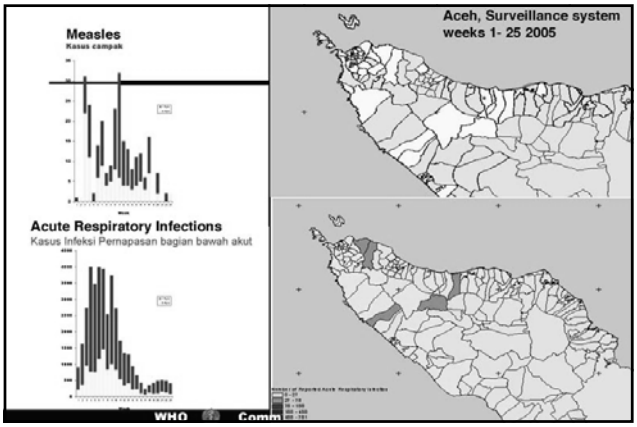
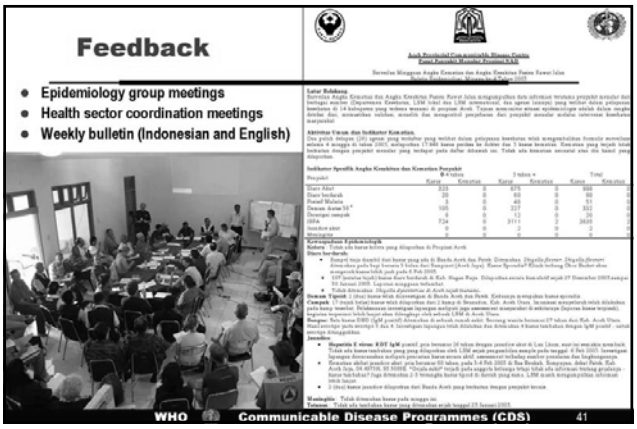

Acute Watery Diarrhoea
Kasus diare cair akut
Acute Bloody Diarrhoea
Diare Berdarah
WHO


Measles
Kasus campak
Aceh, Surveillance system weeks 1- 25 2005
Acute Respiratory Infections
Kasus Infeksi Pernapasan bagian bawah akut
WHO


Feedback
Epidemiology group meetings
Health sector coordination meetings
Weekly bulletin (Indonesian and English)
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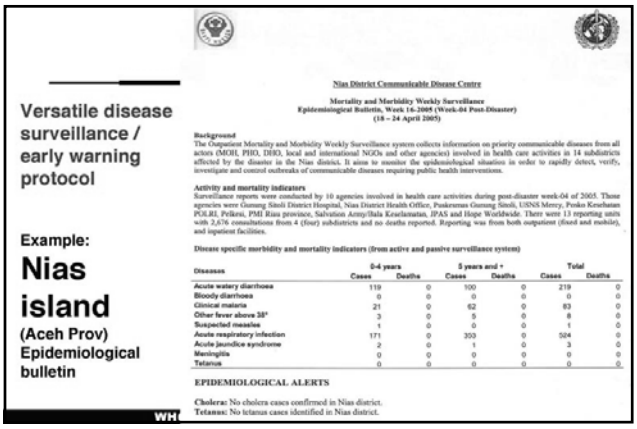
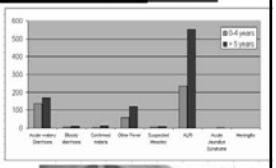

Versatile disease surveillance / early warning protocol
Example:
Nias island
(Aceh Prov)
Epidemiological bulletin
Nias District Communicable Disease Centre
Mortality and Morbidity Weekly Surveillance
Epidemiological Bulletin, Week 16-2005 (Week-04 Post-Disaster)
(18 – 24 April 2005)
Background
Activity and mortality indicators
Disease specific morbidity and mortality indicators (from active and passive surveillance system)
EPIDEMIOLOGICAL ALERTS
Cholera: No cholera cases confirmed in Nias district.
Tetanus: No tetanus cases identified in Nias district.

Public Health Laboratory – Aceh province 2005

- Laboratory facilities established in Banda Aceh & Meulaboh
  - For confirmation of major epidemic and endemic communicable diseases
- SOPS developed and agreed for
  - Sample collection
  - Packaging
  - Transport
  - Specimen analysis
- Tracking samples from different agencies
- Reporting and analysis of lab data



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Outbreak preparedness – Aceh province 2005

- Sensitive surveillance / ewarn system
- Outbreak preparedness plans
- Outbreak control teams set up
- Partners identified for specific tasks
- Drugs stockpiled for priority diseases
- Standard treatment protocols avail. →
- Isolation facilities identified
- Lab capacity ensured
- Sampling kits procured for outbreak investigations
- Personal protective equipment (PPE) procured

- **Malaria**
  - (Artesunate + Amodiaquine)
- **Dengue**
  - (MOH, based on SEARO document)
- **ARI, measles**
  - MOH / WHO IMCI, 2nd line treatment: amoxicillin)
- **Acute watery diarrhea**
  - (MOH / WHO IMCI)
- **Cholera**
  - (WHO guideline)
- **Shigella**
  - (WHO guideline being reviewed - ciprofloxacin)
- **Tetanus**
  - (MOH directive)

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Outbreak investigation and response

- Multidisciplinary! Many partners! Coordination crucial!
  - Epidemiology
  - Laboratory
  - Clinical Management
  - Mass immunization
  - Infection Control
  - Environmental health
  - Social Mobilization
  - Health education
  - Media Relations
  - Harm Reduction/Risk communication
  - Logistics/ transport/ cold chain
  - Security considerations

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Priority CD control measures in disasters

Short term measures

1. Provide **safe water and sanitation**
2. Provide **food and shelter**
3. Protect susceptible groups through **vaccination**: mass measles vaccination is priority; recommended vaccinations for expatriates.
4. Institute **vector control** measures
5. Control **animal reservoirs**
6. **Health education** re: safe water & food, excreta disposal, hygiene & hand washing
7. **Surveillance / early warning and response system** for rapid detection and response to CD outbreaks
8. Prompt and effective **clinical case management**
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Priority CD control measures in disasters (II)

Long term measures

- **Legislative and administration issues:** disaster committee functions/activities, water quality and quantity regulations.
- **Technical issues**: update and update guidelines/protocols accordingly.

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Conclusions

- **Most common natural disasters are associated with flooding, with a heightened concern for an unusual increase in water- and vector borne diseases.**
- **However, in the absence of secondary physical environmental effects, CDs have not been demonstrated to cause a high incidence of mortality in the aftermath of a natural disaster.**
- **Mortality and morbidity associated with CDs after a natural disaster (and emergencies) is avoidable through implementing priority CD control interventions.**

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Other 2005 Teleclasses

For more information, refer to
www.webbertraining.com/schedule.cfm

August 11 – *Effective Presentation of Infection Control Data*
With Bonnie Barnard, Mountain Pacific Quality Health Foundation

August 25 – *Community Acquired MRSA*
With Dr. Rachel Gorwitz, Centres for Disease Control, Atlanta
Sponsored by JohnsonDiversey (www.johnsondiversey.com)

September 15 – *Vaccines – Adding to the Arsenal of Disease Control*
With Centres for Disease Control, Atlanta

September 20 – *UK Teleclass – Controlling Device-Related Infections*
With Dr. Robert Pratt & Carol Pellowe, Thames Valley University

Questions? ***Contact Paul Webber paul@webbertraining.com***