Introduction To
Disaster Epidemiology

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March 2013
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Disaster

Dis : bad

Astro: star

http://www.merriam-webster.com/dictionary/disaster
Disaster

A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.

UN/ISDR - UN Intl Strategy for Disaster Reduction Sec [15 January 2009]

2007: Gono(Cyclone), Konarak. Iran I.R.
Photo credit: MJ Moradian
Disaster in Health Facilities:

Need more than resources

2008: Namazi Hospital, Shiraz Iran I.R.
Photo credit: MJ Moradian

2006: Kharame Exercise, Shiraz Iran I.R.
Photo credit: Fars EMS
Epidemiology is a philosophy, a strategy, a methodology, a way of studying a health problem. Epidemiology is not a body of knowledge.
Definitions of Epidemiology

“The study of the DISTRIBUTION and DETERMINANTS of health related stats and events in POPULATIONS and the application of this study to control of health problems”

Epidemiology Gordis, 2004
Disaster Epidemiology

Disaster Epidemiology is defined as the use of epidemiology to assess the short- and long-term adverse health effects of disasters and to predict consequences of future disasters.
Although unpredictability is characteristic of disasters, many types of disasters recur with regularity, resulting in a body of research, called disaster epidemiology.
Disaster epidemiology allows for retrospective data collection and analysis of similar types of disasters and prospective consideration of the best practices in similar types of disaster management.

Epidemiology In Emergencies

- Descriptive Epidemiology
- Analytical epidemiology
- Evaluation epidemiology

Disaster Epidemiology & Various Topics

- Communicable disease
- Environmental health
- Occupational health
- Chronic disease
- Injury
- Mental and behavioral health
Disaster Epidemiology

- Provides situational awareness
- Provides information that helps us understand what the needs are, plan the response, and gather the appropriate resources
Role of Epidemiology in Disasters

- To identify the priority health problems in the affected community
- To determine the extent of disease existing within a community
- To identify the causes of disease and the risk factors
- To determine the priority health interventions

Role of Epidemiology in Disasters

- To determine the extent of damage and the capacity of the local infrastructure
- To monitor health trends of the community
- To evaluate the impact of health programs

NEEDS

What are the needs within your sector? Cross cutting issues?
Can they be quantified? Qualified?
Puzzle of Information System

CAPACITY

What resources are available to address needs?

How can these resources most effectively be used?

Are they funded? Or just planned?
Puzzle of Information System

WHO WHAT WHERE WHEN

Who are the agencies active in your sector?
Where are they working and what are they doing?
When are their programmes active and how much are they doing?
Puzzle of Information System

GAPS

What locations have missing resources? Overlaps? Are all sub-sectors being addressed?

What additional resources need to be advocated for?

Is this the most effective usage of resources?

GCCT1 Geneva Apr08
Information System

- Strategic Decisions
- Needs-Based Planning
- Advocacy to Donors, Media
- Technical Solutions
Disaster and Information

We deal with information in disasters
The importance of (Health) Information

"in a disaster, accurate information, like clean water, is an indisputable good"

Keen & Ryle, 1996
### push and pull information propagation

<table>
<thead>
<tr>
<th>STEPS</th>
<th>EXAMPLE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facts/Events</td>
<td>Deaths</td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td>Number of deaths</td>
<td>Collect and Count</td>
</tr>
<tr>
<td>Indicator</td>
<td>Mortality Rate</td>
<td>Calculation</td>
</tr>
<tr>
<td>Information</td>
<td>Rates by sex, age, location</td>
<td>Analysis</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Time trends, comparison with other areas</td>
<td>Interpretation</td>
</tr>
<tr>
<td>Decision Making</td>
<td>Decisions (impact, severity)</td>
<td>Assessing options</td>
</tr>
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</table>
Information in Disasters

- No information is available, or what is available is biased to such a degree to be useless.

- Two opposite prevalent attitudes of Emergency Health Managers:
  - Extinction by Instinct
  - Paralysis by Analysis
Information Management in Disaster – Simply Defined!

60% Interpretation

40% Information
The Cost of Information

From A..Green, 1999
The impact of Disaster on information

- Pre-existing information systems deteriorate
- Insecurity
- Population movements
- Poor communication
- Collection & analysis of data clash with other priority activities
The impact of Disaster on information

- Proliferation and fragmentation of information systems
- A large part of the collected information remains unused
- There are strong incentives for manipulating the information
Constraints of Epidemiology in Disasters

- Poor understanding of basic epidemiological principles and measurement techniques
- Rapid turnover of skilled staff
- Lack of access to a significant fraction of the affected population due to chaos or insecurity

Constraints of Epidemiology in Disasters

- Limited resources for processing information
- Difficulty in estimating the population size
- Survey samples may not represent the total affected population

Key Epidemiological Indicators

- Incidence
- Prevalence
- Morbidity rate
- Mortality rate
- Awareness of the value of immunization
- Compliance to universal precautions against HIV/AIDS
- Equity in distribution of resources
- Access
- Coverage
- Quality of services
- Availability

Uses of Epidemiology in Disasters

- Rapid needs assessment
- Demographic studies determining (population size)
- Building a surveillance system
- Investigating a disease outbreak
- Program monitoring and evaluation
- Conduct investigations / Surveys


Seaman J. Disaster epidemiology: or why most international disaster relief is ineffective. Injury. 1990;21:5.
Rapid Needs Assessment

- To determine the magnitude of the emergency
- To define the specific health needs of the affected population
- To establish priorities and objectives for action
- To identify existing and potential public health problems

Vilius Grabauskas

Rapid Needs Assessment

- To evaluate the capacity of the local response including resources and logistics
- To determine external resource needs for priority actions
- To set up the basis for a health information system

To monitor the health of a population and identify the priority health needs

To follow disease trends for early detection and control of outbreaks

To assist in planning and implementing health programs
Surveillance

To ensure resources are targeted to the most vulnerable groups
To monitor the quality of health care
To evaluate the coverage and effectiveness of program interventions

### Outbreak Investigation

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<th>Reportable Diseases</th>
<th>Diseases of Public Health Importance</th>
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<tr>
<td>Measles</td>
<td>Rabies</td>
</tr>
<tr>
<td>Cholera</td>
<td>Tetanus</td>
</tr>
<tr>
<td>Meningitis</td>
<td>Sexually transmitted infections (gonorrhoea, syphilis, chlamydia, genital ulcer disease, chancroid)</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>HIV/AIDS</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td></td>
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<tr>
<td>Yellow fever</td>
<td></td>
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<tr>
<td>Hemorrhagic fever</td>
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DISTRIBUTION OF NATURAL DISASTERS

AREA WISE (1975-2001)

LEGEND (No. of Events)

- 0 event
- 1 - 35 events
- 36 - 70 events
- 71 - 150 events
- 151 - 260 events
- > 260 events

INDIA

ALASKA

USA

JAPAN

CHINA

INDONESIA

PACIFIC RING OF FIRE
DISTRIBUTION OF PEOPLE AFFECTED

BY NATURAL DISASTERS (1975-2001)

LEGEND

- Zero.
- One to 18 Million.
- 18 to 48 Million.
- 48 Million to One Billion.
- One Billion to 3.5 Billion.
- More Than 3.5 Billion.
The Disaster Risk Index (DRI)

Spatial distribution of DRI classes.
Figure 1 – Trends in occurrence and victims

* Victims: sum of killed and total affected
Number of people reported killed by natural disasters 1900 - 2010

EM-DAT: The OFDA/CRED International Disaster Database - www.emdat.be - Université Catholique de Louvain, Brussels - Belgium
FIGURE 1.1 ECONOMIC LOSSES DUE TO NATURAL DISASTERS FROM 1950 TO 2000

Source: Munich Re
Figure 1.2 Total amount of disaster damage between 1991 and 2000 in millions of US dollars (2000 values)

Source: EM-DAT: The OFDA/CRED International Disaster Database
Map 2 – Percent share of reported victims by disaster sub-group and continent in 2010*

*Percentages ≤ 0.05 are displayed.

- **Geophysical**
  - Americas: 90%
  - Europe: 0.4%
  - Asia: 95%
  - Africa: 4%
  - Oceania: 0%

- **Climatological**
  - Americas: 2%
  - Europe: 1%
  - Asia: 79%
  - Africa: 0%
  - Oceania: 0.1%

- **Hydrological**
  - Americas: 2%
  - Europe: 6%
  - Asia: 53%
  - Africa: 2%
  - Oceania: 1%

- **Meteorological**
  - Americas: 13%
  - Europe: 0.1%
  - Asia: 5%
  - Africa: 2%
  - Oceania: 0.1%

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**Natural disasters**

- **Biological**
  - Epidemics
  - Insect infestations
  - Animal attacks

- **Geophysical**
  - Earthquakes
  - Volcanos
  - Dry mass movements

- **Climatological**
  - Droughts
  - Extreme temperatures
  - Wildfires

- **Hydrological**
  - Floods
  - Wet mass movements

- **Meteorological**
  - Storms

**Disasters used in this publication**
Map 2 – Percent share of reported victims by disaster sub-group and continent in 2011*

*Percentages ≤ 0.05 are displayed as zeros
Natural disaster occurrence in 2010

- Oceania: 4%
- Europe: 18%
- Africa: 18%
- Americas: 25%
- Asia: 35%

Natural disaster occurrence 2000-2009

- Oceania: 1%
- Europe: 4%
- Africa America: 4%
- Asia: 85%
# Killed In Iran due to Natural disaster up to 2010

- **Drought**: 0
- **Earthquake**: 140,000
- **Flood**: 1,000
- **Storm**: 0

The graph shows the number of people killed in Iran due to natural disasters up to 2010. The highest number of deaths occurred from earthquakes.
Natural disaster in Iran up to 2010

- **Drought**: Significant impact with a large number of affected individuals and substantial damage.
- **Earthquake**: Moderate impact with a moderate number of affected individuals and damage.
- **Flood**: Minimal impact with a few affected individuals and minor damage.
- **Storm**: Minimal impact with a few affected individuals and minor damage.
- **Others**: Minimal impact with a few affected individuals and minor damage.

EM-DAT: The International Disaster Database
Centre for Research on the Epidemiology of Disasters - CRED
Absolute and relative mortality risk for earthquakes

Source: GAR on Disaster Risk Reduction - 2009
Absolute and relative multi-hazard mortality risk for tropical cyclones, floods, earthquakes and landslides

Source: GAR on Disaster Risk Reduction - 2009
Topics

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Shiraz Eram Garden

Photo credit: Fars EMS
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