Community-based Disaster Risk Reduction

Clinician Outreach and Communication Activity (COCA) Conference Call
August 21, 2012
Objectives

At the conclusion of this session, the participant will be able to accomplish the following:

- State the basic principles of disaster risk reduction and management
- Identify community hazards and vulnerability that contribute to disaster risk
- Describe effective risk reduction principles for disaster planning
- Describe the process for writing a community plan for disaster risk reduction
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Community-based Disaster Risk Reduction

Mark Keim, MD
Senior Science Advisor
An Evolution in Approaches

- Preparedness
- Response
- Risk Management
What is Disaster Risk Management?

**Definition**

- “The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to…

  *lessen the adverse impacts of hazards and the possibility of disaster*.”

Prevention and disaster risk management

Process for Risk Management

1. Establish context
   - Develop criteria
   - Define structure

2. Identify risks
   - Hazard identification
   - Vulnerability assessment

3. Analyze risks
   - Determine consequences
   - Determine likelihood

4. Evaluate risks
   - Compare against criteria
   - Set priorities

5. Treat risks
   - Identify options
   - Prepare plans
   - Evaluate residual risk

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**Components**

- Risk assessment
- Risk avoidance
- Risk reduction
- Risk transfer
- Risk retention

Risk Management vs. **Risk Reduction**

- Prevention
- Mitigation
- Preparedness
- Response
- Recovery

- Risk Reduction
  - Prevention
  - Mitigation
  - Preparedness

- Risk Reduction lessens the *likelihood* of disaster
Disaster risk management and the emergency management cycle

Risk reduction measures are
- Delivered pre-impact
- Most cost-effective
- Community based
- Sustainable

Pre-impact

Risk retention measures are
- Delivered post-impact
- Least cost-effective
- Nationally and internationally based
- Non-sustainable

Post-impact

A comparison among various techniques for prevention, emergency management and risk management as applied to disasters

<table>
<thead>
<tr>
<th>Stage of Prevention</th>
<th>Phase of emergency management cycle</th>
<th>Risk management technique</th>
<th>Disaster risk management component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary prevention</td>
<td>Prevention</td>
<td>Risk avoidance</td>
<td>Hazard avoidance</td>
</tr>
<tr>
<td>Secondary prevention</td>
<td>Preparedness (susceptibility / resilience)</td>
<td>Risk reduction</td>
<td>Vulnerability reduction</td>
</tr>
<tr>
<td></td>
<td>Structural (exposure)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mitigation</td>
<td>Financial (susceptibility / resilience)</td>
<td>Risk transfer</td>
</tr>
<tr>
<td>Tertiary prevention</td>
<td>Response</td>
<td>Risk retention</td>
<td>Residual risk</td>
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<tr>
<td></td>
<td>Recovery</td>
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</tbody>
</table>

How Do We Estimate Disaster Risk?

$$D = H \times V, \text{ where } V = \frac{E \times S}{R}$$

- D = Risk of disaster
- H = Hazard
- V = Vulnerability of population
- E = Exposure to the hazard
- S = Susceptibility to the hazard
- R = Resilience
Disaster Risk Assessment

Hazard analysis
- Hazard identification
- Hazard likelihood of occurrence
- Hazard impact

Vulnerability analysis
- Demographic
- Socio-political
- Economic
- Cultural
- Health
- Developmental
## Risk Assessment for 2010 World Exposition

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Impact</th>
<th>Likelihood</th>
<th>Hazard (H = I x L)</th>
<th>Vulnerability (V)</th>
<th>Risk (R = H x V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epidemic</td>
<td>2.3</td>
<td>4.4</td>
<td>10.1</td>
<td>1.5</td>
<td>15.2</td>
</tr>
<tr>
<td>Poisoning</td>
<td>1.8</td>
<td>4.1</td>
<td>7.4</td>
<td>1.4</td>
<td>10.4</td>
</tr>
<tr>
<td>Fire</td>
<td>1.5</td>
<td>4.8</td>
<td>7.2</td>
<td>1.2</td>
<td>8.6</td>
</tr>
<tr>
<td>Flood</td>
<td>1.7</td>
<td>3.8</td>
<td>6.5</td>
<td>1.3</td>
<td>8.5</td>
</tr>
</tbody>
</table>
What is a Hazard?

Definition of a hazard

“A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage”

Examples of Hazards

- Floods
- Typhoons
- Radiation
- Outbreaks
- Earthquakes
- Tornadoes
What is Vulnerability?

- “The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effect of a hazard” UNISDR 2009

- Or simply put…

- Likely to incur physical or emotional illness or injury

Public Health Vulnerability

- Certain populations are more vulnerable to disaster-related morbidity and mortality
Factors that Increase Public Health Vulnerability

- Poverty
- Extremes of age
- Gender
- Disability
- Lack of information, education and communication
- Lack of experience and process
- Inadequate healthcare
- Geographical location / isolation
- Inadequate social and organizational integration / coordination
- Inadequate preparedness and mitigation

- Ethnicity
- Inappropriate developmental policies
- Food insecurity
- Societal stratification
- Poor water and food quality
- Limited state & local resources
- Political perceptions
- Negative social interactions: administrative graft / corruption, competition
- Lack of social order
- High burden of illness and/or injuries

Vulnerability = \frac{(E \times S)}{R}

Factors affecting vulnerability:
- Exposure
- Susceptibility
- Resilience
What is susceptibility?

- **Susceptibility**
  - “The state of being at risk, if exposed to a hazard”

- **Example of susceptibility**
  - Not being able to swim

What is Resilience?

- **Resilience**
  - “The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions”.

- **Example of resilience**
  - Living among healthy people who can help you

Vulnerability assessments consider key factors that affect public health vulnerability

- **Socio-economic status**
  - Demographics
  - Economic indicators
  - Education
  - Linguistic

- **Health status**
  - Health indicators
  - Healthcare access
Mapping Human Vulnerability

Miami-Dade County, FL - Vulnerable Populations (Poverty and Elderly Combined) Emergency Response Preparedness Map Series

Map Purpose:
This map portrays US Census Tract populations to determine areas that are most vulnerable during a disaster.

Data Sources:
- Transportation information provided by FEMA
- GISP (GOLD, 03 Data)
- Bathymetric Data provided by NOAA
- Demographic data provided by the US Census Bureau

US Census Tracts
Total Population - US Census 2000

US Census Tracts
Percent in Poverty - US Census 2000

Percent Elderly Population

US Census Tracts
Percent Aged 65 yrs or older

Percent Poverty and Elderly Combined

Major Highways
Secondary Hwys
How can we reduce our vulnerability to disasters?

- **Disaster reduction occurs at the community level †**
  - Community health sectors can play an active role in reducing human vulnerability
  - Reducing susceptibility
    - “Health people” ††
  - Reducing exposure
    - “Healthy homes” ††
  - Increasing resilience
    - “Healthy communities” ††

Vulnerability Reduction: Reducing Exposures

- **Floodplain management**
  - Dams, levees, weirs

- **Population protection measures**
  - Evacuation
  - Mass care

- **Land use planning and regulation**

- **PPE, sanitation/hygiene**
Vulnerability Reduction: Reducing Susceptibility

- Health promotion
- Health care
- Poverty reduction
- Community planning
- Immunization
National Prevention Strategy

- Identifies goals, priorities, recommendations, and measures for improving health through prevention
- Grounds recommendations in evidence-based practice
- Aligns and focuses federal prevention and health promotion efforts, including existing national efforts
- Healthy People 2020
- National Quality Strategy
- First Lady’s “Let’s Move!” campaign
- America’s Great Outdoor Initiative
National Prevention Strategy

Increase the number of Americans who are healthy at every stage of life.

- Tobacco Free Living
- Preventing Drug Abuse and Excessive Alcohol Use
- Healthy Eating
- Active Living
- Mental and Emotional Well-being
- Reproductive and Sexual Health
- Injury and Violence Free Living
- Healthy & Safe Community Environments
- Clinical & Community Preventive Services
- Empowered People
- Elimination of Health Disparities
Priorities

- Tobacco Free Living
- Preventing Drug Abuse and Excessive Alcohol Use
- Healthy Eating
- Active Living
- Mental and Emotional Well-being
- Reproductive and Sexual Health
- Injury and Violence Free Living

Five Causes Account For 66% of All Deaths

- Heart Disease: 27%
- Cancer: 23%
- Chronic Lower Respiratory Disease: 6%
- Stroke: 5%
- Unintentional Injuries: 5%

All Other Causes: 34%

Vulnerability Reduction: Increasing Resilience

- Six R’s of resilience
  - Readiness
  - Robustness
  - Redundancy
  - Resourcefulness
  - Rapid response
  - Recovery
Human resilience as a means for vulnerability reduction

- **Resilience**
  - The ability to cope with and recover from disasters

- **Resilience is comprised of:**
  - Adaptive capability
  - Response capacity
  - Recovery capacity

- **Human behaviors that increase disaster resilience**
  - Preparedness
  - Response
  - Recovery
11 E’s of Emergency Preparedness

- Evaluation and monitoring of hazard
- Early warning
- Evacuation
- Emergency operations planning
- Education and training
- Exercises and drills
- Engagement of the public
- Electronic media and communication
- Epidemiology
- Equipment and supplies
- Economic and political incentive

Exercise

How can MRC units reduce the risk of disasters in your own communities?

- **Epidemics**
  - Reduce exposures?
  - Reduce susceptibility?
  - Increase resilience?

- **Cyclone / flood**
  - Reduce exposures?
  - Reduce susceptibility?
  - Increase resilience?
Centers for Disease Control and Prevention
Atlanta, Georgia
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