# Disaster Preparedness and Response Training™

## Complete Course: Modules One, Two, & Three™

Facilitator's Guide™

2014

National Center for Environmental Health

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# COURSE OVERVIEW

The Disaster Preparedness and Response Training Course has three modules. The course also has a final comprehensive capstone activity where learners apply the knowledge and skills learned in the course. After completing all three modules, you will have a better understanding of the disaster-related rapid needs assessments and surveillance necessary to support responses to disasters and other public health emergencies.

Each module builds on the skills and concepts learned in the previous modules. The modules should be completed consecutively in the following order:

- Module One – Epidemiologic Response to Disasters
- Module Two – Disaster Response Rapid Needs Assessment
- Module Three – Overview of Disaster-related Morbidity and Mortality Surveillance

## COURSE DESIGN

The course uses a "self-paced," learner-focused format. The majority of the instructional content for the module is contained in a Participant Workbook. Learners will read through the Participant Workbook individually and stop at specified points to discuss key points and practice exercises with a mentor or a facilitator. This self-paced format allows learners to complete the training at their own pace. It is expected that a mentor or facilitator will meet with the learner(s) periodically to review key points and address any questions. It is up to the learner and the facilitator to schedule meeting times. Depending on the number of learners, the facilitator might wish to schedule group sessions or meet individually with each learner.

This Facilitator Guide provides suggestions on how to facilitate discussions with learners around key concepts and lessons learned. The Facilitator Guide also provides suggested answers for the practice exercises and case studies included throughout the course

## TARGET AUDIENCE

The target audience is 2nd year Field Epidemiology Training Program (FETP) residents (fellows) and alumni, as well as other health professionals associated with ministries of health who are responsible for disaster preparedness and response initiatives.

## Options for Facilitating this Training

Training can be assisted in two ways:

1. **Individual mentor-directed** – A mentor helps the learner complete the training. The mentor's main responsibility is to review the learner's work and provide feedback. A mentor meets with the learner a minimum of two times. At the first meeting, the mentor orients the learner to the training, provides examples and directions indicated, answers questions, and sets future modes of contact and meeting time(s). Very small groups (fewer than five learners) may choose to work on the training together and find individual or collective mentors.
2. **Classroom** – Classroom training can be conducted in two ways. The first way is for learners to read the training material *before* attending class and then review in class what they read, the second is for learners to read the training material *during* class.
    a. **Learners read training material *before* attending class.** At the start of each module, the facilitator reviews key points. The facilitator may prepare PowerPoint slides for a brief presentation of key points (a draft deck of slides is provided), lead an informed discussion about the reading, or ask learners about what they read and answer questions individually or in small groups (Appendix B contains sample questions). After each review, learners will complete practice exercises and skills assessments as directed.
    b. **Learners read training material *during* class.** The facilitator directs learners to read the training material and complete the exercises as indicated in the workbook. The facilitator leads group discussions to review what learners have read and reviews learners' answers to the exercises and skill assessments.

## Facilitator/Mentor Role and Responsibilities

As a facilitator or mentor, you will help in the learning process. Your primary role will be to do the following:

- Schedule time to meet with learner(s) to discuss training topics and exercises
- Introduce the module and lesson topics
- Lead discussions to review or elaborate on content in the Participant Workbook
- Answer questions that learners might raise as they read the Participant Workbook
- Review and discuss learners' answers to practice exercises and case study questions, and provide feedback.
- Summarize the key learning points for each lesson
- Ensure learners complete the modules in a timely manner

You will also have an additional responsibility to play a more active role in supporting learners with their field work after the training.

## ICON GLOSSARY

Throughout the Facilitator Guide, the following icons will help you navigate quickly to relevant sections.

**Red Boxes –** Areas highlighted in ***RED*** will help guide you by providing instructions, suggested timeframes for each activity, and key content to read to the learners.

**Light bulb –** Key idea or lesson learned that you should emphasize for learners

**Stop –** A point at which the participant should consult a mentor or wait for the facilitator for further information or instructions *[**BLUE** in participant workbook, **RED** in instructor guide]*

**Check –** Knowledge checks that learners should complete. Typically at the end of each section

**Pencil –** Practice exercise or case study that learners should complete

## GLOSSARY OF TERMS

**Active Surveillance** – Surveillance that employs staff members to contact regularly health care providers or the population to seek information about health conditions.

**Assessment Area** – The geographic area that makes up the sampling frame in an epidemiologic study.

**Case Definition** – A set of standard criteria for classifying whether a person has a particular disease, syndrome, or other health condition. A case definition frequently includes criteria for person, place, and time and often includes inclusion criteria (characteristics that a person must have if they are to be included) and exclusion criteria (characteristics that disqualify a person from inclusion). A case definition can also include the degree of certainty in a diagnosis ranging from confirmed, probable, to suspected.

**Cluster Accessibility** – The ability to enter a given selected cluster to complete interviews. Difficulty in accessibility may arise due to storm damage, unsafe conditions, or restricted entries.

**Communicable Disease** – An infectious disease transmissible from person to person by direct contact with an affected individual, the individual's discharges, or by indirect means.

**Completion Rate** – A type of response rate that shows how close interview teams came to completing the targeted number of interviews.

**Complex Emergency** – A crisis in a country, region or society where there is a total (or near total) breakdown of authority, resulting from internal or external conflict, and which may require a large-scale international response beyond the mandate or capacity of any one single agency.

**Confidence Interval (CI)** – The range around a numeric statistical value obtained from a sample, within which, at a given level of probability, the actual, corresponding value for the population is likely to fall (e.g., 95%).

**Contact Rate** – A type of response rate showing the proportion of households where contact was attempted and the household successfully completed an interview.

**Cooperation Rate** – A type of response rate that shows the proportion of households where contact was made and the household agreed to complete an interview.

**Direct Health Effect** – An adverse health effect caused by the actual physical forces of a disaster, such as a drowning or injury from flying debris.

**Disaster** – The serious disruption of societal functioning causing widespread human, material, or environmental losses that exceed the local response resources, triggering calls for external assistance.

**Disaster Epidemiology** – The use of epidemiology to measure the short- and long-term health effects of disasters and to predict the consequences of future disasters.

**Disaster Surveillance** – A public health practice used to assess health effects, monitor the effectiveness of relief efforts, respond to public concerns and media inquiries, and facilitate planning for future disasters. See surveillance.

**Displacement** – The forced movement of populations of people or animals from the area where they live, usually due to sudden impact from natural disasters, threat or conflict.

**Environmental Hazard** – Any phenomenon in the environment that is a potential source of harm or adverse health effects.

**Epidemiologic Case Study** – A study aimed at revealing the relationships between exposures and mortality and morbidity, including case-control studies, cohort studies, risk-factor studies, case series, and outbreak investigations.

**Evaluation and Effectiveness Study** – A study aimed at evaluating specific programs and response techniques in addition to assessing the success of specific programs and responses.

**Final Report** – A report distributed to a wide audience that builds off of a preliminary report and includes additional data analysis and results, typically provided within a few weeks of conducting a rapid needs assessment (RNA).

**Hazard** – Any source of potential harm 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.

**Hazard Mapping** – The act of specifying and identifying locations at high risk for a specific hazard (e.g., areas vulnerable to flooding).

**Household** – A household includes all the individuals who occupy a housing unit as their usual place of residence.

**Human-Induced Disaster** – A disaster which occurs as the result of intentional or unintentional human actions and that occurs in or close to human settlements.

**Human Impact** – Injury, mortality, increased disease morbidity rates for a variety of illnesses, subsequent displacement, and a lack of necessities, such as food and water.

**In situ** – In a natural or original position or place.

**Incidence** – The occurrence of new cases of disease or injury or events in a population over a specified period.

**Incidence Proportion** – The proportion of an initially disease-free population that develops disease, becomes injured, or dies during a specified period.

**Indirect Health Effect** – Caused by unsafe/unhealthy conditions that develop due to the effects of the disaster or events that occur from anticipating the disaster (e.g., carbon monoxide poisoning from improper generator use).

**Infrastructure Damage** – Damage to houses, business centers, hospitals, and transportation services because of a disaster.

**Mitigation Strategy** – Formulated action or development of policies that reduce disaster-related risk to people and property.

**Morbidity** – The state of being ill or diseased or the incidence of illness in a population.

**Mortality** – The incidence of death in a population.

**Natural Disaster** – A disaster which is the result of potentially harmful phenomenon that occurs in nature, such as hydrometeorological, geological and biological hazards.

**Noncommunicable Disease** – A disease that does not pass from person to person, typically of long duration and slow progression.

**Passive Surveillance** – A system in which a health jurisdiction receives reports from hospitals, clinics, public health units, or other sources.

**Preliminary Report** – A presentation provided to key stakeholders within a day or two after data collection, allowing partners to make quick and better informed decisions and address any immediate needs.

**Probability Proportional to Size** – A method of sampling that ensures clusters with more households have a higher chance of selection and that is weight-adjusted during data analysis.

**Rapid Needs Assessment (RNA)** – A collection of techniques (e.g., epidemiological, statistical, anthropological) designed to identify quickly the basic and health needs of a community.

**Response Rate** – A calculation that helps determine the representativeness of the sample to the population within the sampling frame. See contact rate, completion rate, cooperation rate.

**Sampling** - The process of selecting representative respondents from the target population who reflect the characteristics of the population from which it is drawn.

**Sampling Frame** – The entire population within the selected assessment area from which a sample is drawn (e.g., a list or map of all households). The sample is a subset of the larger sampling frame.

**Sentinel Surveillance** – Surveillance that occurs when data are gathered from a limited number of sites; Sentinel Surveillance is used as an alternative to population-based surveillance and national surveillance.

**Stratified Sampling** – A commonly used sampling method that decreases the sampling error by dividing the target population into suitable, relatively homogenous, nonoverlapping subpopulations (strata); a random sample is then selected within each stratum.

**Surveillance** – The ongoing systematic collection, analysis, and interpretation of injuries, illnesses, and deaths, for the use in planning, implementation, and evaluation of public health practice.

**Syndromic Surveillance** – Surveillance that uses a group of signs and symptoms, primary complaints, or other characteristics of the disease, rather than specific clinical or laboratory diagnostic criteria.

**Technological Disaster** – A disaster which occurs as the result of human actions or technological failures.

**Two-Stage Cluster Sampling Design** – The recommended RNA sampling methodology. In the first stage, clusters are selected probability proportional to size from a population (30 clusters). Then within each cluster, interview-subject subunits are randomly selected (7 interviews).

**Vulnerability Analysis** – The analysis of the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

**Weighted Frequency** – A mathematical weight given to probability of selection, used in data analysis to adjust analyses to account for a complex sampling design (e.g., two-stage cluster sampling method). Weighted Frequency is often used to represent an entire target population.

# Module One: Epidemiologic Response to Disasters™

# Acknowledgement

Module One: Epidemiologic response to disasters was developed by the Centers for Disease Control and Prevention, National Center for Environmental Health, Division of Environmental Hazards and Health Effects, Health Studies Branch (CDC/NCEH/DEHHE/HSB). DEHHE/HSB acknowledges these individuals for their collaboration and commitment to the development of this facilitator guide:

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**Disclaimer**

The findings and conclusions in this facilitator guide are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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# MODULE 1: EPIDEMIOLOGIC RESPONSE TO DISASTERS

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***Estimated Time:*** *6 hours (30 minute introduction to module, up to 1.3 hours of independent reading, up to 1.3 hours of group discussion, up to 2.3 hours of practice exercises, and 30 minutes module review and wrap-up)*

***Distribute****: Participant Workbook (for this module or, if conducting a five-day course, for all three modules*

***Explain****: The skills that learners will acquire and how they will acquire these skills by reading the Epidemiologic Response to Disasters Participant Workbook. Note that learners will have opportunities to apply the skills by completing practice exercises and skill assessments. Explain also that brief facilitator-led discussions will clarify or will elaborate on key concepts*

***Provide****:* An overview of how the skills taught in the first module, *Epidemiologic Response to Disasters,* will prepare learners for supporting disaster response activities and conducting epidemiological responses and surveillance

***Introduce***: Lessons in Module One

***Tell****: Learners to read each lesson until they see the STOP sign*

# OVERVIEW OF MODULE ONE – EPIDEMIOLOGIC RESPONSE TO DISASTERS

In the 1960s, scientists began to use epidemiological methods to respond to the public health impact of disasters. Epidemiologists assess the effect of a disaster on human health, recommend means to control an outbreak within a disaster situation, and provide support for minimizing the effect of future disasters. To assist meaningfully as an epidemiologist, you must know the different types of disasters, how they occur, and the consequences they have for society. In the wake of a disaster many different types of organizations and professionals will provide assistance. You should have a clear understanding of how you as an epidemiologist fit into a potentially complex response effort.

In this module, you will learn to distinguish between different types of disasters and their public health effects and learn about the role of an epidemiologist in disaster response and preparedness. This module consists of two lessons:

- Lesson 1: Public Health Implications of Disasters and Hazards
- Lesson 2: The Role of Disaster Epidemiology in Disaster Preparedness and Response

## LEARNING OBJECTIVES

After completing Module One, you will be able to do the following:

- Describe how a disaster affects the community, and especially a disaster's potential public health effects
- Explain the epidemiologist's role during each phase of the disaster cycle
- Understand the unique challenges of responding to a disaster as an epidemiologist

## ESTIMATED COMPLETION TIME

Module One will take approximately six hours to complete, including some discussion time with your mentor or facilitator.

## PREREQUISITES

Before participating in this training module, we recommended that you complete the following training courses:

- Introduction to public health and epidemiology (FETP core curriculum)
- Responding to outbreaks (FETP core curriculum)

***Lesson 1**: Public Health Implications of Disasters and Hazards*

***Overview:** This lesson describes different types of disasters that affect human society and the public health consequences common to most types of disasters*

***Total Estimated Time**: 3 hours*

***Reading and Activities**: up to 45 minutes*

***Group Discussion**: up to 45 minutes*

***Practice Exercise #1**: 90 minutes, including a 30-minute review*

# LESSON 1: PUBLIC HEALTH IMPLICATIONS OF DISASTERS AND HAZARDS

***Independent Reading**: Tell learners to read the first two sections of Lesson 1—Introduction and Common types of disasters – until they see the STOP sign (pages 2-5).*

***TIME**: 15 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## INTRODUCTION

As human populations grow and societies become increasingly interconnected and complex, the damages from natural and human-induced disasters have become more and more extensive. Our vulnerabilities as societies have deepened the effects that disasters have on human health. Socioeconomic, political, cultural, geographical, and other factors combine and compound to increase the scope of a disaster's consequences. As an epidemiologist, you may be called on to respond to disasters. You should understand the different types of disasters, the immediate and longer term of their effects on public health, and, following a disaster, the factors that magnify adverse health outcomes.

In this lesson, you will learn about the different types of disasters that affect human society and the public health consequences common to most types of disasters.

After completing this lesson, you will be able to do the following:

- Describe different categories of disasters
- Describe a disaster's effects in a community
- Identify a disaster's potential public health consequences

## COMMON TYPES OF DISASTERS

There are many definitions for a disaster. Different organizations may use slightly differing definitions. Still, the following are fundamental components across all definitions – a disaster

- is a severe event,
- causes damage to infrastructure, economic and social structures, or human health, and
- requires external assistance.

The United Nations Department of Humanitarian Affairs, the World Health Organization and Gunn's multilingual Dictionary of Disasters Medicine and International Relief, all define a **disaster** as the following:

> *A disaster is a serious disruption of the functioning of society, causing widespread human, material or environmental losses that exceeds the local capacity to respond, and calls for external assistance.*

While many disasters happen suddenly with little warning (e.g., tornadoes, landslides), others are preceded by warning signs (e.g., tropical cyclones). Disasters can result from natural **hazards** such as severe weather or from human-related activities such as bombings. Disasters are typically classified into distinct categories based on the cause of the hazard as either natural or human-induced.[1] The following describes these classifications:

**Natural disasters** – This category of disasters include those caused by hydrometeorological, geological, and biological hazards. Examples of hydrometeorological-related disasters include floods, tornados, hurricanes (including cyclones, typhoons, monsoons and other tropical storms), ice storms, or extreme heat, and can be a factor in other hazards such as wildfires. Geological phenomena that can lead to disasters include earthquakes, landslides or mudslides, avalanches, and volcano eruptions. It can be difficult to categorize some natural disasters as overlap often occurs. For example, a tsunami is triggered by a geological event but includes an oceanic process manifested as a water-related hazard. Another example is a mudslide occurring as a result of flash-flooding due to a hurricane or other storm. Biological disasters are those that are caused by the spread of disease. There are four major patterns of disease occurrence ranging from the least to the most severe (endemic, outbreak, epidemic, and pandemic). Biological disasters are most often associated with outbreaks, epidemics, and pandemics.

[1] Ifrc.org. Types of a Disaster: Definition of Hazard website. [Cited 2013 Sept 12]. Available from: http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/.

**Technological or human-induced disasters** – This category of disasters result from human actions or technological failures. Human activity has increasingly affected an environment's natural ecology and contributed to the manifestation of these disasters. For example, human activities (e.g., agricultural or other practices) that result in deforestation have led to landslides and drought. Similarly, the settlement of communities in flood zones or close to beaches and coastal areas has increased the human effect of floods and tsunamis.

*Notable human-induced disasters*

- *Brazil Plan Crash São Paolo's Congonhas Airport*
- *North Korea Oil Pipe Explosion*
- *Siberia Mine Explosion*
- *Mozambique Munitions Explosion*
- *Congo Train Derailment*

*Source: Time Magazine Lists* *http://content.time.com/time/specials/2007/article/0,28804,1686204_1686252_1690614,00.ht*

Most human activities directly responsible for creating disasters are related to technology or industry. Technological advances can and have resulted in creating both intentional and unintentional disasters. A technological disaster is attributed, in part or entirely, to human intent, error, negligence, or involves a failure of a manufactured system. An example of this is the 2010 Gulf of Mexico Oil Spill disaster, which resulted in the immediate death of 11 workers.[2]

**Complex emergencies** – Complex emergencies, which result from internal or external conflict, can be slow to take effect and can extend over a long period. In a complex emergency, there is the total or considerable breakdown of authority which may require a large-scale response beyond the mandate or capacity of any one single agency, especially in resource limited countries. Complex emergencies are categorized by

- extensive violence and loss of life;
- displacements of populations;
- widespread damage to societies and economies;
- need for large-scale, multi-faceted humanitarian assistance;
- hindrance or prevention of humanitarian assistance by political and military constraints; or
- significant security risks for humanitarian relief workers in some areas.

In WHO (2002) Environmental health in emergencies and disasters: a practical guide, **complex emergency** is defined as the following:

[2] Centers for Disease Control and Prevention. Fatal injuries in offshore oil and gas operations – United States, 2003-2010. MMWR 2013 62(16):310-4

*Situations of disrupted livelihoods and threats to life produced by warfare, civil disturbance and large-scale movements of people, in which any emergency response has to be conducted in a difficult political and security environment.*

Table 1 lists examples of natural disasters, technological/human-induced disasters and complex emergencies

**Table 1. Examples of different types of disasters**

| Natural Disasters | Technological/Human-induced Disasters | Complex Emergencies |
|---|---|---|
| • Earthquakes<br>• Extreme Heat<br>• Floods<br>• Drought<br>• Tropical cyclones<br>• Landslides<br>• Tornadoes<br>• Tsunamis<br>• Volcanoes<br>• Wildfires<br>• Winter Weather<br>• Infectious disease outbreaks | • Radiation emergencies from nuclear blasts, nuclear reactor accidents, or accidental spills of radioactive material<br>• Accidental release of hazardous chemicals<br>• Bioterrorism<br>• Oil spills<br>• Bombing or destroying a nuclear reactor | • War<br>• Conflict |

*Lead a discussion to review key lessons learned. Complete the Knowledge Checks and Discussion Questions. To guide additional discussion, you may use the following questions and suggested answers (15 minutes)*

***Potential Discussion Questions***

*What are the fundamental elements of a disaster?*

*Possible answers:*

- *It is a severe event*
- *It causes damage to infrastructure, economic and social structures or human health*
- *It requires external assistance*

Name the classifications/categories of disasters

*Possible answers:*

- *Natural disasters – ecological disruptions such as hydrometeorological or geophysical phenomena*
- *Technological or human induced (i.e., of human origin) – result either directly or indirectly from human activities that disrupt the ecosystem or relate to technological activities of human origin*
- *Complex –the combination of natural and human-induced hazards and other causes of vulnerability*

*Give examples of natural disasters*

*Possible answers:*

- *Earthquakes*
- *Extreme Heat*
- *Floods*
- *Tropical cyclones or hurricane*
- *Landslides*
- *Tornadoes*
- *Tsunamis*
- *Volcanoes*
- *Wildfires*
- *Winter Weather*
- *Infectious disease outbreaks*

***Potential Discussion Questions, continued***

*Give examples of technological/human induced disasters*

*Possible answers:*

- *Radiation emergencies from nuclear blasts, nuclear reactor accidents, or accidental spills of radioactive material*
- *Accidental release of hazardous chemicals*
- *Bioterrorism*
- *Oil spills*
- *Bombing or destroying a nuclear reactor*

*Give examples of complex emergencies*

*Possible answers:*

- *War*
- *Conflict*

**KNOWLEDGE CHECK**

Oil spills, radiation emergencies from nuclear blasts, and bioterrorism are all examples of what kind of disaster? *(You may select more than one response)*

A. Natural disaster

**B. Technological disaster**

C. Complex emergency

**D. Human-induced disaster**

**DISCUSSION QUESTION #1**

Think about your community. What types of disaster(s) is your community most likely to experience?

*Allow respondents to answer for their specific community. We recommend you think of a few disasters for the local region as examples.*

***Independent Reading**: Tell learners to read the next section of Lesson 1 – Effects of Disasters – until they see the STOP sign (pages 6-8).*

***TIME**: 10 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## EFFECTS OF DISASTERS

A key aspect to remember is that a natural or human-induced event becomes a disaster only if it reaches a scope that is beyond the local capacity to handle the emergency and requires the assistance of external organizations. Often times, the hazard by itself might not be devastating. For example, a tropical cyclone that occurs in the middle of an ocean is purely a weather event and does not cause much, if any, damage. Such a disaster's effect will vary between communities depending on preparedness levels, resiliency, and mitigation efforts; that is, what might be a disaster in one community might not be a disaster in another. An area with a tsunami warning system might experience less of an effect (e.g., loss of life) from a tsunami than might an area with no warning system.

*A hazard may lead to a disaster when it interacts with vulnerable human populations*

Several factors contribute to the vulnerability of a community: social vulnerabilities associated with poverty, social class, health and nutritional status, access to health services, and environmental conditions.

A disaster's effects generally fall into the following categories.[3]

**Infrastructure Damage** – Damage may occur to houses, business centers, hospitals, and transportation services. The local health infrastructure may be destroyed, which can disrupt the delivery of routine health services to an affected population. People who vacate damaged housing and other buildings may be without adequate shelter. Roads may be impassible or damaged, hindering relief efforts, limiting access to needed medical supplies and care, affecting the distribution of food throughout the country, and increasing the risk of injuries as a result of motor vehicle incidents. Environmental hazards can cause a disruption to utility services (e.g., power, telephone, gas) and to the delivery of basic services.

[3] CDC, Public Health Surveillance for Disaster-related Mortality. Full-day Training: Colorado Department of Health and Environment Disaster Epidemiology Training; October 24, 2012; Denver CO

**Human impact** – Injury or death are the most immediate effects of disasters on human health. In the wake of a disaster and the ensuing infrastructure and societal damage, morbidity rates for a variety of illnesses may increase as populations become displaced and relocated to areas where health services are not available. Or populations can find themselves in areas not equipped to handle basic needs at the level necessary to manage a surge of patients. Damage to infrastructure can lead to food and water shortages and inadequate sanitation, all of which accelerate the spread of infectious diseases. Loss of loved ones, social support networks, or displacement can result in psycho-social problems. Proper management of dead bodies also becomes a challenge and every effort should be taken to identify the bodies and assist with final disposal in accordance with surviving family member wishes and the religious and cultural norms of the community.

**Environmental hazards** – During natural or human-induced disasters, technological malfunctions may release hazardous materials into the community. For example, toxic chemicals can release and be dispersed by strong winds, seismic motion, or rapidly moving water. In addition, disasters resulting in massive structural collapse or dust clouds can cause the release of chemical or biologic contaminants such as asbestos or mycotic (fungal) agents. Flooded or damaged sewers or latrines may force people to use alternative methods for disposing human waste, potentially introducing additional environmental hazards into a community. Increase in vector populations, such as mosquitoes or rodents can pose a risk to human health, as can stray animals displaced by the disaster.

Regardless of how a disaster's effects are characterized, the result is a serious disruption of the functioning of society, causing widespread human, material, or environmental losses that exceed the local capacity to respond, and require external assistance.

*Lead a discussion to review key lessons learned. Complete the Knowledge Checks and Discussion Questions. To guide additional discussion, you may use the following questions and suggested answers (15 minutes)*

***Potential Discussion Questions***

*At what point does a natural or technological/human-induced event become a disaster?*

*Possible answer:*

*If it reaches a scope that exceeds local resources and requires assistance from external organizations*

*Name the impact categories of disasters?*

*Possible answers:*

- *Infrastructure damage*
- *Human impact*
- *Environmental hazards*

*What is the result of a disaster?*

*Possible answer:*

*Disasters almost always result in increased morbidity and mortality and other public health concerns, environmental and infrastructure damage, or societal disruption.*

**KNOWLEDGE CHECK**

*Fill-in the blank with the correct response to the sentences.*

Damage to houses, business centers, hospitals, and transportation services is an example of **infrastructure damage**.

Chemical or biologic contaminants such as asbestos or mycotic (fungal) agents possibly released from massive structural collapse or dust clouds during a natural or human induced disaster are categorized as **environmental hazards**

**Human impact** of a disaster can include increased morbidity rates for a variety of illnesses.

### DISCUSSION QUESTION #2

What are the factors that can influence the effects a disaster may have on a community or region?

*A disaster's impact will vary depending on community preparedness levels, resiliency, and mitigation efforts; what may be a disaster in one community may not be one in another. Several factors contribute to the vulnerability of a community: these factors include social vulnerabilities associated with poverty, social class, predisaster health and nutritional status, access to health services, and environmental conditions*

***Independent Reading**: Tell learners to read the next section of Lesson 1 – Disaster-Related Health Effects and Public Health Implications – until they see the STOP sign (pages 9-12).*

***TIME**: 15 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## DISASTER-RELATED HEALTH EFFECTS AND PUBLIC HEALTH IMPLICATIONS

Several factors determine the public health effects of a disaster, including the nature and extent of the disaster itself, population density, underlying health and nutritional conditions of the affected population, level of preparedness, and the preexisting health infrastructure.

Defining the relationship between a disaster and its specific health effects requires broad scientific investigation. Nevertheless, using available and reliable evidence and information, we can classify a disaster's health effects as either direct or indirect.

**Direct health effects** – Caused by the disaster's actual, physical forces. Examples of a direct health effect include drowning during a tsunami or injury caused by flying debris during a hurricane or tornado. These health effects typically occur during the event.

**Indirect health effects** – Caused by unsafe/unhealthy conditions that develop due to the effects of the disaster or events that occur from anticipating the disaster. Some indirect health effects may not appear until several weeks following a disaster while other indirect health effects may occur immediately after, or even prior to, the disaster.

For example, carbon monoxide poisoning is an indirect health effect that typically occurs during power outages and would require immediate attention. Table 2 describes several possible direct and indirect health effects of natural disasters.

**Table 2. Direct and indirect health effects of natural disasters**

| Type of Disaster | Direct Health Effects | Indirect Health Effects |
|---|---|---|
| Hurricane/cyclone | • Drowning<br>• Injuries from flying debris (e.g., head and chest trauma)<br>• Injuries from submerged debris or structures (e.g., puncture wounds) | • Worsening of chronic disease<br>• Carbon monoxide poisoning<br>• Waterborne disease<br>• Vector-borne disease<br>• Disease outbreak<br>• Mental health concerns |
| Tornado | • Injuries from flying debris or structural collapse | • Worsening of chronic disease<br>• Carbon monoxide poisoning<br>• Waterborne disease<br>• Vector-borne disease<br>• Disease outbreak<br>• Mental health concerns |
| Flood | • Drowning<br>• Injuries from submerged debris or structures | • Worsening of chronic disease<br>• Carbon monoxide poisoning<br>• Waterborne disease<br>• Vector-borne disease<br>• Disease outbreak<br>• Mental health concerns |
| Earthquake | • Injuries from rock slides or collapsed buildings<br>• Drowning from ensuing tsunami | • Worsening of chronic disease<br>• Carbon monoxide poisoning<br>• Waterborne disease<br>• Vector-borne disease<br>• Disease outbreak<br>• Mental health concerns |
| Volcanic eruption | • Suffocation by ash or toxic gases<br>• Injuries, including burn injuries, from mud or lava flows<br>• Drowning from ensuing tsunami | • Worsening of chronic disease<br>• Carbon monoxide poisoning<br>• Waterborne disease<br>• Vector-borne disease<br>• Disease outbreak<br>• Mental health concerns |

## PUBLIC HEALTH CONCERNS FOLLOWING A DISASTER

One of the public health concerns following a disaster is the potential for the spread of communicable diseases or new illness outbreaks. Damage to water systems, sanitation facilities, food supply systems, health infrastructure, and other basic infrastructures can increase the risk of an outbreak following a disaster. The gathering of large numbers of displaced people within shelters or refugee camps provides increased opportunity for disease transmission. In addition to the effect on humans, disasters can also disrupt the environment and increase human exposure to vectors such as mosquitoes, rodents, or other animals. Outbreaks do not spontaneously occur after a disaster. The risk of an outbreak of a communicable disease to occur is minimal unless the disease is endemic in an area before the disaster, because transmission cannot take place unless the causative agent is present. Improved sanitary conditions can greatly reduce the chances of an outbreak.[4]

In addition to concerns about communicable diseases, public health officials also track chronic diseases, mental health problems, injuries and mortality. Chronic diseases such as diabetes, asthma, and high blood pressure could worsen due to disruption of routine health services, lack of access to prescription drugs, or environmental conditions. The inability to treat chronic diseases could be life-threatening to vulnerable populations and could give rise to additional complications that could affect a person's long-term quality of life.

After the initial phases of a disaster, the overall public health response effort gradually shifts from providing emergency care to providing primary and routine health services and resolving environmental health concerns. The epidemiologist should carefully assess the potential effect of the disaster on long-term public health needs. Damaged infrastructure after a disaster may significantly affect the ability to deliver routine health services for months or even years, interrupting immunization campaigns and treatment of chronic diseases.

Mental health problems can become a major public health concern following a disaster. The lack of mental health services or increase in stress may result in a rise suicide attempts, domestic violence, safety concerns for family and friends, and a feeling of anxiety attributed to the monumental task of rebuilding a life.[5] In addition, disaster-related injuries might include drowning, electrocution due to downed power lines, motor vehicle crashes, and injuries due to cleanup efforts (e.g. chain saw injuries, wounds, tetanus).

[4] Pan American Health Organization. Natural Disasters: Protecting the Public's Health. Washington (DC); 2000. Report No.: 575.
[5] University of North Carolina. Public health consequences of disasters. Haiti Field Epidemiology Training Program, Intermediate, Module 6; no date [cited 2014 Oct 16].

*Lead a discussion to review key lessons learned. Complete the Knowledge Checks and Discussion Questions. To guide additional discussion, you may use the following questions and suggested answers (15 minutes)*

***Potential Discussion Questions***

*How are direct health effects caused?*

*Possible answer:*

*Direct health effects are caused by the disaster's actual, physical forces. Examples of direct health effects include drowning from a tsunami or injury from flying debris during tropical cyclone, hurricane or tornado. These direct health effects of disasters typically occur during the event. These effects usually require immediate attention and resource allocation by emergency managers or public health response agencies.*

*How are indirect health effects caused?*

*Possible answers:*

*Indirect health effects result from unsafe/unhealthy conditions that develop due to the disaster's effects or events that occur while anticipating the disaster. Some indirect health effects may not appear until several weeks following a disaster, while other indirect health effects may appear immediately after the disaster. For example, carbon monoxide poisoning is an indirect health effect that typically occurs during electricity (power) outages and would require immediate attention.*

*What are examples of direct health effects of tropical cyclone?*

*Possible answers:*

- *Drowning*
- *Injuries from flying debris (e.g., head and chest trauma)*
- *Injuries from submerged debris or structures (e.g., puncture wounds)*

.

*What are examples of indirect health effects of tropical cyclones or hurricane?*

*Possible answers:*

- *Exacerbation of chronic disease*
- *Carbon monoxide poisoning*
- *Water-borne disease*
- *Vector-borne disease*
- *Disease outbreak*
- *Mental health concerns*

## KNOWLEDGE CHECK

What is not a typical example of an indirect health effect?

A. Exacerbation of chronic disease

B. Waterborne disease

**C. Drowning**

D. Disease outbreak

## DISCUSSION QUESTION #3

In what ways can treatment of chronic disease be affected after an earthquake?

*Chronic disease treatment might be affected if health care infrastructure, such as hospital facilities, are destroyed or damaged. Due to destruction of roads and buildings, people might be unable to receive medication necessary for chronic disease management.*

***Practice Exercise Instructions***

*Depending on the size of the group, tell learners to complete this exercise individually, with a colleague, or as part of a small group. Instruct them to read through the following case studies and answer the questions related to each case. Have learners record their answers in the space provided in the participant workbook. Once completed, review the exercise and discuss possible answers*

***TIME**: 15 minutes per scenario, include additional time for review*

*NOTE: Depending on the size of the group and your time constraints, you may wish to assign different groups to look at different scenarios. For example, groups 1 and 2 might look at scenarios 1 and 2, while groups 3 and 4 look at scenarios 3 and 4.*

## PRACTICE EXERCISE

### PRACTICE EXERCISE #1

*In this practice exercise, learners will apply the concepts learned in Lesson 1 to actual examples of disasters and their effects.*

**The Great East Japan Earthquake – 2001**

On March 11, 2011, a 9-magnitude earthquake struck the east coast of Japan and triggered a tsunami with waves estimated to be greater than 30 meters, destroying many cities and villages. The earthquake and tsunami claimed over 15,000 lives and left over 2,000 missing. This catastrophic event severely damaged the Fukushima Nuclear Power Plant, resulting in the release of radioactive material. Radioactive contamination from the power plant added to the public health effects from the tsunami and earthquake.

http://reliefweb.int/sites/reliefweb.int/files/resources/Ops_Update_24monthReport_Final.pdf; http://www.who.int/kobe_centre/emergencies/east_japan_earthquake/situation_reports/sitrep35_6july2011.pdf

**How would you classify this disaster?**

*This is classified both a natural and technological or human induced disaster. An earthquake and a tsunami are both natural disasters, but the resultant release of radioactive material would be considered technological or human induced disaster.*

**What are the potential resulting effects of the disaster?**

*The most significant effect was the toll on human health, which resulted in death and injury for over 27,000 persons. Infrastructure damage occurred in which homes, businesses, hospitals, and public health services were severely curtailed or completely destroyed. The earthquake and tsunami triggered a technological disaster which caused environmental hazards, in this case the release of radioactive materials from the nuclear power plant.*

**What are the likely public health implications?**

*Injuries resulting from the earthquake and tsunami are ongoing concerns, as are cleanup efforts. Concerns include chronic diseases (e.g., diabetes, asthma) and mental health and wellness when coping with a disaster. Exposure to cold weather and a lack of shelter could result in hypothermia. Exposure to radioactive material could also result in short- and long-term health issues. Following a disaster, damage or disruption to water systems, sanitation facilities, food supply systems, health infrastructure, and other basic infrastructure can increase the risk of an outbreak or illness. And the potential remains for the spread of communicable diseases or disease outbreaks.*

**What are the possible direct health effects?**

*Immediate or direct public health effects include drowning or physical trauma from the tsunami and earthquake.*

**What are the possible indirect health effects?**

*Long-term or indirect public health effects include exacerbation of chronic diseases (e.g., someone with diabetes might not have regular access to needed medications), potential effects of radiation contamination, water-borne diseases (e.g., norovirus), vector-borne diseases (e.g., malaria), communicable disease outbreaks in shelters, and mental health. Remember, risk of an outbreak of a communicable disease to occur is minimal unless a disease is endemic in an area before the disaster, because transmission cannot take place unless the causative agent is present.*

**What are some potential response challenges?**

*Damaged infrastructure (e.g. road inaccessibility, downed power lines), disruption or elimination of basic public health functions (sanitation, waste water treatment), and responder safety related to possible radiation exposure. The chaotic and overwhelming complexity of the disaster required an international response that exceeded the capacity of a single agency within Japan. Long-term emergency shelters were required due to large-scale and continued evacuations of the population near the power plant.*

**Tungurahua – 2006**

The Tungurahua volcano in Ecuador erupted on August 16, 2006. The eruption continued overnight before diminishing the following day. Massive clouds of ash, steam, and gas (approximately 8 km high), as well as abundant lava and pyroclastic flows descended through Achupashal, Cusúa, Mandur, Bascún, Juive Grande and La Hacienda rifts. The villages of Chilibu, Choglontuz, and Palitagua were severely damaged.

Volcanic material was also reported in Baños and blocked the Chambo and Puela rivers, producing a dam and putting several communities at risk for flooding. Ash fallout also severely affected the provinces of Los Ríos and Bolívar.
http://www.paho.org/disasters/index.php?option=com_content&task=view&id=759&Itemid=904

**How would you classify this disaster?**

*A volcanic eruption is considered a natural disaster.*

**What are the potential resulting effects of the disaster?**

*The primary source of infrastructure damage comes from the heavy ash fallout and other debris from the volcano, which can cause collapsed roofs and impassible roads. Driving in ash-filled conditions might be difficult or impossible due to slippery road conditions or poor visibility, resulting in automobile accidents that cause injuries. The falling ash severely damaged villages, power grids, and water systems, causing unsafe conditions for communities located near the blocked dam. The massive clouds of ash, steam and gas can cause eye, skin, and respiratory irritation in humans, particularly those with preexisting conditions such as asthma or chronic bronchitis. Because of the stress and trauma of the event, the affected population could experience long-term mental health issues.*

**What are the likely public health implications?**

*Heavy ash fallout can lead to collapsed roofs, which can kill or injure people inside the buildings. Also, ash and other debris can cause severe burns or asphyxiation or both, and may contaminate food and water supplies. People in the vicinity of the ash fallout can have respiratory ailments, such as irritated nose, throat, and breathing difficulties. The affected population could also experience mental health problems.*

**What are the possible direct health effects?**

*Immediate or direct health effects include suffocation from ash, exposure to toxic gases, injury from mud or lava flows, and drowning from an ensuing tsunami on the coast or flooding from blocked rivers.*

**What are the possible indirect health effects?**

*Long-term or indirect health effects include exacerbation of chronic diseases (e.g., asthma, high blood pressure), water-borne diseases (e.g., malaria or yellow fever), and waterborne diseases (e.g., typhoid fever), mental health. Remember, risk of an outbreak of a communicable disease to occur is minimal unless a disease is endemic in an area before the disaster, because transmission cannot take place unless the causative agent is present.*

**What are some potential response challenges?**

*The falling ash severely damaged roads, power grids, and water systems, which made the movement of people or supplies extremely difficult or impossible. Rising dam levels made several villages inaccessible, which hampered evacuation efforts.*

**Heavy Rains and Landslides affect Guatemala – 2010**

Heavy rains in September 2010, on the Pacific coast of Guatemala, caused landslides and overflowing of rivers, due to soil saturation. According to reports, there were more than 40 deaths, 16 people went missing and more than 50,000 people were affected. A red alert was declared in the affected areas. There was no damage to health facilities, although the road infrastructure was affected.
http://www.paho.org/disasters/index.php?option=com_content&task=view&id=1371&Itemid=904

**How would you classify this disaster?**

*This disaster can be classified as a natural disaster which was the result of heavy rain leading to soil saturation and landslides*

**What are the potential resulting effects of the disaster?**

*Rapidly moving water and debris can cause infrastructure damage such as broken electrical, water, gas, and sewage lines. Roads are destroyed or greatly damaged, which endanger motorists and prevent the transportation of and access to relief aid. Other infrastructure in the path of the landslide can be severely damaged or destroyed (e.g., water systems, healthcare facilities, and communication).*

**What are the likely public health implications?**

*Landslides may cause many deaths in a very short amount of time, with trauma and suffocation by entrapment among the most common. Damage or destruction to health infrastructure, causing a potential lack of access to healthcare and chaotic environmental conditions, becomes a concern for communicable diseases that are endemic in the area. Public health officials also should track mental health problems and bodily injuries*

**What are the possible direct health effects?**

*Some immediate or direct health effects include death and injuries from debris slides or mudflows.*

**What are the possible indirect health effects?**

*Some long-term or indirect health effects include exacerbation of chronic disease, water-borne diseases, vector-borne disease, and mental health issues. Remember, risk of an outbreak of a communicable disease to occur is minimal unless a disease is endemic in an area before the disaster, because transmission cannot take place unless the causative agent is present*

**What are some potential response challenges?**

*Landslides rapidly destroy roadways and cause catastrophic debris slides. Landslides hamper safe movement of people or supplies. Landslides also bury villages and hillside houses, which complicates search and rescue efforts.*

**Darfur- Western Sudan, Sudan's Darfur Conflict – 2003**

The Darfur region in western Sudan is experiencing one of the world's worst humanitarian emergencies. Since early 2003, conflict and violence between government forces and Janjaweed militia against the rebel forces of the Sudan Liberation Movement/Army and the Justice and Equality Movement have driven over one million people from their homes. The displaced have sought refuge in makeshift camps in Sudan and over 150,000 refugees have sought shelter and relief across the border in Chad

http://origins.osu.edu/article/worlds-worst-humanitarian-crisis-understanding-darfur-conflict

The operating environment in Darfur, Sudan, where displacement and population movements occur continuously, is extremely challenging. The population of concern includes around 2.3 million internally displaced persons (IDPs), some 140,000 refugees, 7,000 asylum-seekers and an estimated hundreds of thousands persons at risk of statelessness. Most are refugees from Eritrea, Ethiopia, Chad, the Democratic Republic of the Congo (DRC) and Somalia. http://www.unhcr.org/pages/49e483b76.html

**How would you classify this disaster?**

*This disaster was a complex emergency caused by several confounding factors including warfare and civil disturbance, and resulting in the large-scale movement of people. Any emergency response had to be conducted in an extremely difficult political and security environment.*

**What are the potential resulting effects of the disaster?**

*Infrastructure in Darfur is nearly nonexistent, with persistent drought ravaging the land and diminishing pasture lands. The human impact was great—refugees faced malnutrition, violence, and high morbidity and mortality.*

**What are the likely public health implications?**

*Due to the complex nature of the disaster, food was scarce, poverty was widespread, and access to healthcare was limited to nonexistent. These public health implications contributed to poor health status among refugees.*

**What are the possible direct health effects?**

*Immediate health effects included injury and death among refugees, starvation, and food insecurity.*

**What are the possible indirect health effects?**

*Long term health effects included malnutrition, spread of communicable disease, worsening chronic conditions, and severe mental health problems. Because of limited resources, health systems were unable to provide care.*

**What are some potential response challenges?**

*The complex political atmosphere and the civil strife hampered the relief agencies' efforts. Warfare threatened the safety of relief workers and prevented the distribution of food, water, and medical supplies to refugees. Additionally, refugees were constantly displaced, which hindered surveillance activities and contributed to the spread of communicable disease.*

*After you are completed with the scenarios, summarize the key learning points from Lesson 1 outlined in the Lesson 1 Summary*

## LESSON 1 SUMMARY

As you have learned in this lesson, a disaster is a serious disruption of the functioning of society, causing widespread human, material, or environmental losses that exceed the local capacity to respond and therefore necessitates external assistance. Disasters are classified as natural, technological/human-induced, complex. A key aspect to remember is that a hazard becomes a disaster only if it reaches a scope that is beyond the capacity of local resources and requires assistance from external organizations. Given the evidence and information, a number of health effects of a disaster can be classified as a direct health effect or an indirect health effect.

Public health concerns following disasters include increased morbidity and mortality due to exacerbation of chronic diseases such as diabetes and asthma; mental health, especially in the absence of mental health services available to those affected by the disaster; and the potential risk of an outbreak due to damage to water systems, sanitation facilities, food supply systems, health infrastructure, and other basic infrastructure. The gathering of large numbers of displaced people within shelters or refugee camps also may provide increased opportunities for transmission of disease.

***Lesson 2**: The Role of Disaster Epidemiology in Disaster Preparedness and Response*

***Overview:** This lesson describes the role of an epidemiologist in the disaster cycle*

***Total Estimated Time**: 2 hours*

***Reading and Activities**: up to 35 minutes*

***Group Discussion**: up to 35 minutes*

***Practice Exercise #1**: 50 minutes, including a 20-minute review*

# LESSON 2: THE ROLE OF DISASTER EPIDEMIOLOGY IN DISASTER PREPAREDNESS AND RESPONSE

***Independent Reading**: Tell learners to read the first four sections of Lesson 2—Introduction, Goals of Disaster Epidemiology, The Disaster Cycle, The Role of an Epidemiologist in Disaster Preparedness and Response – until they see the STOP sign (pages 18-25).*

***TIME**: 25 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## INTRODUCTION

Traditional epidemiologic methods and tools apply to disaster preparedness, response, and recovery efforts. Disaster epidemiology uses epidemiologic principles to assess both the short- and long-term adverse health effects of disasters and to predict the consequences of future disasters. Epidemiologists are increasingly called on to assist with both natural and technological disaster responses. Given the complex nature of disaster preparedness and response efforts, and given the multiple players and stakeholders involved, understanding the unique role and responsibilities of an epidemiologist is critical. This lesson describes the role of an epidemiologist within the disaster cycle.

After completing this lesson, you will be able to do the following:

- Define the goals of disaster epidemiology
- Describe the disaster cycle
- Explain the epidemiologist's role during each phase of the disaster cycle
- Identify as an epidemiologist the unique challenges of responding to a disaster

## GOALS OF DISASTER EPIDEMIOLOGY

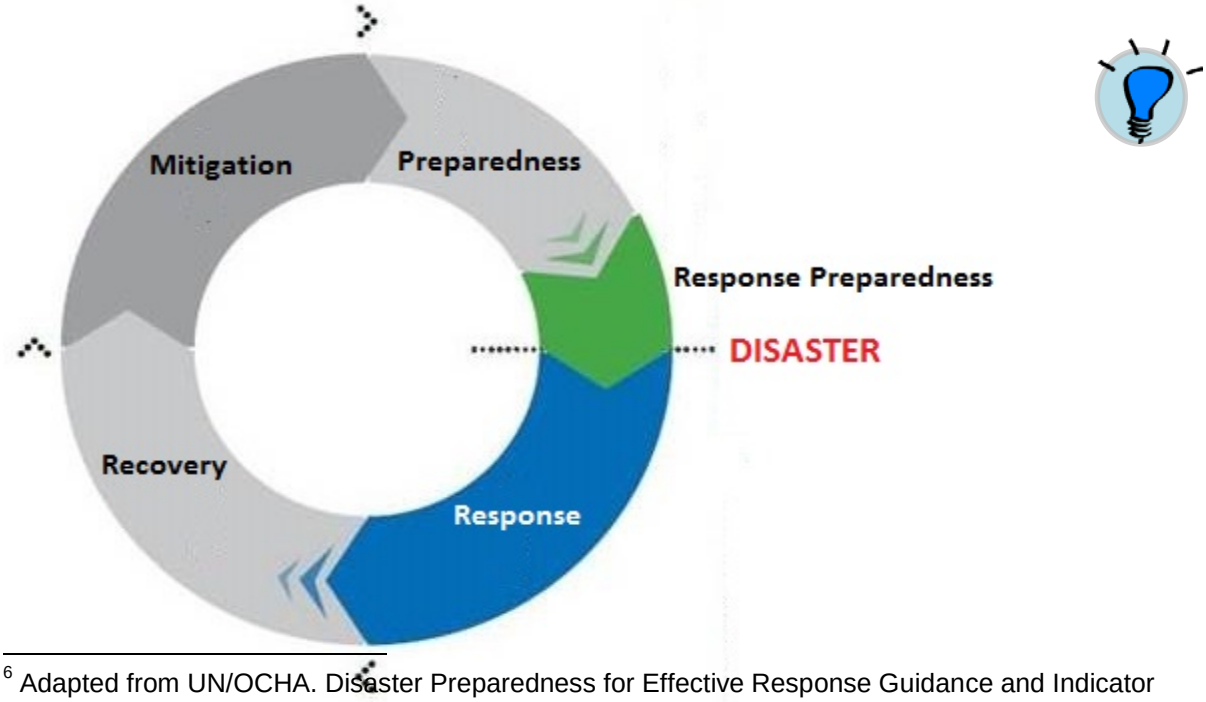
The primary goal of disaster epidemiology is to prevent or reduce the morbidity and mortality resulting from a disaster. Disaster epidemiology can produce timely and reasonably accurate information about morbidity and mortality caused by disasters and the factors that put populations at risk for illness and death. This information is essential to inform decisions about how to prioritize response efforts and where to direct relief supplies, equipment, and personnel. Epidemiologic knowledge can also identify specific risk factors associated with different types of disasters. Such identification can help develop effective strategies for mitigating the effects of disasters in the future. Such data can also inform the design of early warning systems and the development of targeted training and education programs

> ***Disaster epidemiology*** *is the use of core public health capabilities to*
>
> - *Assess the needs of affected populations and provide timely and accurate health information to decision makers, and*
> - *Identify risk factors and improve prevention and mitigation strategies for future disasters*

## THE DISASTER CYCLE

Disasters are often thought of as happening in a cyclical manner, consisting of four phases: preparedness, response, recovery, and mitigation (Figure 1).[6] It is important to note that the activities that take place within the disaster cycle are interrelated and may happen concurrently.

**Figure 1. Four phases of the disaster cycle**




(Source: UNOCHA)

[6] Adapted from UN/OCHA. Disaster Preparedness for Effective Response Guidance and Indicator Package for Implementing Priority Five of the Hyogo Framework, Geneva.2008. Available from: http://www.unisdr.org/files/2909_Disasterpreparednessforeffectiveresponse.pdf.

**Preparedness** – The preparedness phase includes the development of plans designed to save lives and to minimize damage when a disaster occurs. Disaster prevention and preparedness measures should be developed and put in place long before a disaster strikes. Preparedness plans should be developed based on the identification of potential disasters and the related risks associated with those disasters. When possible, this should include hazard mapping to specify locations at high risk for specific disasters. The plan should include training of health personnel, community members, and other potential first-responders, as well as establishing systems for communicating warnings to the community.

Strategies for evacuating at-risk communities before impending disasters should be well thought out and communicated to community members. Weather patterns, geophysical activities, terrorist activities, industrial activities, wars, and other activities associated with a potential disaster should be monitored so that officials can anticipate impact, issue timely warnings and, when possible, evacuate at-risk populations. This phase should also include an inventory of available resources to respond to a potential disaster. An inventory will help estimate the additional resources needed and speed up the mobilization of resources following a disaster. Finally, partnerships should form in the preparedness phase to establish alliances, outline respective roles and define everyone's responsibilities.

**Response** – The response phase is the actions taken to save lives and prevent further damage in a disaster. This phase begins immediately after a disaster has struck. During the response phase, plans developed in the preparedness phase are put into action. While some disasters last only for a few seconds (e.g., earthquakes, explosions), others might last for several days, weeks, or even months (e.g., floods, droughts). The primary focus of the response phase is to provide relief and take action to reduce further morbidity and mortality. Such actions include providing first aid and medical assistance, implementing search and rescue efforts, restoring transportation and communication networks, conducting public health surveillance, and evacuating people who are still vulnerable to the effects of the disaster. Also during this phase necessary supplies, including food and water, are distributed to survivors.

**Recovery** – As the immediate needs of the disaster are addressed and the emergency phase ends, the focus of the disaster efforts shifts to recovery. The recovery phase includes the actions taken to return the community to normal following a disaster.

Actions during this phase include repair and maintenance of basic health services, including sanitation and water systems; repair, replace or rebuild property; and the proper management of dead bodies. Proper care of dead bodies is necessary to help minimize the psychosocial effects on families. The management of dead bodies involves a series of activities that begin with the search for corpses, in situ identification of bodies, transfer to a facility serving as a morgue, delivery of the body to family members, and assistance from local health authorities for the final disposal of the body in accordance with the wishes of the family and the religious and cultural norms of the community. Documenting the cause of death, manner of death, and relationship to the disaster is important to better understand the human health effects of a disaster.

**Mitigation** – The mitigation phase is the sustained action or development of policies that reduce or eliminate risk to people and property from a disaster. During the mitigation phase, identified risks and population vulnerabilities are carefully reviewed to develop strategies to prevent reoccurrence of the same type of disaster in the future or limit the effect from such disasters. Existing preparedness plans are reviewed and revised to enhance the preparation efforts. A few examples of activities that could take place during the mitigation phase are building or strengthening dams and levees, establishing better and safer building codes, purchasing fire insurance, and updating land use zoning.

Though the order of events that take place following a disaster have a specific priority, many activities happen simultaneously. Similarly, some activities related to disaster response and recovery can extend for long periods. This is evident in continued efforts to manage the Chernobyl Nuclear Power Plant disaster that continues to plague the area over 30 years later with continued health risks and environmental cleanup.[7]

## THE ROLE OF AN EPIDEMIOLOGIST IN DISASTER PREPAREDNESS AND RESPONSE

One public health action goal during a disaster is to identify certain risk factors. Specifically, those risk factors that predispose individuals or populations to adverse health outcomes during the four phases of the disaster cycle (preparedness, response, recovery and mitigation). The knowledge of these risks helps identify mechanisms of death, injury, and exposure. Such risk mechanism identification can mitigate the effects of current disasters and improve prevention and mitigation strategies for future disasters. Epidemiologists help to identify disaster-related outcomes, consider risk factors for disaster-related outcomes, and determine relevant risk

[7] The Chernobyl Forum. Chernobyl's legacy: health, environmental and socio-economic impacts and recommendations to the governments of Belarus, the Russian Federation and Ukraine. 2002. Available from http://www.preventionweb.net/files/5516_Chernobyllegacy.pdf

factors for affected population groups. Epidemiologists have a role to play during all phases of the disaster cycle. But the epidemiologist's primary role is during the preparedness, response, and recovery phases.[8]

## During the Preparedness Phase

During the preparedness phase, an epidemiologist's role is to conduct activities such as hazard mapping, translating data into policy, vulnerability analysis, educating the local community, and providing guidelines for community needs assessment and disaster-related morbidity and mortality surveillance. In addition, epidemiologists play a vital role in providing training and building partnerships among potential disaster response agencies, such as local and state health departments, national or international governmental and nongovernmental organizations, and academic institutions. Throughout the disaster cycle, identifying the key partners in disaster response and including them in response plan development helps to smooth relationships among agencies.

## During the Response Phase

During a disaster's response phase, the assistance of an epidemiologist is usually requested. The request is typically to support immediate response efforts. The epidemiologist plays a major role in such response efforts. During this phase, the epidemiologist employs scientific data collection and analysis methods to conduct a rapid assessment of health and medical needs through surveys and investigations. Using information obtained through needs assessments and surveillance, the epidemiologist can make recommendations for the distribution of health resources and other resources to affected populations.

**Rapid needs assessment (RNA)** – An epidemiologist might conduct an RNA during the response phase of a disaster. RNAs quickly identify a community's basic and health needs. The assessments help determine the magnitude of a community's needs and aid in planning and implementing relief efforts. A toolkit developed by CDC, the Community Assessment for Public Health Emergency Response (CASPER), can be a valuable reference for conducting rapid needs assessments. You will learn more about RNAs in Module 2 of this course.

**Surveillance** – During a disaster response, an epidemiologist might conduct surveillance of the health problems faced by the affected populations. Morbidity surveillance detects disease outbreaks and tracks disease trends. Early detection and response can mitigate the likelihood of outbreaks. Conducting health surveillance allows for informed decisions about allocating resources, targeting interventions to meet specific needs, and planning for future disasters. In addition to public health morbidity surveillance, mortality surveillance can provide information to prevent excess death.

[8] Noji EK. The Public Health Consequences of Disasters. New York, NY: Oxford University Press; 1997.

Available surveillance systems should be used to the extent possible. In the preparedness phase, surveillance systems useful for detecting disaster-related health effects should be identified. But following disasters, disruption of health systems might occur; use of traditional surveillance systems is not always feasible and alternate surveillance methods should also be considered. You will learn more about public health surveillance during disasters in Module 3 of this course.

## During the Recovery and Mitigation Phases

Following the response phase of a disaster, the epidemiologist's role is to continue necessary surveillance and monitoring activities, conduct research on the causes of disaster-related morbidity and mortality, evaluate interventions, and develop follow-up studies of populations affected by the disaster. The findings from these studies can help to identify prevention strategies for future disasters.

**Epidemiologic case studies** – While epidemiologic studies are mainly conducted after the disaster is over, the development of the study plan and associated data collection efforts begin in the response phase. The studies aim at revealing relationships between exposures and mortality and morbidity. Epidemiologic studies can include case-control studies, cohort studies, risk factor studies, case series, and outbreak investigations. Some examples are

- a case-control study on the risk of tornado-related death and injury after the tornado has occurred,
- an ecological study on chronic diseases and disaster medication needs of tropical cyclone or hurricane evacuees, or
- a cohort study of the potential link between severe flooding and an increase in the incidence of gastrointestinal symptoms in affected populations.

**Evaluation and effectiveness studies** – Evaluation and effectiveness studies can occur during a response or after the disaster. These studies evaluate specific programs and response techniques and assess the success of specific programs and responses. Evaluation and effectiveness studies can focus on the implementation of relief programs, methods used, or the performance of the local health authorities during a response. Examples of evaluation and effectiveness studies include the following:

- Lessons learned from an emergency response to cyclone or hurricane-related mass evacuations
- An outcomes assessment of a particular triage method after disasters
- An assessment of the use and distribution of health services following a disaster

*Lead a discussion to review key lessons learned. Complete the Knowledge Checks and Discussion Questions. To guide additional discussion, you may use the following questions and suggested answers (25 minutes)*

***Potential Discussion Questions***

*What are the main concepts you learned from the sections you just read?*

*Possible answer:*

- *The goals of disaster epidemiology*
- *The disaster cycle*
- *The role of an epidemiologist during the different phases of the disaster cycle*

*Define disaster epidemiology*

*Possible answers:*

*Disaster epidemiology is the use of core public health capacities to assess the needs of affected populations, provide timely and accurate health information to decision makers, identify risk factors, and improve prevention and mitigation strategies for future disasters*

*Describe the Response phase*

*Possible answer:*

*During the response phase, plans developed in the preparedness phase are activated. While some disasters last only for a few seconds (earthquakes, bombs, or other explosions), others might last for several days, weeks, or even months (floods or droughts). Thus the timing of the Response phase can vary. The primary focus of the Response phase is to provide relief and take action to reduce further morbidity and mortality*

***Potential Discussion Questions, continued***

*Describe the Recovery phase*

*Possible answer:*

*Once the immediate needs of disaster victims are addressed and the emergency phase ends, the focus of disaster efforts shifts to recovery. The Recovery phase includes the actions taken to return the community to normal following a disaster. Actions that take place during this phase include the repair and maintenance of basic health services, including sanitation and water systems; repairing, replacing or rebuilding property; and the management of dead bodies.*

*Describe the Mitigation phase*

*Possible answer:*

*The Mitigation phase is the sustained action or development of policies that reduce or eliminate risk to people and property from a disaster. During the Mitigation phase, identified risks and population vulnerabilities are carefully reviewed to develop strategies to prevent reoccurrence of the same type of disaster in the future or limit the effects from such disasters. Existing preparedness plans are reviewed and revised to enhance the preparation efforts. A few examples of activities that could take place during the Mitigation phase are building or strengthening dams and levees, establishing better and safer building codes, purchasing fire insurance, and updating land use zoning.*

*Describe the role of the epidemiologist throughout the disaster cycle*

*Possible answer:*

*During the Preparedness phase, an epidemiologist's role is to conduct activities such as hazard mapping, translating data into policy, vulnerability analysis, education of the local community, and provision of guidelines for community needs assessment and disaster-related morbidity and mortality surveillance. In addition, the epidemiologist plays a vital role in providing training and building partnerships. The epidemiologist plays a major role in response efforts. During the Response phase, the epidemiologist employs scientific data collection and analysis methods to conduct a rapid assessment of health and medical needs through surveys and investigations. During the Recovery and Mitigation phases, the epidemiologist's role is to continue necessary surveillance and monitoring activities, conduct research on the causes of disaster-related morbidity and mortality, evaluate interventions, and develop follow-up studies of populations affected by the disaster.*

**KNOWLEDGE CHECK** *(FROM PAGE 21)*

What are the phases of the disaster cycle?

**A. Preparedness, response, recovery, mitigation**

B. Preparedness, response, risk assessment, planning, reconstruction

C. Planning, response, risk assessment, evaluation, mitigation

D. Planning, response, recovery, surveillance, evaluation

**KNOWLEDGE CHECK** *(FROM PAGE 24)*

What activity takes place during the preparedness phase of a disaster cycle? *(you may select more than one response)*

A. Distributing basic supplies such as food and water

**B. Establishing partnerships**

C. Repairing roads and collapsed structures

D. Conducting epidemiologic studies

What activity takes place during the mitigation phase of a disaster cycle? *(you may select more than one response)*

A. Conducting a rapid needs assessment

B. Conducting an inventory of available resources

**C. Evaluating the safety of building codes**

**D. Conducting epidemiologic studies**

## DISCUSSION QUESTION #4

As an epidemiologist, what are some of the challenges or difficulties you could face in a disaster?

*Epidemiologists play a vital role in helping to identify disaster-related outcomes, consider risk factors for disaster-related outcomes, and help determine relevant risk factors for affected population groups. Still, given the many factors surrounding a disaster, in disaster situations epidemiologists face numerous and complex problems, including the following:*

- *Working in a potentially hostile political environment*
- *Difficulty in applying epidemiologic methods in the context of great destruction, public fear, social disruption, or large population movement and shifting demographics*
- *Lack of time for organizing epidemiologic investigation*
- *Limited infrastructure for data collection*

***Independent Reading**: Tell learners to read the next section of Lesson 2 – Special Considerations for Disaster Epidemiology – until they see the STOP sign (pages 26-27).*

***TIME**: 10 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## SPECIAL CONSIDERATIONS FOR DISASTER EPIDEMIOLOGY

Challenges or considerations for disaster epidemiology include the following:

**Absence of baseline data** – Baseline information, such as prevalence of health conditions, may be absent; especially when the population affected is displaced to a shelter. In these cases information on the population may not be available before the disaster occurs. This absent or unavailable baseline information is a challenge when trying to determine the impact of the disaster such as true increases in particular health conditions. For example, an RNA after the Deepwater Horizon oil spill found that 31% of households reported at least one person experiencing recent cardiovascular symptoms. However, it is difficult to determine the true increase due to the lack of information on cardiovascular symptoms in the community prior to the oil spill.

**Difficulty in obtaining denominator data** – The population under surveillance may change frequently and be unpredictable. Residents might have evacuated or been displaced. Traditional census or population data might not adequately reflect the at-risk population. Additionally, the disaster might not affect individual persons uniformly.

**Damage or disruption to the local healthcare infrastructure** – Needed facilities might be damaged and provide only limited services. Healthcare systems might be completely destroyed and nonfunctional. Therefore, the only available medical assistance may be from outside, in the form of 1) temporary hospitals run by response workers, 2) Red Cross temporary shelters for basic medical care, or 3) mobile health units run by nongovernmental organizations or volunteer medical groups. Unfortunately, these aid agencies might not collect information uniformly, making surveillance difficult and comparison of data to create a clear picture of the disaster event nearly impossible.

**Coordination of data collection efforts** – Competing priorities often involve multiple sectors and affect what data are collected and the timing of that data collection. In addition, coordination of efforts can be difficult. Standardization of data elements across the different collection agencies and streamlined reporting and information sharing mechanisms are often difficult to obtain. Therefore, repeated collection of information in

a rapid manner from multiple sources under adverse conditions can be quite challenging.

**Logistical constraints** – Power and telephone outages affect communication networks and transportation systems. The usual reporting mechanisms can be interrupted, leading to the underreporting of health events.

**Morbidity and mortality rate calculation challenges** – To compare pre- and post-impact morbidity and mortality rates and to compare those rates across population groups, we must calculate the rates rather than use simple numbers. For example, this calculation is done by relating death counts to the population during a specific period. In stable conditions, the population data can be obtained from census bureaus or other community data sources. During emergencies, however, epidemiologists often encounter challenges in estimating the population size to use as a denominator. Typically, when census or other community level data are not available, estimates and educated guesses about the population size will need to suffice.

*Data about number of deaths can be obtained from the following sources:*

- *Medical Examiner or Coroner Office*
- *Clinic or hospital*
- *Disaster Mortuary Team (DMORT)*
- *Religious authorities*
- *Household members*

When calculating mortality, it is important to consider the size of the population and the time period in which the deaths occurred. This should be done by calculating mortality rates. Moreover, to determine the overall mortality effect, we need to understand the normal death toll within a certain period. Module 3 of this course will discuss tools to help conduct morbidity and mortality surveillance activities, including calculation of morbidity and mortality rates.

*Lead a discussion to review key lessons learned. Complete the Knowledge Checks and Discussion Questions. To guide additional discussion, you may use the following questions and suggested answers (10 minutes)*

***Potential Discussion Questions***

*What are some of the challenges or considerations for disaster epidemiology?*

*Possible answers:*

- *Baseline information, such as prevalence of health conditions, may be absent; especially when the population affected is displaced to a shelter and therefore no information is available before the disaster occurred. This absent or unavailable baseline information poses a challenge when trying to determine true increases in particular health conditions.*
- *The population under surveillance might change frequently and be unpredictable, residents might have evacuated or might have been displaced, traditional census or population data might not adequately reflect the at-risk population, and persons might not be affected uniformly. Therefore, there is difficulty obtaining denominator data.*
- *Facilities might be damaged and only able to provide limited services or healthcare systems might be completely destroyed and nonfunctional. Therefore, outside medical assistance may occur in the form of temporary hospitals run by response workers, Red Cross temporary shelters for basic medical care, or mobile health units run by nongovernmental organizations or volunteer medical groups.*
- *Competing priorities often involve multiple sectors and affect what data to collect and the timing of that data collection. In addition, coordination of efforts can be difficult. Standardization of data elements across the different collection agencies and streamlined reporting mechanisms and sharing of information are often difficult to obtain.*
- *Logistical constraints such as electricity (power)and telephone outages affect communication networks and transportation systems, leading to interruption of usual reporting mechanisms and underreporting of health events*

***Practice Exercise Instructions***

*Depending on the size of the group, tell learners to complete this exercise individually, with a colleague, or as part of a small group. Instruct them to read through the each of the questions in the practice exam and select the best answer. Have participants record their answers in the space provided in the participant workbook. Once completed, review the exercise and discuss possible answers.*

***TIME**: up to 30 minutes to complete, then reconvene the group to discuss the answers (up to 20 minutes)*

## PRACTICE EXERCISE

### PRACTICE EXERCISE #2

*In this practice exercise, you will test your knowledge and understanding of disaster and disaster epidemiology. For each question, choose the best answer(s) from the four choices provided (A, B, C, or D). Circle the letter at the beginning of the statement that corresponds to your choice. NOTE: Some questions may have more than one correct answer; you may select more than one response.*

1. **Disaster epidemiology seeks to**
   - **A. Prevent or reduce the morbidity and mortality resulting from disasters**
   - **B. Assess basic needs of affected populations**
   - C. Provide first-response to affected populations
   - **D. Inform resource allocation plans for the response phase of a disaster cycle.**

2. **Epidemiologists play a role only in the response phase of the disaster cycle.**
   - A. True
   - **B. False**

3. **What activity takes place during the recovery phase of the disaster cycle?**
   - A. Training of health personnel
   - B. Developing preparedness plans
   - **C. Repairing and maintenance of basic health services**
   - D. Establishing partnerships

4. **During which phase of the disaster cycle should inventories of medical supplies and basic needs be conducted?**
   - **A. Preparedness**
   - B. Response
   - C. Recovery
   - D. Mitigation

5. **What activity takes place during the response phase of the disaster cycle?**
   - **A. Conducting surveillance of health problems**
   - B. Conducting an inventory of available resources
   - C. Training of health personnel
   - D. Conducting epidemiologic studies

6. **During what phase of the disaster cycle does an epidemiologist play the most limited role?**
   - A. Preparedness
   - B. Response
   - C. Recovery
   - **D. Mitigation**

7. **Which of the following *does not* describe an epidemiologist's role in a disaster?**
   A. Identify disaster-related outcomes
   B. Determine risk factors for affected population groups
   **C. Rebuild damaged infrastructures and restore health systems**
   D. Conduct rapid needs assessments

8. **What is the role of an epidemiologist during the preparedness phase of the disaster cycle?**
   **A. Conduct needs assessments**
   **B. Analyze vulnerabilities of communities**
   **C. Educate local communities**
   **D. Conduct surveillance activities.**

9. **Conducting a rapid needs assessment occurs during which phase of the disaster cycle?**
   **A. Preparedness**
   **B. Response**
   **C. Recovery**
   **D. Mitigation**

10. **What is an indicator of significant public health effects during disasters?**
    A. Disease incidence
    B. Disease prevalence
    **C. Mortality rate**
    D. Case-fatality rate

11. **What are some challenges for conducting epidemiologic work within a disaster setting?** *Possible responses:*
    - *Working in a potentially hostile political environment*
    - *Difficulty in applying epidemiologic methods in the context of great destruction, public fear, social disruption, and/or large population movement and shifting demographics*
    - *Lack of time for organizing epidemiologic investigation*
    - *Limited infrastructure for data collection*

12. **Conducting an outcomes assessment of a particular triage method after a natural disaster is an example of**
    **A. An evaluation study**
    B. A rapid needs assessment
    C. An epidemiologic study
    D. A case-control study

*After you are completed with the scenarios, summarize the key learning points from Lesson 1 outlined in the Lesson 1 Summary*

## LESSON 2 SUMMARY

As you have learned in this lesson, the primary goal of disaster epidemiology is to prevent or reduce the disaster-related morbidity and mortality. Disasters are often thought of as happening in a cyclical manner consisting of four phases: Preparedness, Response, Recovery and Mitigation. This is known as the disaster cycle. As an epidemiologist, your role will be to help to identify disaster-related outcomes and determine relevant risk factors for the affected population. While epidemiologists have a role to play during all phases of the disaster cycle, their primary role is during the preparedness, response, and recovery phases. At the same time, you should remember there are some additional challenges to conducting epidemiology in a disaster setting. These challenges include the absence of baseline data, a difficulty in obtaining denominator data, damage or disruption to local infrastructure, difficulty in the coordination of efforts, and other logistical constraints

*This is the completion of Module One. Please thank the learners for attending (or let them know the schedule if continuing on to Module Two or Module Three), ask if they have any remaining comments or questions, and provide any contact information for any additional follow-up questions.*

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# Module Two: Disaster Response Rapid Needs Assessment™

# Acknowledgement

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**Disclaimer**

The findings and conclusions in this facilitator guide are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

U.S. Centers for Disease Control and Prevention
Office of Noncommunicable Disease, Injury and Environmental Health,
National Center for Environmental Health,
Health Studies Branch

# MODULE 2: DISASTER RESPONSE RAPID NEEDS ASSESSMENT

## TABLE OF CONTENTS

***Estimated Time:*** *17.5 hours (30 minute introduction to module, up to 4.25 hours of independent reading, up to 3.75 hours of practice exercises, up to 4 hours of group discussion, up to 2.25 hours of skills assessments, 2.25 hours of optional data exercise, and a 30 minute module review and wrap-up)*

***Distribute****: Participant Workbook for this module (if not already distributed)*

***Explain****: The skills the learners will learn and how they will learn these skills by reading the Disaster Response Rapid Needs Assessment Participant Workbook. Note that learners will have opportunities to apply what they learn by completing practice exercises and skill assessments. Explain that brief facilitator-led discussions will clarify or will elaborate on key concepts.*

***Provide****: An overview of how the skills taught in the second module, Planning a Disaster Response RNA will build on the information from the first module. Explain how this procedure will further prepare them for supporting disaster response activities and conducting epidemiological responses and surveillance.*

- *Module 1 provides an overview of disaster types, how they occur, and the consequences they have for society.*
- *Module 2 teaches the use of a rapid needs assessment (RNA) for disaster response and the various components needed to plan, execute and report results collected from the assessment*

***Introduce***: *Lessons in Module Three*

***Tell****: Learners to read each lesson until they see the STOP sign*

# OVERVIEW OF MODULE TWO – DISASTER RESPONSE RAPID NEEDS ASSESSMENT

A **rapid needs assessment (RNA)** is a collection of techniques (e.g., epidemiological, statistical, anthropological) designed to provide information about a community's needs following a disaster.[9] It uses local resources and specific methods to conduct a relatively quick, effective, and representative community snapshot to assess needs and guide relief efforts. During a disaster, you should consider an RNA when you need to understand a disaster's impact on affected populations.

[9] Lloyd F. Novick, John S. Marr. *Public Health Issues Disaster Preparedness: focus on bioterrorism*. Jones & Bartlett Learning; 2003.

In this module, you will learn about an RNA for disaster response and the various components needed to plan, execute, and report results collected from the assessment. This module consists of four lessons:

- Lesson 1: Planning a Disaster Response RNA
- Lesson 2: Preparing for an RNA
- Lesson 3: Conducting an RNA
- Lesson 4: Data Entry, Analysis, and Writing the Report

Content is drawn from several tools and approaches, including the following:

- Centers for Disease Control and Prevention (CDC) /Health Studies Branch (HSB) Community Assessment for Public Health Emergency Response (CASPER) toolkit.
- Johns Hopkins and the International Federation of Red Cross and Red Crescent Societies Public Health Guide in Emergencies.
- World Health Organization, Cluster sampling methodology.

## LEARNING OBJECTIVES

After completing Module Two, you will be able to do the following:

- Explain the steps for planning an RNA
- Identify an appropriate sampling method
- Design a questionnaire instrument
- Identify steps for implementing an RNA during a disaster response

## ESTIMATED COMPLETION TIME

Module Two will take approximately 17.5 hours to complete, including some discussion time with your mentor or facilitator.

## PREREQUISITES

Before participating in this training module, we recommend that learners complete the following training courses:

- Module One: Epidemiologic Response to Disasters
- Questionnaire Design (FETP core curriculum)
- Interview Techniques (FETP core curriculum)
- Introduction to Sampling (FETP core curriculum)

***Lesson 1**: Planning a Disaster Response Rapid Needs Assessment (RNA)*

***Overview:** This lesson describes the purpose and importance of surveillance, particularly as it relates to controlling or reducing disaster-caused injuries, illnesses, and deaths, as well as some of the common public health disaster surveillance challenges.*

***Total Estimated Time**: 2.75 hours*

***Reading and Activities**: up to 55 minutes*

***Group Discussion**: up to 60 minutes*

***Practice Exercise #1**: 50 minutes, including a 20 minute review*

# LESSON 1: PLANNING A DISASTER RESPONSE RAPID NEEDS ASSESSMENT (RNA)

***Independent Reading**: Tell learners to read the first three sections of Lesson 1—Introduction, Overview of RNA Methodology, and Four Phases of an RNA – until they see the STOP sign (pages 3-5).*

***TIME**: 15 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## INTRODUCTION

As you learned in Module One, *Epidemiologic Response to Disasters*, significant damage can happen after a disaster, such as physical injuries, illnesses, potential disease outbreaks, short- and long-term psychological effects, death, significant damage to buildings and other structures, and devastating financial loss.[10] As an epidemiologist, you could be called on to assist in determining the extent of such damage, particularly damage to human health and the health infrastructure, to identify the needs of a community, and to recommend interventions to reduce further morbidity or mortality.

In this lesson, you will learn about an RNA method for gathering information about the health and other basic needs of a community affected by a disaster. The lesson sets out the four phases of conducting an RNA.

After completing this lesson, you will be able to do the following:

- Describe the need for conducting an RNA
- Recognize the issues that need to be addressed before conducting an assessment
- Identify challenges of conducting an RNA

[10] Noji EK. 1997. The public health consequences of disasters. New York, NY: Oxford University Press.

## OVERVIEW OF RNA METHODOLOGY

The destruction of homes, damage to local infrastructure such as the water supply, electricity, and health facilities, and the interruption of services and social support networks can affect a community's well-being. During the response phase of a disaster, public health and emergency management professionals must be prepared to respond to and meet the needs of the affected community. Action to mitigate adverse effects requires timely and accurate information. Key information such as the number of affected households, health status, immediate- and long-term needs and the scope and type of intervention required can be obtained quickly and effectively with the RNA's proven methodology.

Specifically, an RNA uses validated data collection methods to determine

- magnitude of the disaster's effect on the community;
- number of households affected,
- basic characteristics of the households affected (e.g., are there more vulnerable groups with increased risk for disease or death?),
- current health priorities and potential public health problems,
- availability of basic needs such as food and water, and
- need for external support or intervention.

A disaster-response RNA provides agencies, emergency managers, or local health authorities with evidence-based information about the affected population's needs. An RNA will help inform the prioritization of interventions and allocation of finite supplies and resources. Without the timely availability of reliable and scientifically sound data, public health officials run the risk of making ill-informed decisions that might adversely affect the response effort.[11]

The RNA methodology is an epidemiologic investigation method. An RNA facilitates rapid data collection within a resource-constrained setting. It also focuses on the *household* as the unit of analysis rather than the individual. This focus on collecting household-level information allows for data collection timeliness. This method also assumes that the disaster affects everyone within a household, and all households within a given area are subject to the same exposure (disaster) equally. The RNA methodology serves as a relatively inexpensive and practical public health tool. Today, for most types of disasters, an RNA represents a first line of epidemiologic response.[12]

[11] CDC. Community Assessment for Public Health Emergency Response (CASPER) Toolkit, Second edition. Atlanta (GA); 2012.
[12] Malilay J, Flanders WD, Brogan D. A modified cluster-sampling method for post disaster rapid assessment of needs. Bull World Health Organ.1996;74:399-405.

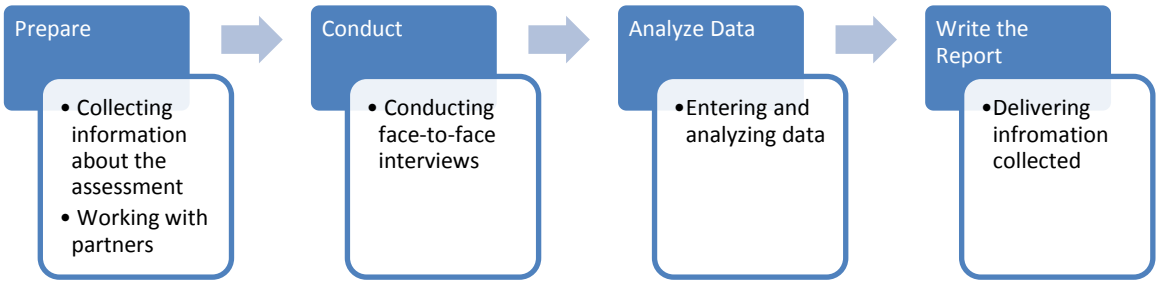
## FOUR PHASES OF AN RNA

The four phases of an RNA are the following:

1. Prepare the Assessment
2. Conduct the Assessment
3. Analyze the Data
4. Write the Report

These phases, represented in the Figure 1, should not be confused with the four phases of the disaster cycle discussed in Module One.

**Figure 1. Four phases of an RNA**




These phases provide a quick, inexpensive, accurate, and reliable process for obtaining household-based information about communities affected by natural or human-made disasters. In this lesson, we will focus on Phase 1 of an RNA, Prepare the Assessment.

*Lead a discussion to review key lessons learned. Complete the Knowledge Check and Discussion Question #1. To guide additional discussion, you may use the question and suggested answers in the red box. (15 minutes)*

***Potential Discussion Question***

*For what purposes is the RNA methodology used?*

*Possible answer:*

*To help with rapid collection of data within a resource-constrained setting. RNA methodology also focuses on the household rather than the individual as the unit of analysis. This focus on collecting household-level information allows for timeliness in data collection. The RNA methodology is also a relatively inexpensive and practical public health tool. Today, an RNA represents a first line of epidemiologic response to most types of disasters*

## KNOWLEDGE CHECK

What are the four phases of an RNA?

A. Respond, Recovery, Analyze Data, Disseminate Information
B. Plan, Respond, Recovery, Write the Report
**C. Prepare, Conduct, Analyze Data, Write the Report**
D. Preparedness, Respond, Recovery, Mitigation

## DISCUSSION QUESTION #1

An RNA is a validated data collection method to determine what type of information?

- *The magnitude of the disasters effect on the community*
- *The number of households affected*
- *The basic characteristics of the households affected – how many households include more vulnerable groups with increased disease or death risk*
- *Current health priorities and potential public health problems*
- *Availability of basic needs such as food and water*
- *The need for external support or intervention*

***Independent Reading**: Tell learners to read the next section of Lesson 1—Purpose and Objectives of an RNA – until they see the STOP sign (pages 6-7).*

***TIME**: 10 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## RNA PURPOSE AND OBJECTIVES

The primary purpose of an RNA is to rapidly obtain vital information about the needs of a community and monitor changes in those needs during the recovery period. In a disaster setting, the main objectives are to

- describe the effects of the disaster on health;
- determine the critical health needs and assess the impact of the disaster;
- characterize the population residing in the affected area;
- produce household-based information and estimates for decision-makers;
- evaluate the effectiveness of relief efforts through a follow-up assessment; and
- prevent adverse health effects.

### When to Conduct an RNA

Conduct an RNA at any time the public health needs of a community are not well known. Such times can occur during a disaster response or within a nonemergency setting. During a disaster, the local, state, or regional emergency managers or health department officials could decide to initiate an RNA when

- the effect of the disaster on the population is unknown,
- the health status and basic needs of the affected population are unknown, or
- the response and recovery efforts need to be evaluated.

*Timeliness of an RNA is critical*

| *Event* | *Initial Assessment Timing* |
|---|---|
| *Hurricane Isabel, NC, 2003* | *< 24 hours* |
| *Earthquake Tsunami, American Samoa, 2009* | *5 days* |
| *Hurricane Katrina, US MS, 2005* | *14 days* |
| *Earthquake Turkey, 1999* | *15 days* |

### RNA Scope

While an RNA is a quick, reliable, and accurate technique that provides household-based information about a community's needs, it is not intended to

- provide direct services to residents such as cleanup or home repair;
- deliver food, medicine, medical services, or other resources to the affected area;
- determine why people are not returning to their community; or
- establish current population estimates.

RNA data are aggregated and reported at the household level. This method determines all the resources from which the affected community can benefit. During their interaction with the community, the RNA team may identify certain households in need of services, such as diabetic patients without insulin or supplemental oxygen-dependent persons without access to electric power. The team can refer these households to the appropriate resources.

## RNA and the Disaster Cycle

You can conduct an RNA at any phase of the disaster cycle. But note that the affected community's needs will change at different points in that disaster cycle and the RNA's objectives will vary depending on the timing of the assessment relative to the disaster. For example, during the preparedness phase, you can conduct an RNA to assess the disaster preparedness level of the community, such as determining how many households have emergency supply kits. During the recovery phase of a disaster, you can conduct an RNA as a follow-up to a previous RNA to assess the effectiveness of the response or intervention program and determine ongoing community needs. RNAs have also been used to assess public health perceptions, determine current health status, and estimate the needs of a community in a nonemergency setting. For example, an RNA can be conducted as part of a larger health assessment to measure a community's awareness and opinions concerning the effect of a project (e.g., a new transportation route) on a community's health.

*Lead a discussion to review key lessons learned. Complete the Knowledge Check and Discussion Question #2. To guide additional discussion, you may use the question and suggested answers in the red box. (15 minutes)*

***Potential Discussion Question***

*When can an RNA be initiated?*

*Possible answer:*

- *When the effect of the disaster on the population is unknown*
- *When the health status and basic needs of the affected population are unknown*
- *When the response and recovery efforts need evaluation*

## KNOWLEDGE CHECK

Which statement(s) *are not* objectives of an RNA? *(Select all that apply)*

A. Produce household-based information and estimates for decision-makers

**B. Determine why people are not returning to their community**

**C. Deliver food, medicine, medical services, or other resources to the affected area**

D. Characterize the population living in the affected area

## DISCUSSION QUESTION #2

What are the main objectives of an RNA in a disaster setting?

- *Describe the effects of the disaster on health*
- *Determine the critical health needs and assess the disaster's effect*
- *Characterize the population residing in the affected area*
- *Produce household-based information and estimates for decision-makers*
- *Evaluate the effectiveness of relief efforts through a follow-up assessment*
- *Prevent adverse health effects*

***Independent Reading**: Tell learners to read the next section of Lesson 1 – Challenges to Conducting an RNA – until they see the STOP sign (pages 8-10).*

***TIME**: 10 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## CHALLENGES TO CONDUCTING AN RNA

Many potential challenges are associated with conducting an RNA in a disaster setting. As a member of an RNA team, you should be aware of the common challenges that can occur during an assessment and be familiar with the preventive actions outlined in Table 1.

**Table 1. RNA challenges and preventive actions[13]**

| Challenge | Description |
|---|---|
| Limited access | **Challenge**: Inability or difficulty in reaching people to interview. |
| | **Preventive action:** Understanding the current situation will be critical, including the displacement of the population (i.e., are people in a refugee camp, evacuation center, or other centralized location such as a shelter?). The sampling methodology might need modifying to ensure access to the affected populations. |
| Limited coordination | **Challenge**: The assessment is poorly coordinated between various Non-Governmental Organizations (NGOs) and excludes the host government and the affected community. |
| | **Preventive action:** Appoint a team leader to coordinate the assessment with the local officials, the affected community's leaders, and other agencies so that the results are shared and not duplicated, and so that future support of relief activities is ensured. |
| Lacking expertise | **Challenge**: The assessment team lacks the expertise needed. |
| | **Preventive action:** Select members of the team with disaster-specific (previous experience), site-specific (geography, language, culture) or specialty-specific skills (epidemiologists, public health nurses, logisticians). |

[13] Johns Hopkins Bloomberg School of Public Health; International Federation of Red Cross and Red Crescent Societies. Public Health Guide for Emergencies, 2nd ed. Geneva: IFRCRCS; 2008 [cited 2013 Nov 10]. Available from: http://www.jhsph.edu/research/centers-and-institutes/center-for-refugee-and-disaster-response/publications_tools/publications/_CRDR_ICRC_Public_Health_Guide_Book/Forward.pdf

| | |
|---|---|
| Incomplete data | **Challenge:** The number of competed surveys are often fewer than expected (e.g., poor access or refusal). |
| | **Preventive action:** Discuss the plans with local authorities, community representatives, and other agencies and use local media to inform/educate the community about the assessment. |
| Unreliable population size | **Challenge:** The estimated size of the target population – the denominator – is unreliable. |
| | **Preventive action:** Conduct a quick census of the affected community by, if possible, walking or driving around the affected area. Reach out to local agencies, other disaster responders, and relief agencies to find out whether they have more updated population estimates. |
| Failure to consider needs | **Challenge:** The assessment report does not consider the affected population's perceived needs. |
| | **Preventive action:** At every stage of the assessment involve representatives from the local governmental and nongovernmental agencies and the affected population, including when you are drawing conclusions from the local responses and determining outstanding needs. |
| Poor execution | **Challenge:** Assessment team members do not complete their assigned tasks in a timely manner. Thus, time is insufficient for accurate assessments, the assessment period is extended, and serious delays in vital action might occur. |
| | **Preventive action:** Establish a detailed and realistic timeline and clearly communicate the expectations and timeline with each team member. Readjust the plan based on the reality of the situation. |
| Poor information sharing | **Challenge:** Information is not shared with government, NGOs, or other agencies. |
| | **Preventive action:** Discuss before the assessment when and how to share common planning and priority settings. |

*Lead a discussion to review key lessons learned. Complete the Knowledge Check and Discussion Question #3. To guide additional discussion, you may use the question and suggested answers in the red box. (15 minutes)*

***Potential Discussion Question***

*Why is the inability to reach people to interview a challenge to conducting an RNA? What is a possible preventive action to that challenge?*

*Possible answer:*

*Because the RNA uses in-person, face-to-face, interviews, it is important to be able to reach people. Understanding the current situation will be critical, including the displacement of the population (i.e., are people in a refugee camp, evacuation center, or other centralized location such as a shelter?). The sampling methodology might need modifying to ensure access to the affected populations.*

**KNOWLEDGE CHECK**

Which statement best describes preventive action for challenges related to unreliable population size?

A. Inform/educate the community about the assessment using local media.
B. Discuss when and how to share common planning and priority settings.
C. Understand the displacement patterns of the population.
**D. Conduct a quick census of the affected community by walking or driving around the affected area.**

Which statement best describes preventive action for challenges related to incomplete assessment data?

**A. Inform/educate the community about the assessment using local media.**
B. Discuss when and how to share common planning and priority settings.
C. Understand the displacement patterns of the population.
D. Conduct a quick census of the affected community by walking or driving around the affected area.

**DISCUSSION QUESTION #3**

Think about your own community, what are some challenges to conducting an RNA that may happen in a disaster?

*Allow respondents to answer for their specific community/jurisdiction. We recommend you think of a few challenges that may arise in the local region as examples (see Table 1).*

***Independent Reading**: Tell learners to read the next section of Lesson 1 – Planning for an RNA – until they see the STOP sign (pages 11-14).*

***TIME**: 20 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## PLANNING FOR AN RNA

Despite the urgent need for information following a disaster, reserving time to prepare sufficiently for an RNA is critical, especially before initiating any data collection. Knowing the purpose, setting, and availability of resources is similarly important, especially *before* making the decision to conduct an RNA.

Table 2 contains a checklist an RNA team can use in planning for the assessment. The checklist will help to clarify the RNA purpose, setting, and availability of resources. As epidemiologists you will most likely be a member of an RNA team. You should be able to identify the information your assessment team might want to collect in an RNA. You should be able to ensure that key planning steps have been covered. All the items on the checklist might not be feasible given disaster response circumstances, availability of resources, and immediate needs. Still, you should adapt the checklist in Table 2 to the context and culture of the affected community and to the available resources in the specific geographic area. Some key actions to consider when planning for an RNA are listed in Table 2.

**Table 2. RNA planning checklist**

| Action | Description |
|---|---|
| Know the Purpose | |
| ☐ Define how information will be used | Before conducting an RNA, response officials' understanding of how the result will be used will help create a clear vision and narrow the scope of the data collection instrument. Clear goals are imperative to ensuring that the appropriate data are collected, thus generating useful information for public health actions. |
| ☐ Determine what information has been obtained from other assessments | Obtain information from local responders or from other assessments conducted by other agencies (e.g., flyovers and area damage assessments). Such information could be beneficial in determining your assessment area(s). |
| ☐ Identify relevant stakeholders | Identify and include all relevant stakeholders in the planning and design stages—this will ensure smooth partnership relations throughout the RNA process. During the first phase of an RNA, the role of each partner should be defined in terms |

| | |
|---|---|
| | of what each will contribute to the assessment. These contributions might include subject matter expertise, analytical support, materials, or ground information about the affected area. Working relationships between national and subnational partners, private or nongovernmental organizations, and educational institutions are built and fostered during the RNA preparedness stage. These partnerships are integral to the successful completion of an RNA. The number and type of partners in an RNA depends on the nature of the assessment, the location, and the RNA needs. |
| Know Your Setting | |
| ☐ Determine geographical areas to include | The RNA can, but might not always, cover all geographic areas affected by the disaster. The RNA's geographical assessment area covered will depend on the availability of resources and the objectives established by the local authorities. When determining the geographical areas in which to conduct an RNA, local authorities might take into account infrastructure damage or accessibility to areas affected by the disaster. Obtaining maps of the affected areas is often helpful (e.g., from local officials or meterologist office for areas affected by a hurricane or flood) to gain a better understanding of the affected community's geographical location, boundaries, terrain, and landmarks. |
| ☐ Determine the demographics and baseline health status of population | Having background information about the demographic characteristics of the affected population is informative for developing the questionnaire. Demographic data might be available from national census data, national statistics offices, Demographic and Health Surveys (DHS), or other population-based surveys. Useful demographic information includes age and sex distribution of the population, average household size, estimates of female- and child-headed households, and social structure. Although knowing the prevalence of medical conditions will be helpful to interpret the data, these data are not often available. |
| ☐ Ascertain security and access information | The RNA team should establish an understanding of ongoing natural or human-made hazards encountered during the RNA. Disaster response is often complicated by new hazards, such as road closures and downed power lines. Determining the |

| | |
|---|---|
| | overall safety and security of the affected area is important, especially before sending teams into the field. Speak with local officials to obtain safety and security information. |
| Know Your Resources | |
| ☐ Identify available resources | Identifying available resources (both equipment and personnel) requires coordinating with a broad set of partners. The following is a series of suggested steps the RNA team should take to identify available resources:<br>• Coordinate with the Ministry of Health or other national agencies to support the response<br>• Determine the types and quantities of locally available resources: personnel, transportation, communication devices, first-aid kits, mapping devices such as Global Positioning System (GPS), computers with internet access, data entry and analysis software<br>• Identify a field coordination center that can serve as a headquarters for the RNA team. This center should be near the affected area and be equipped with phone or VHF or UHF radio communication device (or both), fax, and Internet access |
| ☐ Assemble the assessment team | Determine how many interview teams are needed. This will be based on the assessment design, sample size, number of interviews that need to be conducted, and the distance that needs to be traveled to access each household. Identify any special expertise needed to conduct the RNA (e.g., a data analyst, a Geographic Information System (GIS) expert, an environmental scientist, a mental health professional), and local staff available to assist in data collection. If you cannot recruit a multidisciplinary assessment team locally, get the proper authorization (e.g., work permits, travel permits) for additional personnel from neighboring areas or partner organizations, including neighboring countries or other expatriots. Local representation is essential to foster trust between the public and assessment teams and improve buy-in and support from the community. If possible, ensure someone locally based can arrange the assessment team's transportation, communication, accomodations, and meals. |

Defining in advance what information is already known, what information is needed, where and from whom data should be collected, key partners and their role, available resources, and other such factors can improve the RNA's coverage, quality, and overall usability. Often, given the urgent need for information, the time required to organize, collect, and analyze precise and reliable data might simply prove infeasible This means you must make some decisions using less precise and less reliable data. When possible, you should confirm any information you use with the appropriate stakeholders (e.g., local officials, NGOs).

*Lead a discussion to review key lessons learned. Complete the Knowledge Check and Discussion Question #4. To guide additional discussion, you may use the question and suggested answers in the red box. (15 minutes)*

***Potential Discussion Question***

*Why is it important to know the purpose when planning for an RNA?*

*Possible answer:*

*Knowing the purpose will help create a clear vision and narrow the scope of the data collection instrument. Clear goals are imperative to ensuring that the appropriate data are collected, thus generating useful information for public health actions. It is also important to obtain information from local responders or from other assessments conducted by other agencies to aid in determining your assessment area(s) and avoid duplication of efforts. Knowing the purpose will also help you to identify relevant stakeholders so that you can include them in the planning and design stages which will ensure smooth partnership relations throughout the RNA process*

**KNOWLEDGE CHECK**

It is important to know the **purpose**, **setting**, and **availability of resources** before making the decision to conduct an RNA.

**DISCUSSION QUESTION #4**

What are some of the key items you should consider when planning for an RNA? *See Table 2 for a checklist. All the items on the checklist might not be feasible given disaster response circumstances, availability of resources, and immediate needs.*

## PRACTICE EXERCISE

***Instructions:*** *Depending on the size of the group, tell learners to complete this exercise individually, with a colleague, or as part of a small group. Instruct them to read through the case study and answer the questions. Have learners record their answers in the space provided. Once completed, review the exercise and discuss possible answers.*

***TIME****: up to 30 minutes to complete, then reconvene the group to discuss the answers (up to 20 minutes)*

### PRACTICE EXERCISE #1

*In this practice exercise, you will apply the concepts learned in Lesson 1. Please read through the following scenario and answer the questions. This scenario will be used across the remaining lessons in this module.*

**Flooding in a Southeast Asian country**

Torrential rainfall and floods due to seasonal monsoons affected a province in a Southeast Asian country. On July 22, 2013, 45,948 people were displaced, 24 reported as dead, 2 were injured, and 14 were missing. Thousands of acres of farmland were damaged. In the early hours of July 21, 2013, flooding on a local river caused embankments to break flooding 80% of nearby areas. The province had one community hospital, one pharmacy, few physicians and clinicians, limited commercial air service, and limited support infrastructure. Nevertheless, it was rich in local culture and had a strong, intact social system and leadership.

All latrines in the city and county centers were destroyed. Two hospitals were partially damaged. Many roads and bridges were damaged, limiting access to affected areas. Electric power was mostly not available, and water utilities had low pressure.

In the flood's aftermath, many health personnel responded, but some experienced personal injury, family injuries or deaths, and property loss. Because some responders were also victims and unable to work during the disaster, public services needed staffing assistance from outside sources.

The local government requested interagency assistance from NGOs, MOH, and other key partners to determine the health and general needs of the affected population. The objective was to inform response and recovery activities by assessing affected areas and identifying post-storm public health need

**List the information that you should gather to plan for an RNA responding to this disaster.**

- *Stakeholders, specifically partners*
- *Geographical area affected*
- *Census data – demographic and baseline health information*
- *Available resources*
- *How information will be used*
- *Information from other assessments*
- *Current safety of the situation*

**What should the goals of the RNA be during the recovery and mitigation phase?**

- *Assess effectiveness of the public health response to the flooding by conducting a follow-up to a previous RNA*
- *Identify ongoing community public health issues and needs during recovery phase*

**List some challenges that you would anticipate in this situations. Describe why these challenges would be relevant to an RNA.**

- *Damaged local health infrastructure causing limited access*
- *Absent baseline information*
- *Competing priorities*
- *Logistical constraints, lacking expertise*
- *Coordination of efforts and poor information sharing*
- *Language or cultural barriers*

*These issues could complicate gathering information needed to conduct the RNA. These issues could also complicate the ability of field teams to collect data, especially if roads remain damaged or people have not returned to their homes. Damage to local health infrastructure and the absence of baseline data might complicate comparing data collected in the RNA with existing health needs in the affected areas.*

*After you are completed with the scenario, summarize the key learning points from Lesson 1 outlined in the Lesson 1 Summary*

## LESSON 1 SUMMARY

As you have learned in this lesson, an RNA is an important tool during a disaster. An RNA helps to gather quickly the information necessary to plan disaster response activities. A four-phased approach and checklist guides RNA activities. Given the time and resource constraints, being aware of and prepared for the challenges you might encounter is important, especially when planning for and conducting an RNA.

***Lesson 2**: Phase 1 – Preparing for an RNA*

***Overview:** This lesson focuses on planning for disaster surveillance, considerations for designing or using existing surveillance systems, and morbidity and mortality surveillance during a disaster*

***Total Estimated Time**: 5 hours*

***Reading and Activities**: up to 110 minutes*

***Group Discussion**: up to 110 minutes*

***Practice Exercises**: 80 minutes, including 30 minutes review*

# LESSON 2: PHASE 1 – PREPARING FOR AN RNA

***Independent Reading**: Tell learners to read the first three sections of Lesson 2 – Introduction, Overview of an RNA Sampling Method, and Determine Assessment Area – until they see the STOP sign (pages 17-19).*

***TIME**: 15 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## INTRODUCTION

In Lesson 1, you learned about the RNA method for gathering household-based information from communities affected by a disaster. This method included a four-phased approach to gather household-based information. Remember that before initiating an RNA, determine whether that RNA uses the right assessment method based on the objectives, timeframe, and availability of resources. After this determination, RNA assessment teams will begin preparing for the RNA (Phase 1) to

- identify the assessment areas,
- develop questionnaires and forms, and
- identify and train field interview teams.

After completing this lesson, you will be able to do the following:

- Describe the recommended sampling methodology used for an RNA
- Describe the modified two-stage cluster sampling method
- Describe considerations affecting sample selection and size
- Develop assessment questionnaires for the RNA
- Describe methods for identifying and training field interview teams

## OVERVIEW OF RNA SAMPLING METHOD

As you learned in Lesson 1, the primary objectives of an RNA are to

- describe the effects of the disaster on health;
- determine the critical health needs and assess the impact of the disaster;
- characterize the population residing in the affected area;
- produce household-based information and estimates for decision-makers;
- evaluate the effectiveness of relief efforts through a follow-up assessment; and
- prevent adverse health effects.

Ideally, you would collect information from all members of the community to assess their needs. But given time and cost constraints, this is rarely feasible, even in nonemergency situations. In a disaster response, obtaining information from every person would be too expensive and time consuming. The need to collect data in a rapid and timely manner necessitates conducting an RNA with a subset, or sample, of the population.

**Sampling** is the process of carefully selecting representative respondents from the target population who reflect the characteristics of the population from which it is drawn. When done correctly, sampling is an efficient way to gather quickly information on a population in a cost-efficient manner. A sample should accurately reflect the distribution of relevant variables in a population according to person, place, and time. To the extent possible, this subset should be as representative as possible of the larger population so as to generalize the findings accurately to the larger target population.

To select households within the assessment area, the recommended RNA sampling method is the two-stage cluster sampling design. This design includes the selection of 30 clusters (first stage) and within each cluster 7 interviews (second stage) are completed. The data collected using this method are meant to generate estimates. How you select the clusters and households for interviews is important to ensure valid estimates.

## DETERMINE THE ASSESSMENT AREA

The first RNA preparation step is determining the assessment, or geographic, area(s). The assessment area(s) are the RNA's sampling frame. A **sampling frame** is a list of households from which a sample is to be drawn, such as maps or lists of households in an area. As mentioned in Lesson 1, local officials from the affected area who requested the RNA will usually determine the sampling frame.

One of the key assumptions of the disaster response RNA is that the households in the sampling frame are all similarly affected. Thus, the sampling frame should be limited rather than be expansive. The disaster area may be geographically large or have vast differences between communities. Differences may include the extent of storm damage, social or geographic vulnerability, or the nature of the jurisdictions responding to their needs. If such conditions occur, you should consider separate sampling frames and RNAs for each specific area. For example, if an earthquake struck an urban area and a rural area, you would consider conducting separate RNAs for the urban and the rural areas. Once you know your sampling frame(s), you will use the appropriate sampling methodology to draw a representative sample to reach your target population.

*Examples of how the sampling frame can be defined include the following:*

- *Political boundaries (e.g., houses in a county, district, city, village)*
- *Geographic boundaries (e.g., houses located within specific landmarks, such as a road or lake)*
- *Specific community (e.g., houses in the most affected community without local health services)*

*Lead a discussion to review lessons learned. Complete the Knowledge Check and Discussion Questions #5 and #6. To guide additional discussion, you may use the questions and suggested answers in the red box. (30 minutes)*

***Potential Discussion Questions***

*What is sampling?*

*Possible answer:*

*Sampling is the process of carefully selecting representative respondents from the target population who reflect the characteristics of the population from which it is drawn.*

*What is the recommended RNA sampling method?*

*Possible answer:*

*Two-stage cluster sampling design. This design includes the selection of 30 clusters (first stage) and within each cluster 7 interviews (second stage) are completed. The data collected using this method are meant to generate estimates. How you select the clusters and households for interviews is important to ensure valid estimates*

## KNOWLEDGE CHECK

A _____ is a list of households from which a sample is drawn

A. Sample

**B. Sampling frame**

C. RNA

D. Cluster

## DISCUSSION QUESTION #5

How is the geographic assessment area(s) identified?

*Generally, the assessment area will be that area affected by the disaster. The assessment area(s) are the sampling frame for an RNA. A sampling frame is a list of households from which a sample is drawn, such as maps/lists of households in an area.*

## DISCUSSION QUESTION #6

How is the sampling frame defined?

*A sampling frame can be defined in a variety of ways. Some examples of how you can define the sampling frame include the following:*

- *Political boundaries (e.g., a county, a village, a district, a city)*
- *Geographic boundaries (e.g., houses located in a specific landmark, such as a road or lake)*
- *Selection of a specific community (e.g., the most affected community without local health services)*

***Independent Reading**: Tell learners to read the next section of Lesson 2 – Two-Stage Cluster Sampling Method – until they see the STOP sign (pages 20-23).*

***TIME**: 20 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## TWO-STAGE CLUSTER SAMPLING METHOD

The next step in preparing for an RNA is to determine the proper sampling method. The sampling method should be selected on the basis of the assessment objectives, timeframe, and available resources. Two-stage cluster sampling is the recommended methodology for conducting an RNA. You may use other sampling methods, however, which are described at the end of this module.

*The two-stage cluster sampling method is recommended for an RNA. Other sampling methods include simple random sampling, systematic sampling, and stratified sampling. However, these may not be feasible.*

The World Health Organization's (WHO) Expanded Programme on Immunization (EPI) adapated the two-stage cluster sampling methodology to estimate immunization coverage.[14] According to WHO, this cluster design is easy to implement in the field, requires few resources, and provides valid and precise estimates with relatively quick reporting.[15] The recommended design is 30 clusters of 7 subjects to yield 95% confidence levels. In 1992, CDC modified the EPI method for use following a disaster.[16] The modification enables users to estimate the number of households with specific needs in the disaster-affected area.

There are times when sampling may not be necessary. A few conditions to consider when determining whether sampling is necessary, include when

- the total number of households in the assessment area is significantly larger than what can be assessed with available resources,
- the area that needs to be covered to assess the affected population is too large,
- the number of field interview teams is limited, or
- the assessment must be completed quickly (one or two days) because results are needed quickly.

[14] World Health Organization (WHO). Rapid health assessment protocols for emergencies. Geneva: WHO; 1999.

[15] Malilay J, Flanders WD, Brogan D. A modified cluster-sampling method for post disaster rapid assessment of needs. Bull World Health Organ.1996;74(4):399-405.

[16] Hlady, W. G., Quenemoen, L. E., Armenia-Cope, R. R., Hurt, K. J., Malilay, J., Noji, E. K., & Wurm, G. Use of a modified cluster sampling method to perform rapid needs assessment after Hurricane Andrew. Annals of Emergency Medicine.1994; 23(4):719-725. [cited 2014 October 24]. Available from: http://www.annemergmed.com/article/S0196-0644(94)70305-1/abstract.

The goal of the two-stage cluster method is to complete 210 interviews (30 X 7) within each assessment area(s).

## Stage One – Selecting 30 Clusters and Mapping

The first stage includes selecting a sample of 30 clusters (e.g., census blocks, villages) with **probability proportional** to the estimated number of estimated number of households. The sampling method thus requires a count of all households in your sampling frame. In some geographic area, clusters may cover a wide area and/or has many housing units, which create logistical challenges for field interview teams to interview. In such situation segmenting the cluster and select the cluster proportional to size is advisable.

> *Selecting with a probability proportional to size ensures that clusters with more households have a higher chance of selection. This method of selection is then corrected during data analyses by weighting.*

You accomplish this first stage by dividing the sampling frame into non-overlapping subpopulations, or "clusters." Thirty clusters are selected with their probability proportional to the number of households in each cluster. You can gain information on the number of household per cluster from local officials, such as community leaders, and from local documents, such as tax records, property records, or census files *(see DEMO data)*. In some countries, you can obtain this information using the Census website or Geographic Information Systems (GIS) software such as ArcGIS developed by the Environmental Systems Research Institute, Inc. (ESRI). Using GIS provides more flexibility in the selection of a sampling frame. GIS allows the user to assess portions of a county, district, city or village. Instructions for using GIS to select clusters are based on your GIS program and shape files; they are not provided in this lesson.

Once you have selected the 30 clusters, create maps of the selected clusters, including road names and key landmarks, using GIS. If GIS resources are not available, identifying the selected clusters and landmarks is possible by using commercially available local maps or satellite images such as Google Earth.

## Stage Two – Selecting Seven Households

For the purpose of conducting interviews during the second stage of sampling, seven households are randomly selected in each of the 30 selected clusters. The sampling method thus requires a count of all the households within the cluster. You should coordinate with local

authorities or leadership to decide how to best determine the number of households within each cluster.

We suggest the following two methods for selection of households from sampled clusters:

1) **Simple Random Sampling** (SRS): Create a complete list of households within the cluster and use a random number generator to select randomly seven households. On arriving at your location, the steps for this method are the following:
    1. Travel around the cluster and count all the households
    2. Number the households from 1 to N
    3. Using a random number table or random number generator provided to field teams, randomly select 7 households (see www.random.org for free tools) *OR* If GIS is available, identify seven random global positioning system (GPS) waypoints generated by using GIS and census data. If no home is located at the waypoint, interview the closet house to the waypoint

2) **Systematic Random Sampling:** Before arriving at a selected cluster, select a random starting point by using a printed map (see Figure 2). On arriving at your selected starting point, the steps for this method are the following:

    1. Use a detailed map (e.g., a cluster viewed in Google Earth) or, if one is not available, count or estimate the number of households within the cluster
    2. Divide that number of households by 7 (the N); any N is acceptable as long as the number remains consistent throughout the cluster
    3. Start at the house nearest the randomly selected starting point, travel through the cluster and select the Nth house to interview until seven interviews are complete

**Figure 2. Example of using systematic random sampling to select seven households for interview. Starting with house #1, every 8th house is selected for interview**

*Lead a discussion to review lessons learned. Complete the Knowledge Check and Discussion Question #7. To guide additional discussion, you may use the question and suggested answers in the red box. (15 minutes)*

***Potential Discussion Question***

*Is sampling always necessary?*

*Possible answer:*

*Sampling is not always necessary. A few conditions to consider when determining whether sampling is necessary, include when*

- *the total number of households in the assessment area is significantly larger than what can be assessed with available resources,*
- *the area that needs to be covered to assess the affected population is too large,*
- *the number of field interview teams is limited, or*
- *the assessment must be completed quickly (one or two days) because results are needed quickly.*

*In those situations, you will likely need to sample.*

## KNOWLEDGE CHECK

What is the recommended sampling method for conducting an RNA?

A. Stratified sampling

**B. Two-stage cluster sampling**

C. Simple random sampling

D. Systematic sampling

## DISCUSSION QUESTION #7

Why is selecting a sample of 30 clusters with probability proportional to size important?

*Selecting with a probability proportional to size ensures that clusters with more housing units have a higher chance of selection. This nonrandom sampling is then corrected by weighting during data analyses.*

***Independent Reading**: Tell learners to read the next sections of Lesson 2 – Considerations Affecting Sample Selection and Size and Other Sampling Methods – until they see the STOP sign (pages 24-26).*

***TIME**: 15 minutes*

## CONSIDERATIONS AFFECTING SAMPLE SELECTION AND SIZE

The following are instances when factors outside of your control cause you to change or modify how you implement an RNA:

**Cluster accessibility** – You or your interview team may encounter difficulty completing all of the interviews for the 30 clusters. Difficulties might include storm damage, unsafe conditions, or restricted entries. If any such difficulty occurs, remember that clusters should be chosen without replacement—meaning that the clusters originally selected are the clusters that are assessed. And due to inaccessibility, this process might result in interviewing fewer than 30 clusters. One option is to increase the number of clusters selected in the first stage sampling prior to going into the field. For example, you or your leadership team can decide to select 35 clusters instead of the standard 30. If this method is chosen, it is critical that the change occurs *before* starting the first stage of the sampling method and before the interview team begins data collection in the field. Also, for this option it is essential that teams then visit all 35 census blocks and treat the design as 35x7 (sample size of 245) in data collection and analysis.

**Clusters with fewer than seven households** – You may also encounter clusters with fewer than seven households, making it impossible for field interview teams to interview the recommended seven households from that cluster. One option is to check the frequencies of households within the chosen sampling frame to identify this problem prior to the first stage of sampling (selecting the 30 clusters). If you see many clusters with a small number of households, combine the clusters to create larger clusters (e.g., combining 2-3 blocks or villages). The only requirement is that clusters be all-inclusive and non-overlapping. If this method is chosen, it is critical that the change occurs before starting the first stage of cluster sampling.

## OTHER SAMPLING METHODS

As you may recall from the previous section, sampling is used when information on everyone from the sampling frame in a population cannot be obtained easily or when logistical challenges arise. Sampling efficiently yields information about a large population by extrapolating data from a representative sample of the population. While modified two-stage cluster sampling is the

recommended method when conducting an RNA, other probability-based sampling methods are available that you may find helpful.

## Simple Random Sampling

Each unit (e.g., household) in the population is identified, and each unit has an equal chance of being in the sample. This method requires a comprehensive list of every household in the sampling frame. The following are key conditions for simple random sampling:

- The selection of each unit is independent of the selection of every other unit
- Selection of one unit does not affect the chances of any other unit

This method will take more time to complete than the two-stage cluster method due to the lack of geographical clustering of samples. More information about simple random sampling is presented by Peter K.Wingfield-Digby, Rapid Assessment Sampling in Emergency Situations, at http://www.unicef.org/eapro/Rapid_assessment_sampling_booklet.pdf[17]

## Systematic Random Sampling

Each unit (e.g., household) in the population is identified, and each unit has an equal chance of inclusion in the sample. You may use systematic random sampling when you can order or list sampling units (i.e., individuals or households) in some manner (e.g., logical geographic order, from one end of the village to the other). Rather than selecting all subjects randomly, determine a selection interval (e.g. every fifth household), select a starting point on the list picked at random, and select every nth household (where n = the sampling interval) on the list. Systematic random sampling assures good geographical distribution according to population density. Systematic sampling also allows better representation than simple random sampling, assuming no cyclic pattern in the distribution of sampling units (which would be extremely rare). More information about systematic random sampling is presented by Peter K.Wingfield-Digby, Rapid Assessment Sampling in Emergency Situations, which can be found at http://www.unicef.org/eapro/Rapid_assessment_sampling_booklet.pdf.[18]

## Stratified Sampling

The target population (sampling frame) is divided into suitable, non-overlapping subpopulations, or strata. A stratum is a subset of the population that shares at least one common characteristic. Each stratum should be homogeneous within and heterogeneous between. A random or systematic sample is then selected within each stratum. Therefore, separate estimates can be obtained from each stratum, and an overall estimate obtained for the whole population defined by the strata. The value of stratified sampling is that each stratum is more accurately represented, and overall sampling error is reduced. More information about stratified sampling is

[17] UNICEF. Rapid assessment samplingin emergency situations. Bangkok: UNICEF; 2010. [cited 2014 October 24]. Available from: http://www.unicef.org/eapro/Rapid_assessment_sampling_booklet.pdf.
[18] *ibid*

in Peter K.Wingfield-Digby's Rapid Assessment Sampling in Emergency Situations, at http://www.unicef.org/eapro/Rapid_assessment_sampling_booklet.pdf.[19]

*Lead a discussion to review lessons learned. Complete the Knowledge Check and Discussion Questions #8 and #9. To guide additional discussion, you may use the question and suggested answers in the red box. (30 minutes)*

***Potential Discussion Question***

*Why do we sample? What are some types of sampling methods?*

*Possible answer:*

*Sampling efficiently yields information about a large population by extrapolating data from a representative sample of the population. While modified two-stage cluster sampling is the recommended method when conducting an RNA, other probability-based sampling methods are available including simple random sampling, systematic sampling, and stratified sampling.*

**KNOWLEDGE CHECK**

_____ uses a selection interval rather than selecting units randomly.

A. Two-stage cluster sampling

B. Simple random sampling

**C. Systematic random sampling**

D. Stratified sampling

[19] *ibid*

## DISCUSSION QUESTION #8

What are some of the challenges affecting sample selection and size?

- *Cluster Accessibility: Because of storm damage, unsafe conditions, or restricted entries, you or your interview team might encounter difficulty completing all of the interviews for the 30 clusters;*
- *Clusters with Fewer Than 7 Households: You might encounter clusters with fewer than 7 households, which will make it impossible for interview teams to interview the recommended 7 households from that cluster.*

## DISCUSSION QUESTION #9

What is the difference between simple random sampling, systematic random sampling, and stratified sampling?

*Simple random sampling*

- *Selection of each unit is independent of the selection of every other unit.*
- *Selection of one unit does not affect the chances of any other unit. This method requires a comprehensive list of every household in the sampling frame.*
- *Simple random sampling might take more time to complete due to the lack of geographical clustering of samples.*

*Systematic random sampling*

- *Use systematic random sampling when you can order or list individuals or households (sampling units) in some manner.*
- *Rather than selecting all subjects randomly, determine a selection interval and a starting point on the list picked at random, then select every nth household, person, etc. on the list (where n = the sampling interval).*
- *You can assure good geographical distribution (according to population density). Systematic sampling allows better representation than simple random sampling (assuming no cyclic pattern in sampling unit distribution, which would be extremely rare).*
- *Systematic random sampling requires a comprehensive list of every household in the sampling frame.*

*Stratified sampling*

- *When conducting stratified sampling, divide the target population into suitable, non-overlapping subpopulations (strata). Each stratum should be homogenous within and heterogeneous between. Then select a random sample within each stratum*
- *Separate estimates can be obtained from each stratum and an overall estimate obtained for the whole population. The value is that each stratum is accurately represented and overall sampling error is reduced*

***Instructions:*** *Depending on the size of the group, tell learners to complete this exercise individually, with a colleague, or as part of a small group. Instruct them to read through the case study and answer the questions. Have learners record their answers in the space provided. Once completed, review the exercise and discuss possible answers.*

***TIME****: up to 15 minutes to complete, then reconvene the group to discuss the answers (up to 10 minutes)*

## PRACTICE EXERCISE #2

*In this practice exercise, you will apply the concepts learned so far in Lesson 2. Please recall the flooding scenario (page 15) and answer the questions.*

**Flooding in a Southeast Asian country, continued**

[See page 15]. As a result of the large number of people displaced, reported dead, injured, or missing due to flooding, gathering exhaustive information is difficult.

**What sampling method would you use to determine health- and safety-related needs of those impacted by the flooding? Why?**

*Two-stage cluster sampling*

*This method is often more practical than a simple random sample, which requires numeration of all households in the sampling frame. Two-stage cluster sampling provides a way to collect information from a relatively small sample size yet provides reasonable estimates for an entire population. This sampling method also allows for increased efficiency (e.g., less driving time) and thus can be more timely and cost-effective.*

***Independent Reading**: Tell learners to read the next sections of Lesson 2 – Develop the RNA Questionnaire and Forms and Structuring an RNA Questionnaire – until they see the STOP sign (pages 28-33).*

***TIME**: 30 minutes*

## DEVELOP THE RNA QUESTIONNAIRE AND FORMS

In addition to identifying the assessment area(s), you should work with stakeholders (e.g., local authorities, subject matter experts) to finalize the assessment questions as well as to determine the best data collection option (i.e., paper forms or electronic devices). The RNA field interview teams should carry all required forms in the field. These forms include the following:

- Questionnaire/interview
- Tracking form
- Introduction letter or consent script
- Confidential referral form

### Developing the RNA Questionnaire

In the aftermath of a disaster, accurate and low-cost, population-based information about the affected community's general safety and health needs is critical. A questionnaire is developed to identify rapidly the need for basic necessities such as food, water, electricity, shelter, and access to medical care. The RNA questionnaire is used to gather the right information to determine the magnitude of the need and to plan and drive relief efforts.

As such, before you begin to develop the questionnaire, you must first identify the RNA's objective, scale, and scope as agreed on by local authorities, subject matter experts, and other key stakeholders. Such agreement will ensure understanding of the work to be undertaken, anticipated time frame, and questionnaire priorities. This is the crucial first step, as all other questionnaire aspects stem from it.[20]

*It is important to collect only data that will be used. Define what you need to know (not what you would like to know) and consider cost, speed, and availability of resources.*

[20] Connolly MA, editor. Communicable disease control in emergencies: a field manual. WHO; 2005. [cited 2013 Sept 3]. Available from: http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/index.html.

## Structuring an RNA Questionnaire

Once you have determined the assessment's scope and objective, you are ready to begin building the questionnaire. The RNA questions will be at the *household level*, including those pertaining to the health status and behavioral/mental health of inhabitants within a household (e.g., does anyone in the household have a cough?).

*Questionnaire objectives and questions should **SMART**:*

- ***S**pecific – clear and unambiguous*
- ***M**easurable – concrete criteria for measuring*
- ***A**ttainable – realistic*
- ***R**elevant – specific to the situation*
- ***T**ime-bound – limited to a time-frame*

Questionnaires should be simple, short and ideally limited to 10-15 minutes (generally, a two-page questionnaire). Consider the following when developing questions:

- Avoid open-ended questions and only ask for information that will meet the assessment objectives. In general, yes/no and multiple choice questions are the best options for obtaining the needed information most efficiently. Examples of an open-ended and closed-ended (preferred) question are provided below.

> ***Open-ended question**:* Since the disaster, what types of injury have you or a member of your household sustained?

> ***Close-ended question (preferred)**:* Since the disaster, have you or a member of your household sustained a broken bone?
>
> ___Yes ___ No ___ Don't Know ___Refused

- Consider including the following categories within the two-page questionnaire:
  - Location of the household
  - Household type (e.g., single family home) and extent of damage to the dwelling
  - Household needs (e.g., food, water, medicine, first aid)
  - Household members' physical and behavioral health status
  - Greatest need

- Consider the comfort level of both the interviewer and the respondent. If questions are too personal, the respondent might refuse or be uncomfortable answering, which might lower the response rate.

- Pilot test the questionnaire (i.e., practice the interview with others who have not been involved in the development) for acceptability, comprehension, and appropriate order to identify any confusing questions and to estimate the length of time necessary to complete the interview.

If possible, use existing questionnaires with demonstrated reliability and validity in your population. Existing questionnaires will save you time and allow you to compare your data with other data. The following resources may provide additional pretested questions from local or international organizations that you can use to develop your own questionnaire:

- WHO
- Demographic and Health Survey (DHS)
- CASPER Toolkit, Appendix B (question bank) and Appendix C (preparedness template that can be used for disaster planning
- CDC surveys such as the Behavioral Risk Factor Surveillance System (BRFSS), Pregnancy Risk Assessment Monitoring System (PRAMS), National Health and Nutrition Examination Survey (NHANES), National Health Care Survey, National Health Interview Survey

## Data Collection Options

There are two options for collecting data from the field: paper forms and electronic devices. You should consider the advantages and disadvantages to both, given the objectives and the nature of your questionnaire. As Table 3 summarizes, paper forms can be labor-intensive in the data entry process while electronic devices can be labor-intensive in the development stage. Also, the potential for error lurks at different stages in the paper versus the electronic formats. Regardless of the data collection method you choose, pilot testing the questionnaire is essential before deployment to the field.

**Table 3. Data collection options advantages and disadvantages**

| | Advantages | Disadvantages |
|---|---|---|
| Paper form | • No technical training<br>• Relatively cheap supplies<br>• Requires paper, pens, and clipboards<br>• No maintenance of supplies<br>• No limitation on number of teams<br>• Faster to fill during an interview | • Relatively slow data management process (i.e., requires data entry after fieldwork)<br>• Can be labor-intensive to enter data into database after fieldwork<br>• Potential for human error |
| Electronic form | • Can provide real-time data quality checks<br>• Quicker data management process (i.e., no data entry required after fieldwork) | • Technical training required<br>• May be expensive to purchase the hardware and software<br>• May incur costs if broken, dropped, or water-damaged<br>• Requires data collection devices, battery chargers, and electricity in the field |

| | | |
|---|---|---|
| | | • Necessitates maintenance and care of software and devices<br>• Can be labor intensive to develop in advance of fieldwork<br>• Unavailability of equipment may limit the number of teams<br>• May distance the interviewer from the interviewee |

## RNA Forms in the Field

The RNA interview team should ensure the following forms are included in the field packet and have been properly reviewed before going into the field. Table 4 contains the necessary forms.

**Table 4. RNA forms in the field[21]**

| Form | Definition | Key Consideration |
|---|---|---|
| Tracking form | Used to monitor the outcome of every interview attempt and is the basis for calculating the response rates. The form will allow the RNA team to collect information about each household selected, even those that are inaccessible. Field interview teams should record each household selected and the interview outcome | The field interview teams should use the reverse side, or second page, of the tracking form to take notes in the field including households that need to be revisited. When the RNA is complete, the tracking form should be destroyed so there is no way to link addresses to specific questionnaires. |
| | See RNA (CASPER) Toolkit, Appendix E for a copy of the tracking form. | |
| Introduction and consent script | When arriving at the household, the team should be prepared to give an introduction and obtain verbal consent. The survey participant must give explicit verbal consent to participate in the interview. Written consent is typically not required because obtaining a signature leads to increased confidentiality risk for the participant. | A script written for the field interviewer teams to recite from is helpful. The script can be memorized or read to respondents. The script should be kept brief, printed on official letterhead, and given to each selected household. This form should include a phone number for the health department or agency responsible for the RNA. |
| | See RNA (CASPER) Toolkit, Appendix G for an example of an | |

[21] CDC. Community Assessment for Public Health Emergency Response (CASPER) Toolkit, Second edition. Atlanta (GA); 2012.

| | | |
|---|---|---|
| | introduction and consent script. | |
| Confidential referral form | Field interview teams must be prepared to respond if they come across an urgent need that presents an immediate threat to life or health. Typically, teams that encounter a household with urgent needs should encourage or assist the household to call emergency services. In the event that calling emergency services is not appropriate or possible, the teams should complete a confidential referral form. | This form should be immediately communicated to the RNA leadership staff for rapid follow-up and communication with previously identified health service providers in the area (e.g., mental health) or response agencies involved in addressing immediate needs during disasters. |
| | See RNA (CASPER) Toolkit, Appendix F for a sample of a confidential referral form. | |
| Leave behind handouts and public health material | The field interview team can help distribute vital public health information to the community (e.g., health education on carbon monoxide poisoning prevention, proper cleanup methods, and contact information for disaster services). Handouts should be prepared in advance and provided to all interviewed households and interested community members. | Handouts should include a list of key contact names and numbers were people can get help and updated information about the disaster including, but not limited to, shelters or places to get medical care, food, electricity, and so on. This information should be given out regardless of participation status and can also be given to interested community members who were not selected to be in the assessment. |

*Lead a discussion to review lessons learned. Complete the Knowledge Check and Discussion Questions #10 and #11. To guide additional discussion, you may cover content covered in Table 3 and Table 4. (20 minutes)*

## KNOWLEDGE CHECK

The _____. monitors the outcome of every interview attempt.

**A. Tracking form**

B. Consent script

C. Confidential referral form

D. Leave behind public health materials

## DISCUSSION QUESTION #10

What are some considerations when designing an RNA questionnaire?

- *Avoid open-ended questions*
- *Limit to 10-15 minutes*
- *Within the questionnaire's two pages, consider the following categories :*
  - *Location of the housing unit*
  - *Housing unit type and extent of damage to it*
  - *Household needs*
  - *Physical and behavioral health status of the household members*
  - *Greatest need*
- *Consider the comfort level of both the interviewer and the respondent—don't ask questions that could make the respondent uncomfortable*
- *Pilot-test for acceptability, comprehension, and appropriate order*

## DISCUSSION QUESTION #11

What are two advantages and two disadvantages of using a paper form for data collection?

*Advantages*

- *No technical training*
- *Relatively cheap supplies*
- *Requires only paper, pens, and (preferably) a clipboard*
- *No maintenance of supplies*
- *No limitation on number of field teams*

*Disadvantages*

- *Must enter data into database after field work*
- *Potential for human error*
- *Relatively slow data management processes and requires after-hours data entry*

***Independent Reading**: Tell learners to read the next sections of Lesson 2 – Identify and Train Field Interview Teams and Conducting the Interview– until they see the STOP sign (pages 34-38).*

***TIME**: 30 minutes*

## IDENTIFY AND TRAIN FIELD INTERVIEW TEAMS

Face-to-face interviews are used to conduct the RNA questionnaire. Therefore, field interview teams must be selected and trained to administer the questionnaires in the field. Training field interview teams on how to administer the questionnaire is vitally important in ensuring the validity of the results. Important considerations in assembling and training a field interview team are discussed in this section.

*The RNA field interview team differs from the RNA assessment team. The field interview team conducts the interviews in the field and the assessment team prepares for the RNA (e.g., identifies the assessment area(s), defines the scope and nature of the questionnaire, develops the questions).*

### Forming Field Interview Teams

The field interview team – the people who conduct the RNA in the field – should ideally be a multidisciplinary, qualified group representing a wide range of expertise and with previous experience conducting interviews. For example, a team to assess the health needs of an affected population would ideally include people from one or more of the following fields: public health and epidemiology, nutrition, logistics, and environmental health.

Take into account the following criteria when selecting team members.[22]

- Familiarity with the region or population affected
- Knowledge of and experience with the type of disaster being assessed
- Capacity for teamwork and local acceptability for those recruited from abroad
- Analytical skills, particularly the ability to see trends and patterns
- Capacity to make decisions in unstructured situations using relatively sparse data

Each field interview team should be a mix of gender, experience, and profession. For example, males paired with females, locals paired with external partners, experienced persons paired with inexperienced persons, and students paired with professionals or seasoned volunteers. This will

[22] WHO. Rapid Health Assessment Protocols for Emergencies website. http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/index.html. Accessed September 25, 2013.

help to ensure an even distribution among the teams as well as promote a safe work environment.

## Size of Field Interview Teams

Identify approximately 20-30 persons to conduct the RNA in the field. These persons should be divided into separate teams, with at least two persons in each team, for a total of 10 to 15 teams. The number of teams will dictate the amount of time needed to conduct the RNA; fewer teams require a longer time to collect the data, while more teams allow for a shorter data collection period. You should also take into account the availability of equipment needed. For example, larger numbers of field interview teams require more equipment such as vehicles and electronic data collection devices (if necessary). Table 5 contains considerations for determining the number of field interview teams.

**Table 5. Considerations for the number of field interview teams**

| Small Number of Field Teams (<10) | Large Number of Field Teams (≥10) |
|---|---|
| • May be easier to identify required staff and train | • May be difficult to identify enough staff and train<br>• Can solicit broader participation across participating organizations |
| • Data collection will take more time | • Data collection will take less time |
| • Less equipment is needed (e.g., vehicles, electronic devices) | • Requires additional coordination and equipment (e.g., data collection devices, battery chargers in the field) |

Once the field interview teams are in place, hold an introductory meeting to allow members a chance to exchange contact information, become familiar with each other's roles and skills, and receive training.

## Training the Field Interview Teams

Training the field interview teams is one of the most important aspects of conducting the RNA. Poorly trained teams could collect or report the data inaccurately, thus jeopardizing the results and misrepresenting the affected communities needs. Therefore, it is important that all field interview teams be trained to conduct an RNA properly. Conduct a three- to six-hour just-in-time training either one day in advance or on the morning of the first day of field data collection. At the end of the training, field interview team members should be familiar with the following:

- The RNA's objectives
- Each team member's roles and responsibilities
- The questionnaire and the information that each question elicits
- The sampling methodology and key considerations
- Future meeting times and places, including the debriefing process

- How to deliver the interview introduction and consent script
- Situations requiring immediate referral
- Safety instructions and a general awareness of potential hazards such as flood water, downed power lines, or unattended animals
- Hazards to look for such as improper generator use
- How to complete the necessary forms for every household at which contact was attempted

For a complete sample agenda, please see the Community Assessment for Public Health Emergency Response (CASPER) Toolkit, Appendix H[23].

## CONDUCTING THE INTERVIEW

Because an RNA is conducted at the household level, you should select one adult household member (i.e., 18 years of age or older) to speak for all household members. The field interview team should use its best judgment to select the person to be interviewed. The general rules for selecting such a person are as follows:

- Any adult regardless of sex, race, ethnicity, or religion can be selected
- If more than one adult is present, the interviewer can allow the household members to self-select or the interviewer may make the choice
- The selected person should understand that he/she is reporting on the entire household and not on just themselves

### Interview Tips

Before going to the field, interview team members should assign and clearly understand roles and responsibilities of each member (e.g., driving, navigating, interviewing). More specifically, we recommended that the local member conduct the interview and make the initial contact with the selected household. The household may be more willing to take part in the interview if it is led by a local representative. Local representatives are typically seen as trustworthy advocates who have the best interests of the community in mind. The assigned interviewer should practice the questionnaire with his/her partner so that both are familiar and comfortable with the questions (e.g., wording of the questions, intent of the questions, skip patterns).

Before going into the field, interview team members should also decide where to conduct the interviews. Specifically, decide beforehand whether household interviews will be conducted in an area outside the home protected from hazards (e.g., front porch) or inside the home. The decision is at the discretion of the team and should take into account the comfort level and personal safety of both team members. An area outside the home, however, is the preferred interview location.

[23] CDC. Community Assessment for Public Health Emergency Response (CASPER) Toolkit, Second edition. Atlanta (GA); 2012.

The following table provides a general guideline for a successful interview and includes suggested tips to build rapport, minimize response bias, and encourage open dialogue.

**Table 6. RNA interview tips**[24]

| | |
|---|---|
| **Building Rapport** | |
| Act professionally | • Dress appropriately including modest clothing, flat shoes, and no excessive jewelry<br>• Refrain from eating, drinking, or chewing gum during the interview |
| Establish legitimacy | • Deliver introductions according to the consent script<br>• Ensure proper identification, including badges which should remain visible to the respondent at all times |
| Show empathy and respect | • Convey a sense of empathy and respect<br>• Establish eye contact, display confidence, and an approachable demeanor<br>• Express interest in the respondent's answers<br>• Be an active listener while remaining patient if/when a respondent is having a difficult time answering questions; remember, the respondent is using his/her time to help ensure the success of the RNA |
| **Minimize Response Bias** | |
| Standardize questions | • Ask questions in the same manner for each interview; read questions exactly as they are written<br>• Do not attempt to "improve" a question by altering a few words or not reading the question in its entirety. This could change the question's entire meaning<br>• Do not omit questions (e.g., if the team member "knows" the answer or thought he/she heard it)<br>• Do not finish a respondents sentences<br>• Do not "prefill" answers to questions (e.g., if the respondent answered a question in another conversation) |
| Allow participants to think | • Give respondents time to express themselves while keeping the interviews at a steady pace |

[24] *ibid*

| Encourage the Respondent | |
|---|---|
| Clarification of questions | • If the respondent needs clarification, repeat the question first and then elaborate if needed<br>• If the respondent is not fully satisfied with the answer choices, encourage him/her to select the one that fits best without leading<br>• If any confusion remains, team members should write down exactly what was said so that the confusion can be addressed with the RNA assessment team |
| Probing techniques | • If a question is open-ended, ask the respondent to elaborate as a way to obtain additional information, if necessary. For example, an interviewer can ask "Is there anything else you would like to add?"<br>• Do not direct a respondent toward an answer, use overt encouragement, or remind a respondent of an earlier remark if the answers differ from what the team expects<br>• Remain neutral and, if necessary, repeat the response – a technique that can lead to clarification or improve recall |

At the end of the interview and before leaving the household, team members should review the entire questionnaire to ensure that all questions have been answered. The team members should record any confusion or concern about questions during the interview and share the confusion or concern with leadership staff. Remember to thank the respondent, to leave the handouts and other public health information, and to refrain from leaving in haste. Before leaving, review the questionnaire again for missing information and complete the tracking form.

*Lead a discussion to review key lessons learned. Complete the Knowledge Check and Discussion Question #12. To guide additional discussion, you may use the question and suggested answers in the red box. (15 minutes)*

***Potential Discussion Question***

*Why do we train field interview teams?*

*Possible answer:*

*Training the field interview teams is one of the most important aspects of conducting the RNA. Poorly trained teams could collect or report the data inaccurately, thus jeopardizing the results and misrepresenting the affected community's needs. Conduct a three- to six-hour just-in-time training either one day in advance or on the morning of the first day of field data collection (see bulleted list above for topics to cover)*

## KNOWLEDGE CHECK

Which of the following is NOT an interview tip when conducting an RNA?

A. Convey a sense of empathy and respect

B. Give respondents time to answer questions

**C. Prefill answers to questions when you have heard the respondent previously answer the question**

D. Ask questions in the same manner for each interview

## DISCUSSION QUESTION #12

What are some things to consider when deciding the number of field interview teams to have for your RNA?

*You will need approximately 20-30 persons to conduct the RNA in the field (10-15 teams). The number of teams will dictate the amount of time needed to conduct the RNA; fewer teams require a longer time to collect the data, while more teams allow for a shorter data collection period. You should also take into account the availability of equipment needed. For example, larger numbers of field interview teams require more equipment such as vehicles and electronic data collection devices (if necessary).*

- *Small Number of Teams – may be easier to identify needed staff, data collection will take more time, less equipment needed*
- *Large Number of Teams – may be more difficult to identify needed staff, data collection will take less time, more equipment needed*

## PRACTICE EXERCISE

***Instructions:*** *Depending on the size of the group, tell learners to complete this exercise individually, with a colleague, or as part of a small group. Instruct them to read through the case study and answer the questions. Have learners record their answers in the space provided. Once completed, review the exercise and discuss possible answers.*

***TIME****: up to 30 minutes to complete, then reconvene the group to discuss the answers (up to 20 minutes)*

### PRACTICE EXERCISE #3

*In this practice exercise, you will apply the concepts learned in Lesson 2. Please recall the flooding scenario (page 15) and answer the questions.*

**Flooding in a Southeast Asian country, continued**

[See page 15]. As previously mentioned, the local government requested interagency assistance from NGOs, MOH, and other key partners to determine the health and general needs of the affected population. This request was met and an RNA assessment team were formed to prepare for the assessment.

**Develop 10 questions to collect information on immediate needs and health-related issues of the affected provinces.**

*Question topics to consider include demographic characteristics, damage to houses, utilities, general and mental health status, interruption of electricity (power) and communication in affected places, destroyed water supply systems in heavily affected areas, and exposure to floodwaters. Ensure they are asked at the **household** level*

**What are some considerations for selecting field interview team members?**

*The field interview team should include a multidisciplinary group of qualified personnel representing a wide range of expertise and previous interviewing experience. Ideally, select team members who have*

- *Familiarity with the region and affected population*
- *Knowledge of and experience with floods and monsoons*
- *Analytical skills, particularly the ability to see trends and patterns of adverse health effects generally seen in post-flood settings*

*Each field interview team should include a mix of individuals across sex, experience, and profession.*

**During the predeployment training, field interview team members were briefed on safety issues they might encounter in the field. What types of personal safety issues may someone encounter after a monsoon? What personal supplies should teams take into the field?**

*Interview teams were advised not to go into areas they believed might expose them or their team to safety risks, and the team was educated about personal safety issues. Examples of safety concerns include the following:*

- *Road inaccessibility and bridge collapse*
- *Downed power lines*
- *Nonfunctioning traffic lights*
- *Domestic and wild animals*
- *Safe judgment in entering homes*
- *Debris – down trees, twisted metal, etc.*
- *Flood water*
- *Increased vectors (e.g., mosquitoes)*

*Teams were also made aware of personal health issues, such as flood or contaminated water exposure and personal supplies they should take to the field (e.g., hat, gloves, coat, sturdy closed-toe shoes, snacks, water).*

*After you are completed with the scenario, summarize the key learning points from Lesson 2 outlined in the Lesson 2 Summary*

## LESSON 2 SUMMARY

As you have learned in this in this lesson, an RNA is a useful tool to provide local, state, and other decision-makers with the health status and basic needs of a population affected by a disaster. During a disaster, the results of an RNA help to plan and implement response activities. Thus it is important to properly identify the geographical areas under assessment, as well as consider all of the factors affecting questionnaire development and properly train the field interview team. With the scarce resources and damaged infrastructures typically found in a disaster setting, the need is critical to provide accurate information to decision-makers who allocate resources and implement relief efforts

# LESSON 3: PHASE 2 – CONDUCTING AN RNA

***Lesson 3**: Phase 2 – Conducting an RNA*

***Overview:** This lesson focuses on planning for disaster surveillance, considerations for designing or using existing surveillance systems, and morbidity and mortality surveillance during a disaster*

***Total Estimated Time**: approximately 1.5 hours*

***Reading and Activities**: up to 15 minutes*

***Group Discussion**: up to 20 minutes*

***Practice Exercise**: 50 minutes, including a 20 minute review*

## INTRODUCTION

***Independent Reading**: Tell learners to read the first two sections of Lesson 3 – Introduction and Administering the Questionnaire in the Field – until they see the STOP sign (pages 41-43).*

***TIME**: 15 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

As discussed in Lesson 2, the method for conducting an RNA is the face-to-face interview. As part of phase 2, *Conducting an RNA*, to conduct a successful interview in the field, interview teams must follow several steps. In this lesson, we discuss the steps interview teams need to follow.

After completing this lesson, you will be able to do the following:

- Explain the interview steps that should be followed in the field
- Discuss field awareness

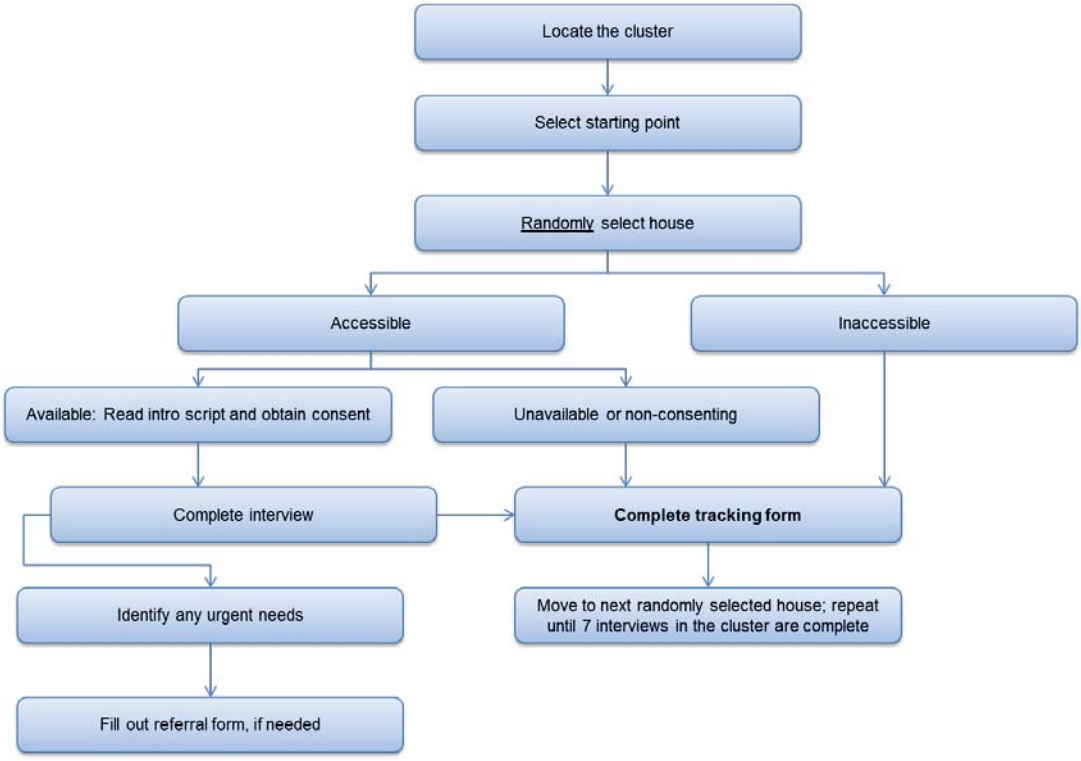
## ADMINISTERING THE QUESTIONNAIRE IN THE FIELD

To administer the questionnaire safely and accurately, field interview teams must follow the approved interview guidelines and steps.

### Interview Steps in the Field

The flowchart in Figure 3 shows the general steps for conducting an RNA in the field.

**Figure 3. General interview steps in the field.**[25]




## Considerations while in the Field

Fieldwork requires awareness of the environment, use of personal judgment, and a positive and flexible outlook. Table 7 depicts five considerations for interview team members to keep in mind while in the field.

**Table 7. Considerations for field interview teams**

| Building Rapport | |
|---|---|
| Think safety | Despite all the preparation necessary before conducting an RNA in the field, unexpected problems may arise. Interview teams should<br>• receive briefings about potential safety concerns, such as downed power lines, unsafe road blockages, unattended pets, and other potential hazards;<br>• use personal judgment when assessing any safety concerns and contact the RNA leadership about any concerns that arise; and<br>• communicate with RNA leadership frequently to ensure safety. |
| Remain flexible | As with all disaster relief efforts, flexibility is important. Various responsibilities need to be shared, such as transportation logistics, interviewing, and tracking. Team members should remember that |

[25] *ibid*

| | |
|---|---|
| | • plans can always change so field interview teams may switch members, may swap clusters, or may be asked to take on an additional cluster; and<br>• a positive attitude is key |
| Adhere to the methodology | To ensure data quality and representativeness, adherence to the RNA methodology is vital. Adherence includes<br>• randomly selecting households within clusters and conducting interviews in a standard, structured manner;<br>• following the assessment procedure and guidelines covered in the just-in-time training; and<br>• calling the RNA team leadership office (field headquarters) if you have any questions |
| Be respectful | Field interview team members going into a community should remember to be respectful to the respondents and to the community. They should<br>• read the provided script its entirety, answer any questions the household respondent might have, and allow the respondent to quit at any time if the respondent so requests; and<br>• consider cultural norms and practices when selecting the time and the day to conduct interviews. Always remember that the respondent has just suffered through a disaster |
| Understand personal limitations | Field team members should understand and accept their own personal limitations, whether those limitations involve a personal comfort level when entering a household, time limitations of being in the field, or a team member's physical condition. |

## RNA Debrief

After the field data collection is complete, a debriefing meeting with all of the team members is a recommended step. The meeting will help to identify lessons learned and suggest improvements. Team members should share their anecdotes, observational information, lessons learned, or concerns not captured on the questionnaire for inclusion in the final report(s). Table 8 includes sample debriefing questions to collect information from RNA teams.

### Table 8. Sample debriefing questions

| Example Questions |
|---|
| • In your opinion, what went well? What did not go well?<br>• To what extent do you think this assessment will be useful to your community in responding to this emergency?<br>• Did you think you were prepared (e.g., training, food, safety, communications, supplies) |

for your assignment?

- Would you want to participate on a team in the future?
- If we were to do this assessment again, what improvements can we make?
- Did you learn anything from this experience?
- Did you have specific problems with any of the tools or methods used (e.g., questionnaire, tracking form, selecting individual house)
- Please provide any additional comments.

*Lead a discussion to review key lessons learned. To guide the discussion, you may use the questions and suggested answers in the red box. (20 minutes)*

***Potential Discussion Questions***

*What are some considerations for field interview team members to keep in mind while they are in the field?*

*Possible answer:*

- *Think safety: know potential safety concerns, use personal judgment to assess safety. Communicate frequently with RNA leadership and team members.*
- *Remain flexible: plans can change; team members and clusters can change at the last minute. Remaining flexible while keeping a positive attitude is important.*
- *Adhere to the methodology: this helps to ensure quality and that data are representative. Just-in-time training helps make sure teams adhere to assessment procedures.*
- *Be respectful: read the provided script entirely. Answer questions and allow the respondent to quit at any time. Consider cultural norms and practices when selecting interview times and days.*
- *Understand personal limitations: field team members should understand and accept their own personal limitations, whether those limitations involve a personal comfort level when entering a household, time limitations of being in the field, or a team member's physical condition*

*Why should you conduct a debrief once field data collection is complete?*

*Possible answer:*

*Debriefing after an RNA helps to identify lessons learned and improvements to future assessments. These meetings allow team members to share anecdotes, to exchange observational information, lessons learned, or concerns not captured in the questionnaire*

## PRACTICE EXERCISE

***Instructions:*** *Depending on the size of the group, tell learners to complete this exercise individually, with a colleague, or as part of a small group. Instruct them to read through the case study and answer the questions. Have learners record their answers in the space provided. Once completed, review the exercise and discuss possible answers.*

***TIME****: up to 30 minutes to complete, then reconvene the group to discuss the answers (up to 20 minutes)*

### PRACTICE EXERCISE #4

*In this practice exercise, you will apply the concepts learned in Lesson 3. Please recall the flooding scenario (page 15) and answer the questions.*

**Flooding in a Southeast Asian country, continued**

[See page 15]. RNA interview teams were selected, appropriately trained, briefed on the conditions related to impassable roads and bridges, damaged hospitals, limited electricity and water, and are ready to begin the RNA

**What are the interview steps in the field?**

- *Locate the cluster*
- *Select starting point*
- *Randomly select a house (determine whether it is accessible or in accessible)*
- *If accessible, read intro script and obtain consent (available) or deem unavailable or nonconsenting (unavailable)*
    - *Complete the interview*
    - *Identify urgent needs*
    - *Complete tracking form*
    - *Fill out referral form, if needed*
- *Move to the next randomly selected house – repeat until you have completed 7 interviews in the cluster*
- *If the house is inaccessible, complete tracking form and move to the next randomly selected house – repeating until 7 interviews in the cluster are complete*

**What are some of the safety concerns in the field?**

*Some examples include downed power lines, unsafe road blockages, unattended pets, flood waters, and other potential hazards*

**Why is debriefing important?**

*Debriefing is important—it provides an opportunity to identify lessons learned and improvement areas. Team members can share their anecdotes, exchange observational information, lessons learned, or concerns not captured on the questionnaire, all for inclusion in the final report(s).*

*After you are completed with the scenario, summarize the key learning points from Lesson 3 outlined in the Lesson 3 Summary*

## LESSON 3 SUMMARY

In this lesson, we explore proper interview techniques by the RNA team while in the field. The interview guidelines that the interview teams are required to adhere to are defined, as well as several important considerations while in the field. Fieldwork often requires an astute awareness of the environment, the use of personal judgment, and a positive and flexible outlook. For example, the interview teams should always be mindful of personal safety (e.g., avoiding downed power lines), remain flexible, and understand their personal limits. After completing RNA field activities, we recommend that team members meet to discuss the process, lessons learned, and areas for improvement.

***Lesson 4**: Phases 3 and 4 – Data Entry, Analysis, and Writing the Report*

***Overview:** This lesson focuses on planning for disaster surveillance, considerations for designing or using existing surveillance systems, and morbidity and mortality surveillance during a disaster*

***Total Estimated Time**: 5.25 hours*

***Reading and Activities**: up to 75 minutes*

***Group Discussion**: up to 50 minutes*

***Practice Exercise**: 50 minutes, including a 20 minute review*

***Optional Data Exercise**: up to 140 minutes*

# LESSON 4: PHASES 3 AND 4 – DATA ENTRY, ANALYSIS, AND WRITING THE REPORT

***Independent Reading**: Tell learners to read the first two sections of Lesson 4 – Introduction and Data Entry and Analysis – until they see the STOP sign (pages 46-48).*

***TIME**: 15 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## INTRODUCTION

In lesson 3, you learned how to define the scope and nature of the questionnaire and how to design the questionnaire. Now we will cover phases 3 and 4, *Data Entry and Analysis*, and *Writing the Report*. We will discuss the process for analyzing data collected from a questionnaire using a statistical software package and learn how to use a preliminary and final reporting structure to report the results from the questionnaire and the data analysis.

After completing this lesson, you will be able to do the following:

- Discuss the considerations for using paper versus electronic devices for data entry
- Describe the method for analyzing data
- Understand the use of weighted analysis
- Describe the process for writing a preliminary and final report of the RNA findings

## DATA ENTRY AND ANALYSIS

You will use statistical software packages to analyze data collected from both paper and electronic questionnaires. Although a variety of statistical software packages are available, we recommend Epi Info™ software: it is user-friendly and free of charge. Any statistical software package is acceptable as long as it allows you to "weight" data (e.g., SAS). Weighting data is a key requirement for any software package considered for an RNA data analysis.

### Data Entry

To ensure the quality of data collected, whether electronically or paper-based, consider how you will enter and analyze the data. Table 9 details considerations for entering and analyzing data.

**Table 9. Considerations for data entry.**[26]

| Paper Form | Electronic Device |
|---|---|
| • Enter into an electronic dataset using software that is familiar, easily accessible, and maintainable<br>• Build data entry platform before conducting fieldwork<br>• Provide training for data entry staff to enter data accurately | • Merge collected data into a single file that statistical software can analyze (e.g., Epi Info™, SAS) |

### Data Analysis

To adjust the data to account for a complex sampling design, such as the two-stage cluster sampling methodology, **weighted frequencies** are used to represent the entire target population (i.e., the sampling frame). Note that in most cases, nonweighted analyses will not represent the entire target population and may bias estimates.

*For tutorials in creating the database, entering data, and running analysis, please visit the CDC's Epi Info™ website at http://wwwn.cdc.gov/epiinfo/user-guide/ and follow the User Guide*

Remember, households selected in cluster sampling have an unequal probability of selection. To avoid biased estimates, data analyses should include a mathematical weight for selection probability. Weighting involves assigning a weight for each household for which an interview is completed. The weight is based on the household's probability of selection. Once all data are merged into a single electronic dataset, a weight variable is added to each surveyed household by use of the formula in Figure 4 (see DEMO data)

[26] *ibid*

**Figure 4. Weight variable formula**

$$Weight = \frac{Total\ number\ of\ households\ in\ the\ sampling\ frame}{(number\ of\ households\ interviewed\ in\ cluster) * (number\ of\ clusters\ selected)}$$

The numerator is the total number of households in the sampling frame; that number will be the same for every assessed household. Remember, the sampling frame is defined as the entire assessment area in which the RNA is conducted.

In only one instance will all the weights be equal. If you complete seven interviews in each cluster, then each household will receive the same weight – assigning weighting will not be required. For example, if information was obtained from exactly seven households in 30 clusters, the denominator for every household would be 7 (number of interviews) * 30 (number of clusters selected) which equals 210. In this case, the sample itself was weighted because all households in the sample had an equal probability of being selected. This outcome is possible, but unlikely to occur.

The more likely scenario is to have households where people are not home, households refuse to participate, or insufficient households in the clusters. When this occurs, the denominator will be different for each surveyed household depending on the cluster from which the household was selected. Households from the same cluster will have the same weight, but weights will differ between clusters. For example, if only five completed interviews occurred in a cluster, the denominator of the weight for each of the five surveyed households would be 5 (number of interviews) * 30 (cluster size) = 150.

*Lead a discussion to review key lessons learned. Complete the Knowledge Check and Discussion Question #13. To guide additional discussion, you may use the question and suggested answers in the red box. (15 minutes)*

***Potential Discussion Question***

*How do you adjust for a complex sampling design such as cluster sampling?*

*Possible answer:*

*To adjust the data to account for a complex sampling design, such as the two-stage cluster sampling methodology, weighted frequencies are used to represent the entire target population (i.e., the sampling frame). Note that in most cases, nonweighted analyses will not represent the entire target population and may bias estimates. Remember, households selected in cluster sampling have an unequal probability of selection. To avoid biased estimates, data analyses should include a mathematical weight for selection probability. Weighting involves assigning a weight for each household for which an interview is completed. The weight is based on the household's probability of selection*

## KNOWLEDGE CHECK

True or **False**. Providing training for data entry staff to enter data accurately is a consideration for electronic data entry. **This is a considerations for paper-based data entry**

Which statement(s) are true about weighted analysis. *(you may select more than one answer)*

**A. Weighted analyses are meant to account for a complex sampling design, such as two-stage cluster sampling.**

**B. Weighted analyses are done to avoid biased estimates**

C. Weighting is always required

**D. Weighted analyses are completed by assigning a weight for each**

## DISCUSSION QUESTION #13

What is the formula for weighting data?

$$Weight = \frac{Total\ number\ of\ households\ in\ the\ sampling\ frame}{(number\ of\ households\ interviewed\ in\ cluster) * (number\ of\ clusters\ selected)}$$

***Independent Reading**: Tell learners to read the next section of Lesson 4 – Example of Applying Weights – until they see the STOP sign (pages 49-55).*

***TIME**: 40 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## Example of Applying Weights: India Tsunami

An RNA conducted in India after a major tsunami will illustrate the process of applying weights using sampling data collected from an RNA. In stage one of sampling, 30 clusters were selected representing a total of 19.370 households. The goal was to conduct 210 interviews, but only 187 were completed. Figure 5 provides a sample dataset showing the number of interviews per cluster and the assigned weight for each household interviewed. For the purpose of calculating the "weight" column (highlighted in yellow), an additional column was added, ""# interviews", to represent the number of households interviewed within the clusters (highlighted in blue). Note that the weighting formula circled in red is the same calculation with the three variables introduced above.

**Figure 5. Sample dataset showing the number of interviews per cluster and the assigned weight for each house interviewed.[27]**

Tables | Illustrations | Charts | Sparklines | Filter

D2 $f_x$ =(19370/(C2*30))

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Date | Cluster_ID | # Interviews | Weight | Q2PeopleLi | Q3PeopleSl | aTwo | b3to17 | c18to64 | d65 | Q4safe | Q5secure | Q6Injured | N6aFall |
| 2 | 2/7/2009 | 2 | 6 | 107.61 | 4 | 6 | | 2 | 3 | 1 | yes | yes | no | no |
| 3 | 2/7/2009 | 2 | 6 | 107.61 | 3 | 2 | | | 2 | | yes | yes | no | no |
| 4 | 2/7/2009 | 2 | 6 | 107.61 | 1 | 1 | | | | 1 | yes | yes | no | no |
| 5 | 2/7/2009 | 3 | 6 | 107.61 | 2 | 2 | | | 1 | 1 | yes | yes | no | no |
| 6 | 2/7/2009 | 3 | 6 | 107.61 | 2 | 2 | | | 1 | 1 | yes | yes | no | no |
| 7 | 2/7/2009 | 3 | 6 | 107.61 | 2 | 1 | | | 1 | | yes | yes | no | no |
| 8 | 2/7/2009 | 4 | 7 | 92.24 | 2 | 2 | 0 | 0 | 0 | 2 | yes | yes | no | no |
| 9 | 2/7/2009 | 4 | 7 | 92.24 | 2 | 2 | 0 | 0 | 2 | 0 | yes | yes | no | no |
| 10 | 2/7/2009 | 4 | 7 | 92.24 | 2 | 2 | 0 | 0 | 2 | 0 | yes | yes | no | no |
| 11 | 2/7/2009 | 4 | 7 | 92.24 | 2 | 2 | 0 | 0 | 0 | 2 | yes | yes | no | no |
| 12 | 2/7/2009 | 4 | 7 | 92.24 | 5 | 6 | 0 | 2 | 4 | 0 | yes | yes | no | no |
| 13 | 2/7/2009 | 4 | 7 | 92.24 | 6 | 8 | 0 | 4 | 4 | 0 | yes | yes | yes | yes |
| 14 | 2/7/2009 | 4 | 7 | 92.24 | 4 | 7 | 0 | 0 | 7 | 0 | yes | yes | no | no |
| 15 | 2/7/2009 | 5 | 6 | 107.61 | 5 | 14 | 1 | 8 | 5 | | yes | yes | no | no |
| 16 | 2/7/2009 | 5 | 6 | 107.61 | 4 | 4 | | 2 | 3 | | yes | yes | no | no |
| 17 | 2/7/2009 | 5 | 6 | 107.61 | 8 | 8 | | 5 | 2 | 1 | yes | yes | no | no |
| 18 | 2/7/2009 | 5 | 6 | 107.61 | 3 | 3 | | | 3 | | yes | yes | no | no |
| 19 | 2/7/2009 | 5 | 6 | 107.61 | 2 | 2 | | | | 2 | yes | yes | no | no |
| 20 | 2/7/2009 | 5 | 6 | 107.61 | 2 | 2 | | | 1 | 1 | yes | yes | no | no |
| 21 | 2/7/2009 | 10 | 5 | 129.13 | 2 | 1 | 0 | 0 | 0 | 1 | yes | yes | no | no |
| 22 | 2/7/2009 | 10 | 5 | 129.13 | 2 | 2 | 0 | 0 | 0 | 2 | yes | yes | no | no |

[27] *ibid*

## Calculating Weighted Frequencies

After assigning weights, the next step was to calculate the frequencies for each of the interview questions. For the purposes of this RNA, EPI Info ™ was the statistical software. To calculate weighted frequencies in Epi Info™ "classic mode," the following steps were performed (use DEMO data):

- Step 1: Import the data file with the weight just created
- Step 2: Click on "Frequencies" along the left hand column
- Step 3: In the "Frequency of" box, select variable(s) for which you would like results
- Step 4: In the "Weight" box, select the variable "WEIGHT" that was just created
- Step 5: Click "OK" (see Figure 6) and generate a report providing the estimates.

### Figure 6. Frequency analysis window showing selected variables and weight

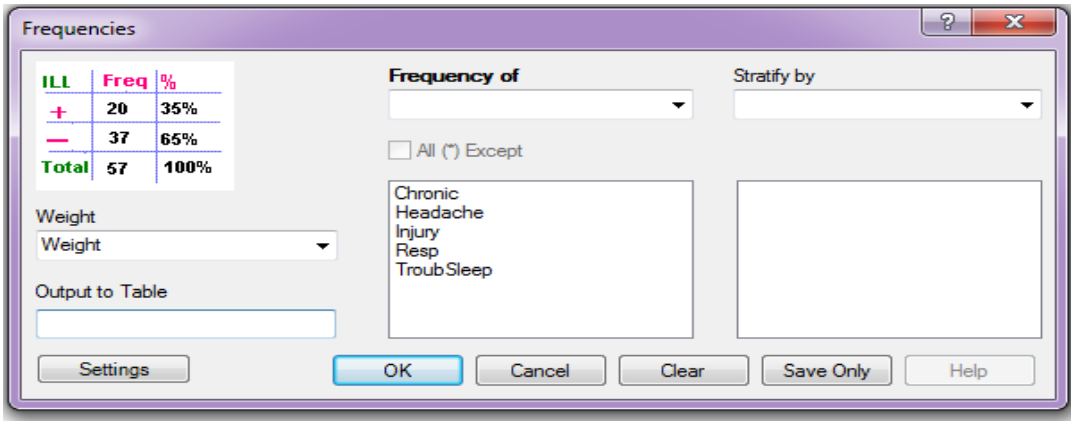
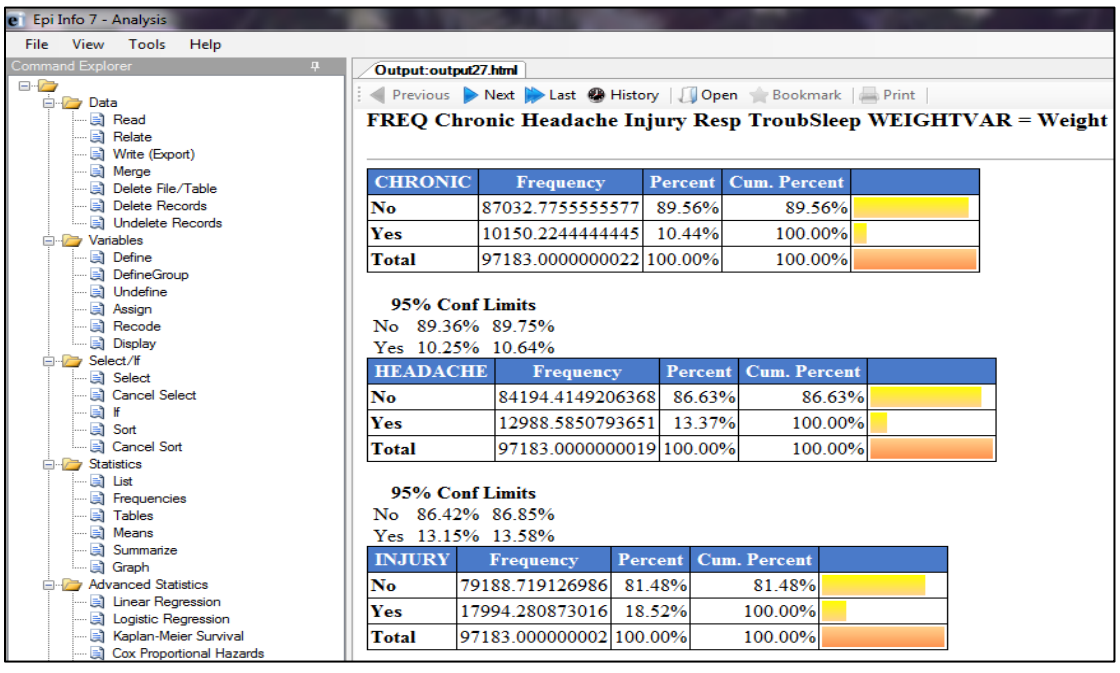



Figure 7 displays the Epi Info™ output window with the selected variables from the previous step, followed by a table for each selection. Save the output tables and use them in the final report.

### Figure 7. Example of Epi Info™ output window showing weighted frequencies



## Nonweighted frequency

To obtain nonweighted estimates, follow the above instructions but do not assign a variable in the "weight" box. Applying weights provides projected estimates that can be generalized to every household in the assessment area or sampling frame. The unweighted frequency only shows results from your RNA sample. Table 10 shows the nonweighted and weighted frequencies for a specific question from a Tsunami RNA.

**Table 10. Nonweighted and weighted frequencies of current source of electricity following a tsunami[28]**

| Sources of Electricity | Indicators | | Sources of Information | | |
|---|---|---|---|---|---|
| | Frequency | % | Frequency | % | 95% CI |
| Power company | 137 | 74.1 | 14,190 | 74.0 | 61.9–86.0 |
| Gasoline generator | 15.7 | 74.1 | 3,200 | 16.7 | 7.6–25.7 |
| None | 19 | 10.3 | 1,789 | 9.3 | 3.8–14.8 |

Remember that weighted analysis does not account for changes that may occur in the number of households between the time of the census and the time of the assessment (e.g., the number of households per cluster may have changed between when the census was conducted and when the RNA was conducted). Thus, despite attempts to arrive at unbiased estimates, the reported frequencies may lack precision.

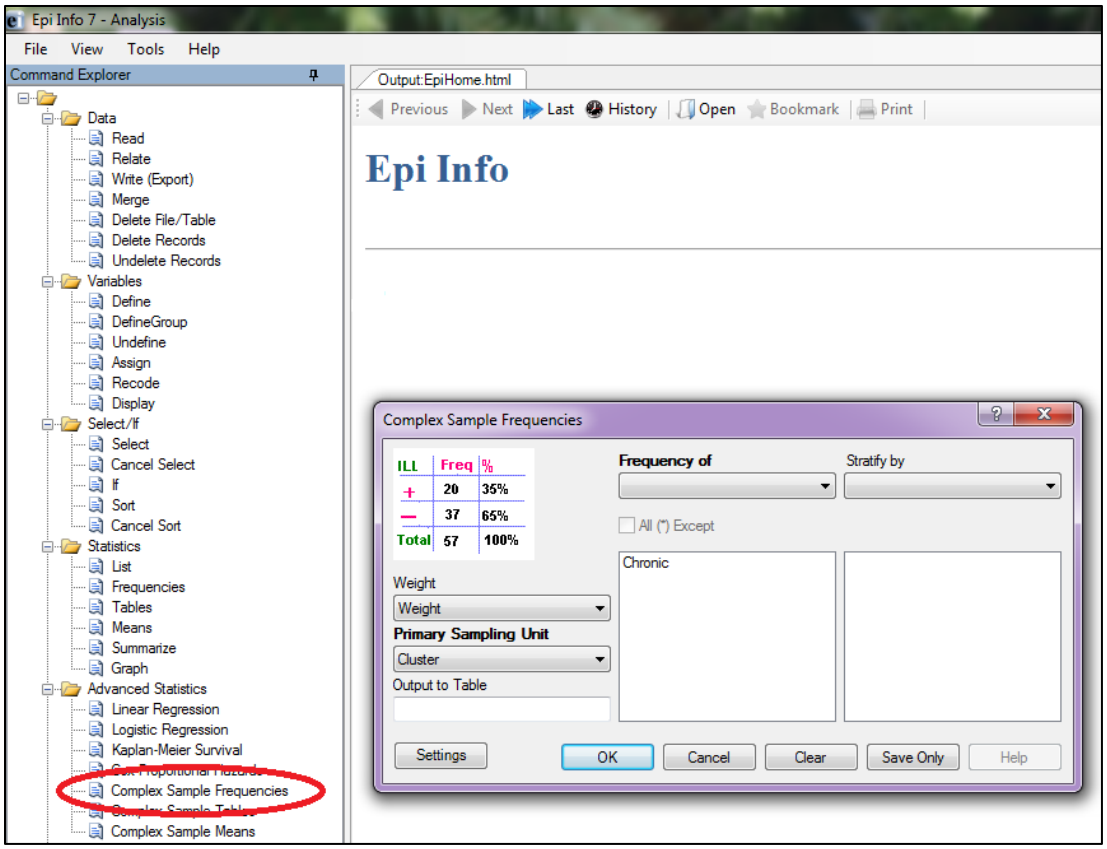
## Calculation of 95% Confidence Intervals

Once the weighting has been established, you will need to calculate **Confidence Intervals (CIs)**. When conducting weighted estimates, the RNA team should use 95% CIs. CIs represent the reliability of the weighted estimate. Do the following steps to calculate a 95% confidence interval in Epi Info™ "classic mode," (see DEMO data):

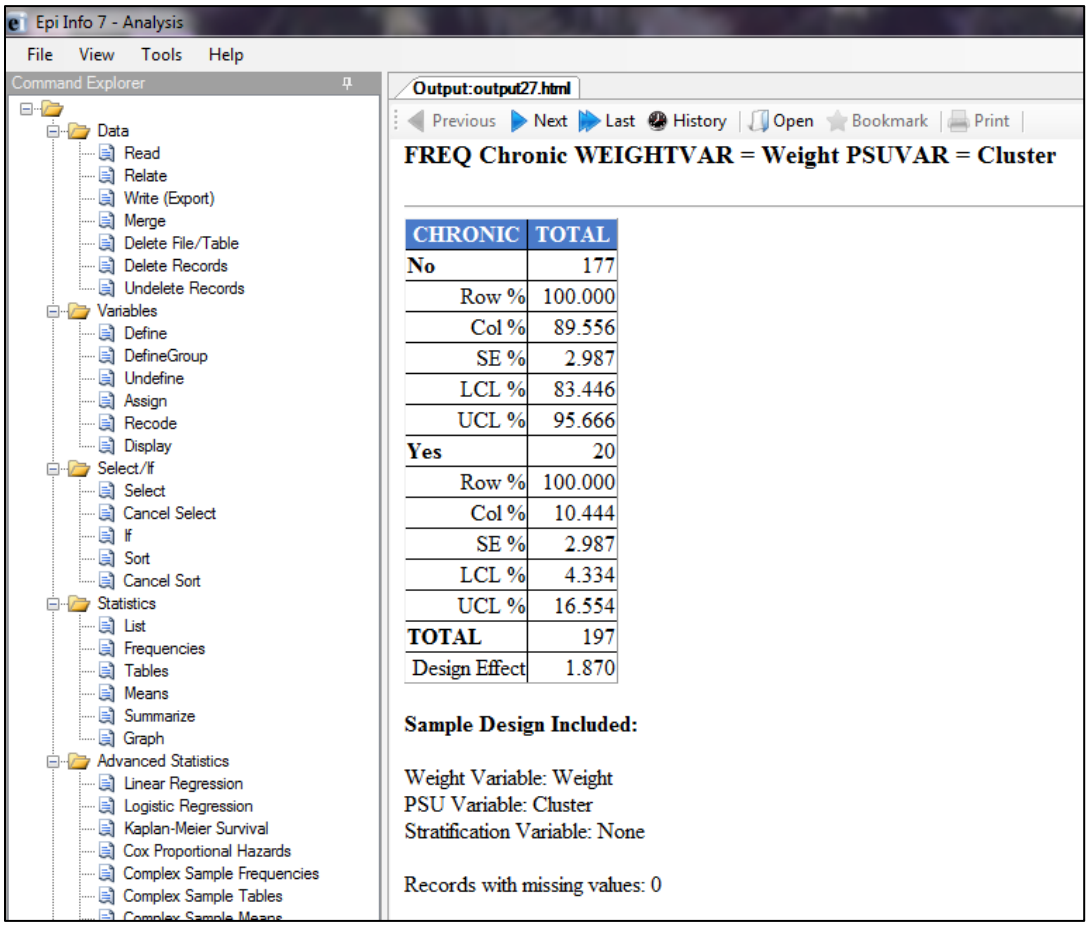
- Step 1: Import the data file into Epi Info™
- Step 2: Select "Complex Sample Frequencies" command under "Advanced Statistics" on the left hand side.
- Step 3: In the "Frequency of" box, select variable for which you interested
- Step 4: In the "Weight" box, select the "WEIGHT" variable that was created
- Step 5: in the "Primary Sampling Unit" box, select the "Cluster Number" variable
- Step 6: Click "OK" (see Figure 9) to generate a table providing confidence intervals

[28] *ibid*

## Figure 8. Selected variable for calculation of complex sample frequencies




## Figure 9. Example of Epi Info™ output window showing complex sample frequencies



## Response Rates

Calculating response rates helps determine the representativeness of the sample to the population within the sampling frame. The field interview teams collect the information to calculate response rates (i.e., numerator and denominator) on the tracking form. This underscores the need for the teams to be well-trained in using the tracking form and to be disciplined in tracking all households selected for interview, including those for which no interview was completed or no contact was made.

To compile the tracking form data, tally the responses to each row on the tracking form. In some sections, it may be necessary to reconcile discrepancies (e.g., the interviewer may have appropriately selected both “no answer” and “door was answered” because the field interview team returned to complete a survey at a household previously selected but no one answered the door”). Select only the final designation (e.g., “door was answered”) for tally and disregard the prior visits. These tallies can then be entered into a spreadsheet, illustrated in Figure 10. Each column should represent a single cluster. If more than one tracking form was completed per cluster, consider forms for the same cluster cumulative and tally them onto the same column in the spreadsheet.

**Figure 10. Sample dataset showing attempted and completed interviews per cluster**

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Location** | | | | | | | | | | | | | |
| | **Cluster** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | **Interviwer** | Team 1 | Team 3 | Team 7 | Team 5 | Team 1 | Team 9 | Team 4 | Team 4 | Team 3 | Team 11 | Team 9 | Team 11 | Tear |
| | **Date of Interview** | 9/9/2013 | 9/10/2013 | 9/9/2013 | 9/9/2013 | 9/9/2013 | 9/10/2013 | 9/9/2013 | 9/9/2013 | 9/9/2013 | 9/9/2013 | 9/9/2013 | 9/9/2013 | 9/9/2 |
| **No Access** | Household Accessible | 12 | 12 | 13 | 13 | 29 | 14 | 12 | 15 | 22 | 19 | 21 | 19 | 23 |
| | Household Inaccessible | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Type of Dwelling** | No Housing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Mobile Home | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | Single Family Home | 12 | 12 | 13 | 13 | 0 | 14 | 12 | 15 | 21 | 19 | 15 | 19 | 12 |
| | Apartment or Condo | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 11 |
| | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Damage** | None or Minimal | 10 | 10 | 11 | 7 | 17 | 11 | 9 | 10 | 13 | 11 | 13 | 13 | 11 |
| | Damaged | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 2 | 2 | 1 | 4 | 0 |
| | Destroyed | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 |
| **No Answer** | Door was answered | 11 | 10 | 11 | 7 | 17 | 11 | 10 | 10 | 15 | 12 | 15 | 13 | 11 |
| | Home but no answer | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | Appears Vacant | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 4 | 0 |
| | Nobody Home | 1 | 2 | 1 | 6 | 10 | 3 | 2 | 5 | 5 | 5 | 6 | 2 | 12 |
| **Interview** | Language Barrier | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| | Refused to Participate | 5 | 2 | 4 | 4 | 9 | 4 | 3 | 2 | 6 | 2 | 3 | 6 | 3 |
| | Non-resident | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 0 |
| | No adult over 18 yrs old | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | Interview begun, not finish | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 1 |
| | Interview Completed | 5 | 7 | 6 | 3 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 |
| **Total Number of Households Sampled** | | 5 | 7 | 6 | 3 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 |
| **Total Number of Households Attempted** | | 12 | 12 | 13 | 13 | 29 | 14 | 12 | 15 | 22 | 19 | 21 | 19 | 23 |

## Calculation Response Rates

The three common response rates included in the analysis are the completion rate, the cooperation rate, and the contact rate. The definition, calculation, challenges, and key considerations of these response rates are described in more detail in Table 11.

**Table 11. Common response rates**

| Rate | Definition | Calculation | Challenges | Key Points |
|---|---|---|---|---|
| Completion | Represents how close interview teams came to collecting the goal number of interviews (typically n=210). | Number of completed interviews / Goal number of interviews (typically n=210) | Rates below 80% (typically n=168) result in an unacceptably low number to represent the sampling frame | You should allot enough time for teams to complete a minimum of 80%. We recommend having a few teams available to return to low-responding clusters during follow-up day(s) |
| Cooperation | The proportion of households at which contact was made and agreed to complete an interview. | Number of completed interviews / All households where contact was made* | The higher the number of contacts made, the more the sample becomes one of convenience. | It represents both the eligibility and the willingness of the community to complete the interview. |
| Contact | The proportion of households at which contact was attempted and agreed to complete an interview | Number of completed interviews / Number of households where contact was attempted** | The lower the contact rate, the more the sample becomes one of convenience at the second stage | Higher contact rates indicate better representativeness of the sample to the population. Lower rates indicate that teams had to attempt interviews at many households to obtain the necessary interviews |

* including completed interviews, incomplete interviews, refusals, door was answered

**including completed interviews, incomplete interviews, refusals, and appears as though someone is home but no answer, appears vacant, and nobody home after 1st , 2nd , or 3rd visit

*Lead a discussion to review key lessons learned. Complete the Knowledge Check and Discussion Question #14. To guide additional discussion, you may use the questions and suggested answers in the red box. (20 minutes)*

***Potential Discussion Questions***

*Why do we calculate response rates?*

*Possible answer:*

*Calculating response rates helps determine the representativeness of the sample to the population within the sampling frame*

*How do you define the three response rates? What are some key points to remember?*

*Possible answer:*

*The three response rates are the contact, completion, and cooperation rates. See Table 11 for information on definition and key points to remember*

**KNOWLEDGE CHECK**

What response rate represents how close field interview teams came to collecting the goal number of interviews (typically n=210)

A. Contact rate

**B. Completion rate**

C. Cooperation rate

**DISCUSSION QUESTION #14**

What are the three common response rates? How do you calculate them?

*Completion*

*Number of completed interviews / Goal number of interviews (typically n=210)*

*Cooperation*

*Number of completed interviews / All households where contact was made*

*Contact*

*Number of completed interviews / Number of households where contact was attempted*

***Independent Reading**: Tell learners to read the next section of Lesson 4 – Reporting Results – until they see the STOP sign (pages 56-59).*

***TIME**: 20 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## REPORTING THE RESULTS

Writing the report is the RNA's final phase. Although it is the last phase, its planning and development should begin long before any data are collected in the field. An essential element to this process is to plan for the report in advance. During the preparation phase of the RNA, you should identify several foundational aspects of the report, such as who will write the report, who is the target audience, and what analysis you will include. Exploring these aspects with the RNA assessment team at the onset will allow the team to turnaround the reports quickly to key stakeholders (e.g., within 48 hours). We recommended the following two reports:

- **Preliminary Report** or presentation provided to key stakeholders within a day or two of data collection. This will allow partners to make quick, better-informed decisions and address any immediate needs
- A **final report** that builds off of the preliminary report and includes additional data analysis and results. This report is distributed to a wider audience and is often provided within a few weeks of the RNA

As with any report, results should be in a simple, easy-to-read format that reflects the original objectives of the RNA. Table 12 provides a series of key considerations when planning and creating reports.

### Table 12. Report considerations[29]

| Action | Description |
|---|---|
| Designate a point person | Designate a person who will be in charge of the reports. This person should be familiar with the entire process and involved in the preliminary meetings, sampling, and analysis. |
| Create table shells | Begin the writing process before completion of data collection. Gather background information for the report and create table shells that will expedite the development of the report. |
| Identify audience needs and tailor content | When drafting the report, consider the target audience. Will you send the report to emergency managers, to epidemiologists, to politicians, to the media, or to all of these recipients?<br>Consider how each audience digests information and tailor accordingly. Use the audience to determine the format, how much |

[29] *ibid*

| | |
|---|---|
| | information to include, the report length, and the technical detail. For example:<br>• Emergency managers may find the projected number of HH useful (e.g., 5k households need tarps, 4k households need medication, etc.). This information is probably best displayed in a bulleted list.<br>• Epidemiologists will likely want the most technical information, including full tables with all the data (including all results, missing data, confidence Intervals, etc.).<br>Politicians/media may need a written paragraph of overall results or bulleted format of key points. Graphs/charts might be more effective rather than lengthy tables. |
| Recommend actions based on results | Present results in an action-prompting format.<br>Actions derive from the current health status or needs of the population as presented in the results. Actions can include, but are not limited to, prioritization of resources, public health messaging, enhanced health surveillance, or public health interventions. |

## Preliminary Field Report

The preliminary field report is a draft version of the final report. The preliminary report contains the initial results and recommendations to share with stakeholders who need time sensitive information. We strongly recommend that you inform partners and stakeholders of the preliminary results as soon as possible to ensure timely responses by other agencies and maximum transparency to the public. Given that the report has not been finalized, that fact should clearly appear on each page and should be clearly communicated to show that the report is preliminary in nature. Therefore, limited distribution of the preliminary report may be in order. Table 13 provides a common structure for the preliminary and final report.

### Table 13. Common reporting structure[30]

| Section | Description |
|---|---|
| Introduction | Describe the purpose of the report, including the background of the disaster (e.g., date occurred, affected population) and details of the RNA request (e.g., who requested, who conducted, timing of assessment) and the RNA's aims and objectives. |
| Approach or methodology | Provide the audience with an overview of the methodology used to produce those results that appear in the results section. Include |

[30] *ibid*

| | |
|---|---|
| | a simple description of the sampling frame (i.e., target population), the two-stage cluster design, the questionnaire, the number and training of field interview teams, and the data analysis procedures. |
| Results | Include the three response rates discussed earlier in this lesson, the number of households represented by the sampling frame, and the RNA's main findings. Remember the audience needs and expectations and tailor the level of detail and content accordingly. |
| Conclusions | Recap the main findings, the RNA's limitations, and the preliminary recommendations as based on the initial conclusions. Recommendations should be specific, objective, targeted, and tangible, thus enabling them to prompt action. |
| Attachments | If available, include other report types or supporting documentation in conjunction with the preliminary report, such as bulleted lists of highlights or press releases. |

We recommend that a presentation accompany the delivery of the preliminary report. Invite to the meeting all partners and appropriate community organizations. The meeting should mirror the structure of the preliminary report and include background, method, results, and conclusion sections. Give consideration to the best way to present the results in an oral presentation. An oral presentation is also a good opportunity to discuss implementation of the recommendations, next steps, and lessons learned, and to solicit input from a broad group of stakeholders

## Final Report

The final report includes additional, detailed information regarding the RNA results. Release of the final report and its distribution to a wider audience is customary within several weeks after release of the preliminary report. A final report will include the following new and updated sections from the preliminary report:

- **Executive summary** – develop an executive summary that highlights the report outcomes in a short and easily digestible format that also contains the report's key results and conclusions
- **Updated results section** – include key findings from the preliminary report as well as any additional analyses not included in the preliminary report (e.g., qualitative data or analysis of open-ended questions, if applicable). The results may include weighted and nonweighted frequencies, weight and nonweighted percentages, and confidence intervals that correct any inaccuracies from the preliminary report.
- **Updated conclusion section** – include discussion from the preliminary report and incorporate any feedback received, additional information, and final

recommendations created in collaboration with partners. Also include any actions taken as a result of the RNA (e.g., enhanced public health messaging)

- **Acknowledgements section** – include in the final report all individuals and organizations that helped with each stage of the RNA

After the report is finalized, provide a final copy to all partners, including state and local public health authorities, emergency operations centers, incident command staff, and other agencies

*Lead a discussion to review key lessons learned. Complete the Knowledge Check and Discussion Question #15. To guide additional discussion, you may use the question and suggested answers in the red box. (15 minutes)*

***Potential Discussion Questions***

*What are some key considerations when planning and creating reports? How many reports do we typically recommend?*

*Possible answer:*

*As with any report, results should be in a simple, easy-to-read format that reflects the original objectives of the RNA. There are typically two reports, a preliminary report and a final report. Look at Table 12 above to discuss key considerations*

**KNOWLEDGE CHECK**

**True** or False. The report writing process should be started before completion of data collection

**DISCUSSION QUESTION #15**

What is the difference between a preliminary and a final report?

- *A preliminary report or presentation is provided to key stakeholders within 48 hours of data entry completion to make quick, better-informed decisions and address any immediate needs.*
- *A final report builds off of the preliminary report and is disseminated to a broader audience, often within a few weeks of the RNA.*

## PRACTICE EXERCISE

***Instructions:*** *Depending on the size of the group, tell learners to complete this exercise individually, with a colleague, or as part of a small group. Instruct them to read through the case study and answer the questions. Have learners record their answers in the space provided. Once completed, review the exercise and discuss possible answers.*

***TIME****: up to 30 minutes to complete, then reconvene the group to discuss the answers (up to 20 minutes)*

### PRACTICE EXERCISE #5

*In this practice exercise, you will apply the concepts learned in Lesson 4. Please recall the flooding scenario (page 15) and answer the questions.*

**Flooding in a Southeast Asian country, continued**

[See page 15]. The RNA interview teams conducted face-to-face interviews and completed the data gathering process. That they distribute within 48 hours a preliminary report to stakeholders is important, as is a final report that for later distribution to a broader audience.

**Why did the teams carry tracking forms into the field?**

*The tracking form marks the number of homes approached and the outcome of each attempted interview. The main purpose of the tracking form is to calculate sampling rates that might be indicative of the representativeness of the data. The tracking form is also how three important rates are calculated:*

- *Contact Rate = Completed Interviews / All Units Where Contact Was Attempted (Completed, Incomplete, Refusals, Non-respondents)*
- *Cooperation Rate = Completed Interviews / All Units Where Contact Was Made (Completed, Partial, Refused)*
- *Completion Rate = Completed Interviews / Ideal Number of Interviews to Complete (typically n =210)*

**What are the components of the final report?**

*A final report will include the following new and updated sections from the preliminary report:*

- *Executive Summary - Develop an executive summary that highlights the report outcomes in a short and easily digestible format and that contains the report's key results and conclusions.*
- *An Updated Results Section - Include key findings from the preliminary report, as well as any additional analyses not included in the preliminary report (i.e., qualitative data or analysis of open-ended questions, if applicable). Results might include weighted and nonweighted frequencies, weighted and nonweighted percentages, and confidence intervals (correcting any inaccuracies from the preliminary report).*
- *An Updated Conclusion Section - Include the discussion from the preliminary report, as well as incorporating feedback received, additional information and final recommendations created in collaboration with partners, and any actions taken as a result of the RNA (e.g., enhanced public health messaging).*
- *Acknowledgements Section - Include and add to the final report all individuals and organizations who helped with each RNA stage.*

*After you are completed with the scenario, summarize the key learning points from Lesson 4 outlined in the Lesson 4 Summary*

## LESSON 4 SUMMARY

In this lesson, we discussed data entry, analysis, and reporting RNA findings. To ensure the quality of the collected RNA data, consider whether to use an electronic or a paper-based data entry method. Weighted analysis may be necessary to account for a complex sampling design, such as the two-stage cluster sampling method. We provided details on how to calculate a weighted analysis and discussed how to obtain the 95% confidence interval. We discussed how response rates determine how representative the RNA sample is to the population within the sampling frame. The field interview teams record the information necessary to calculate these rates on the tracking form. The three response rates included in the analysis are the completion rate, the cooperation rate, and the contact rate. After completion of data entry and analysis, develop a preliminary or draft report that includes the initial results and recommendations to share with those stakeholders who need time-sensitive information. Once stakeholders and other vested parties provide their input, produce the final RNA report and include additional, detailed information regarding the RNA results. Release of the final report and its distribution to a wider audience is customary within several weeks of the preliminary report.

# SKILLS ASSESSMENT

***Instructions**: Tell learners to read the skills assessment. See learner instructions below.*

***TIME**: up to 90 minutes to complete, then reconvene the group to discuss the answers (up to 45 minutes)*

## RAPID NEEDS ASSESSMENT (RNA) CASE STUDY: FLOODING IN GUATEMALA

This case study is based on an actual assessment conducted in 2010 by the Guatemala Ministry of Health (GMOH). The scenario has been adapted from the case study of this assessment developed by the Health Studies Branch (HSB), National Center for Environmental Health (NCEH), Centers for Disease Control and Prevention (CDC) in Atlanta, GA.

### Instructions

- Read each section of the case study example
- Pretend that you are on the response team sent to investigate this emergency
- Read the questions in the grey-shaded boxes
- Use the information covered in Module Two to respond to the questions
- Write your responses in the space provided within this workbook
- Discuss your responses with your mentor/facilitator

## LEARNING OBJECTIVES

After completing this skills assessment, you will be able to describe the following:

- The two-stage cluster sampling design used in an RNA
- What should be included in an RNA household assessment
- The usefulness of an RNA during an emergency response

## CASE SCENARIO

In June 2010, Tropical Storm Agatha made landfall in Guatemala. Between June 1$^{st}$ and June 3$^{rd}$, the storm was responsible for the deaths of 160 persons and another 53 missing. Rapid, subsequent flooding, torrential downpour, and severe storms caused evacuation of multiple residences, neighborhoods, and cities. Emergency water rescues and helicopter extractions occurred, but much of the property left behind by residents was heavily damaged or destroyed. In the aftermath of the disaster, the Guatemala Ministry of Health (GMOH) conducted a Rapid Needs Assessment (RNA) to 1) identify the immediate public health needs of residents who returned to the affected communities and 2) guide response and recovery activities.

## Assessment Location

Preparations for the assessment began on June 4th. The GMOH knew it would be important to conduct the assessment in the areas hit hardest by the storms. To help determine where to take action, GMOH began quickly to collect information about precipitation levels.

**Q1. When would an RNA be helpful?**

*GMOH officials would most likely conduct the RNA after the tropical storm, after subsequent rain and flooding ended, and especially after GMOH officials deemed it safe to send teams into the affected areas. Ultimately, the timeline depends on the RNA objective(s). For example, if the goal is to determine whether health protection messages are being received about boiled water, then conduct the RNA immediately. If the goal is to understand the disaster's mental health effects, postpone the RNA for a few weeks.*

**Q2. Develop 1-2 RNA objectives**

*Any objective is fine as long as it is RNA-appropriate (e.g., focus on household needs, not individuals within the community). Some examples include the following:*

- *Determine household evacuation or other protective behaviors*
- *Determine the affected community's current general needs and health needs*
- *Provide information for the allocation of resources*
- *Determine the affected community's mental health needs*
- *Determine access to medical care*

**Q3. What information would you need to gather to determine where to conduct the assessment?**

*To find the most flood-affected areas, you should gather information from damage assessments or information from emergency responders and local government officials. You can also obtain data from weather services to locate the path of the tropical storm through Guatemala and look at maps depicting areas of heaviest flooding. Gathering and synthesizing data from several sources help narrow the focus of where to start. Typically, you would conduct an assessment such as this in the areas identified as most disaster-affected or damaged, where local infrastructure and vulnerable populations have been hit hardest.*

**Figure 11. Areas affected by heavy rain or flooding**

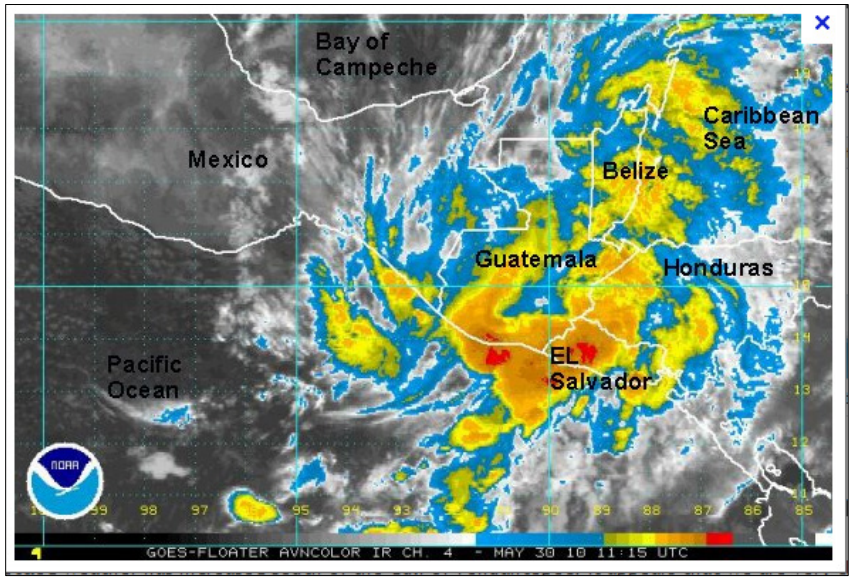
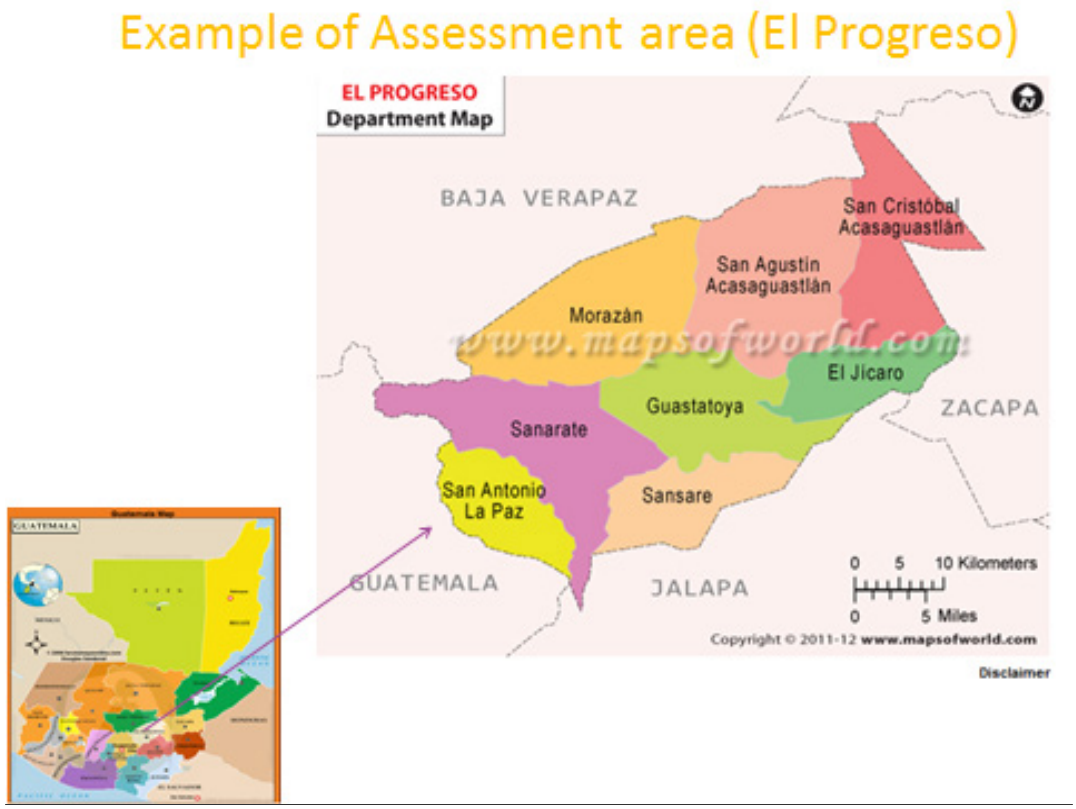



**Figure 12. Satellite image of assessment area in a GIS map**




Using data collected from emergency managers and meteorological maps that showed the areas with the highest precipitation levels (Figure 11), the GMOH selected El Progreso as the assessment location. GMOH then developed maps using GIS data, as seen in Figure 12. After deciding the location, the GMOH continued with the next step: creating a questionnaire

## Questionnaire Design

In working to design a questionnaire, that health officials and emergency managers formulated questions that captured multiple types of information pertaining to the affected population—including their health needs and the storm's physical effects.

**Q4. After a disaster such as a flood, what specific information would GMOH officials want to capture in a data collection instrument?**

*Examples of questionnaire elements in a flood-RNA include the following:*

- *Demographic information, such as household size and structure (e.g., number of children in the household under the age of 1)*
- *Assessment of property damage, including the level of flood water in the house and whether the home is still habitable*
- *Availability and access to basic utilities and supplies, including potable water, running water, toilets, food, electricity, phones, sanitation services and diapers*
- *Access to basic health care, including medical supplies, medical care, and prescriptions*
- *Health conditions of the affected persons, including any injuries, physical or mental illness, and other chronic conditions that occurred post-disaster*
- *Access to relief efforts, including safety information, aid received, and clean-up information.*
- *Evacuation behaviors*
- *Communication methods*

GMOH developed a sampling plan to determine to which households within El Progresso they would administer the questionnaire. After completing the sampling plan, GMOH created a short, one-page questionnaire to collect all the necessary health, access, and demographic information needed to conduct the assessment accurately (Appendix A).

## Data Collection

Given the number of affected households within the Progreso Department's target population (approximately 28,000 households), the GMOH evaluated the best method for selecting a sample and set out to collect a sample to assess.

**Q5. If you were selecting a sampling method, which one would you choose?**

*As the target population is quite large (approximately 28,000 households), two stage cluster sampling would be ideal. A two-stage cluster sampling is a practical and efficient way to collect information from a relatively small sample but reasonably apply it to a much larger sampling frame. Information from only 210 HU's is collected, and by using census information to determine their selection probability, it becomes possible to collect information to help project department-wide household frequencies and percentages.*

**Q6. After determining the most appropriate sampling method, what information and sources of information would be needed to select a sample of households from the target area?**

*To select a sample, a complete list would be needed of all the households in the target area or, if an exact total cannot be formulated, an approximation. Sources to find such information would include census data, tax assessor or tax office records of the households themselves, and local (department, village, region or zone) government offices.*

*The GMOH considered multiple selection methods but ultimately chose a two-stage probability-proportional-to-size sampling method. As the first stage involved gathering a list of all the primary households, the team identified census and property data as necessary information sources with which to begin. The GMOH team reached out to the Guatemala Census Office and was able to gather block-level (Avenida) information on the total number of HUs in the affected area. To conduct the sampling, the team chose variable names and location of the fields needed from the database – Department, Municipal Zone, block (Avenida) total population, and HU count, for example.*

The GMOH considered multiple selection methods, but ultimately chose a two-stage probability-proportional-to-size method. As the first stage involved gathering a list of all the households, the team identified census and property data as necessary information sources. The GMOH team reached out to the Guatemala Census Office and was able to gather block-level (Avenida) information on the total number of households in the affected area. To conduct the sampling, the team chose variable names and locations of the fields needed from the database: examples include Department, Municipal Zone, block (Avenida), total population, and HU count. Figure 13 is an example of the downloaded data files, divided by their department of interest, Progreso:

**Figure 13. Sample excerpt of data from El Progreso**

K7 578

| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Departamento | Municipal | Zona | Avenida | Populacion Total | Numero de Casas | Cumulativo | Cum_Range | N_al azar | N_Groupo | NA_Generado |
| 2 | El Progreso | Morazan | 1 | 1 | 44 | 25 | 25 | 1-25 | | | 50 |
| 3 | El Progreso | Morazan | 1 | 2 | 50 | 21 | 46 | 26-46 | | | 102 |
| 4 | El Progreso | Morazan | 1 | 3 | 42 | 18 | 64 | 47-64 | 50 | 1 | 315 |
| 5 | El Progreso | Morazan | 2 | 4 | 40 | 16 | 80 | 65-80 | | | 338 |
| 6 | El Progreso | Morazan | 2 | 5 | 37 | 22 | 102 | 81-102 | 102 | 2 | 500 |
| 7 | El Progreso | Morazan | 2 | 6 | 68 | 27 | 129 | 103-129 | | | 578 |
| 8 | El Progreso | Morazan | 3 | 7 | 40 | 14 | 143 | 130-143 | | | 1264 |
| 9 | El Progreso | Morazan | 3 | 8 | 38 | 17 | 160 | 144-160 | | | 1630 |
| 10 | El Progreso | Morazan | 3 | 9 | 46 | 18 | 178 | 161-178 | | | 2006 |
| 11 | El Progreso | Guastatoya | 1 | 1 | 29 | 16 | 194 | 179-194 | | | 2134 |
| 12 | El Progreso | Guastatoya | 1 | 2 | 48 | 20 | 214 | 195-214 | | | 2150 |
| 13 | El Progreso | Guastatoya | 1 | 3 | 59 | 19 | 233 | 215-233 | | | 2264 |
| 14 | El Progreso | Guastatoya | 2 | 4 | 53 | 27 | 260 | 234-260 | | | 2767 |
| 15 | El Progreso | Guastatoya | 2 | 5 | 16 | 5 | 265 | 261-265 | | | 2807 |
| 16 | El Progreso | Guastatoya | 2 | 6 | 35 | 16 | 281 | 266-281 | | | 3047 |
| 17 | El Progreso | Guastatoya | 3 | 7 | 3 | 3 | 284 | 282-284 | | | 3128 |
| 18 | El Progreso | Guastatoya | 3 | 8 | 52 | 29 | 313 | 285-313 | | | 3293 |
| 19 | El Progreso | Guastatoya | 3 | 9 | 57 | 25 | 338 | 314-338 | 330 & 337 | 3 & 4 | 3369 |
| 20 | El Progreso | Sansare | 1 | 1 | 27 | 12 | 350 | 339-350 | | | 3764 |
| 21 | El Progreso | Sansare | 1 | 2 | 28 | 14 | 364 | 351-364 | | | 3767 |
| 22 | El Progreso | Sansare | 1 | 3 | 36 | 27 | 391 | 365-391 | | | 4222 |
| 23 | El Progreso | Sansare | 2 | 4 | 40 | 25 | 416 | 392-416 | | | 4237 |
| 24 | El Progreso | Sansare | 2 | 5 | 36 | 21 | 437 | 417-437 | | | 4291 |
| 25 | El Progreso | Sansare | 2 | 6 | 52 | 32 | 469 | 438-469 | | | 4318 |
| 26 | El Progreso | Sanarate | 1 | 1 | 102 | 36 | 505 | 470-505 | 500 | 5 | 4396 |
| 27 | El Progreso | Sanarate | 1 | 2 | 19 | 7 | 512 | 506-512 | | | 4510 |
| 28 | El Progreso | Sanarate | 1 | 3 | 31 | 14 | 526 | 513-526 | | | 4657 |

To determine the selection of clusters, the team divided the process into four steps:

1. Start a cumulative tally of households from block (Avenida) to block (shown in yellow)
2. Use a random number generator to randomly select 30 numbers
3. Choose the block (Avenida) that represents the first random number
   a. Looking at the hypothetical data above, a random number of 50 would correspond with the block (Avenida) where the 50$^{th}$ household is found based on the cumulative column. In this case, *Municipal Morazan; Zona 1; Avenida 3 in Row 4* is the first cluster
4. Continue to select blocks (Avenidas) using the randomly generated number list until all 30 clusters have been selected

**Q7. Looking at the sample data in Figure 13, which cluster would be chosen by the random number 287?**

*Random number 287 corresponds with the 287th HU found in the 3rd zona, Municipal Guastatoya, Avenida 8. This cluster contains HUs 285 through 313.*

The GMOH team was divided up, and each unit was given contact phone numbers for field coordinators, a list of all contact numbers for all interviewers, and a map of their respective cluster(s). On June 5th—just two days after Agatha ended—the field interview teams were trained on how to properly administer the data collection instrument. By the morning of June 6th, the teams began assessing households in the Progreso Department

**Q8. What information should the predeployment training cover?**

- *Background of the current disaster (e.g. reason for current RNA)*
- *Purpose of RNA (rapidly obtain data for decision-making efforts, specific goals)*
- *Brief methodology overview (two-stage cluster sample, importance of field teams)*
- *Organization of teams*
- *Selecting households (explain cluster methods, describe HU selection process)*
- *Review questionnaire (interview tips, clarification of specific questions – intent, skip patterns, etc.)*
- *Completing forms (tracking, intro, and consent script, public health materials, referrals)*
- *Safety briefing for field interview teams (road conditions, downed power lines)*
- *Logistics (meeting or call-in times/paces, transportation, food and water, Identification documents or badges, contact information, instructions for potential media encounters, debriefing time/location)*

**Q9. The GMOH team broke into groups to conduct interviews. What general guidelines should you follow when assembling interview teams?**

- *Each team should have at least two members*
- *Each team should try to include one male and one female member*
- *Teams should be made up of professionals with varying backgrounds (e.g., an epidemiologist and public health practitioners)*
- *Someone on the team should have access to a motor vehicle*
- *Someone on the team should have a functioning cell or satellite phone*
- *If possible, someone on the team should speak the native language(s) that is (are) spoken widely in the affected area*

## Fieldwork

All household interview attempts were recorded on the tracking form (Figure 14)

## Figure 14. RNA tracking form

**Rapid Needs Assessment (RNA)**
**Tracking Form**

Location: .....Cluster # (i.e., 1-30): ..... # of Houses in the Cluster.....Interviewer: .....Date of Interview: ..... / ..... /....

**Instructions:** Use one tracking form per cluster. Check where appropriate, but try to choose only one best option for each of the five categories. Go as far down the list as possible for each site you visit.

| Sampled Housing Units | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1) ACCESS** | | | | | | | | | | | | | | | | | | |
| Household is Accessible | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Household is Inaccessible | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| **2) TYPE OF DWELLING** | | | | | | | | | | | | | | | | | | |
| No housing structure | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Mobile Home | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Single Family Home | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Apartment or Condo | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Other | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| **3) DAMAGE** | | | | | | | | | | | | | | | | | | |
| None or Minimal | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Damaged | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Destroyed | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| **4) ANSWER** | | | | | | | | | | | | | | | | | | |
| Door was answered | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Appears as though someone is home but no answer | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Appears vacant | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Nobody home after... | 1st visit | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| | 2nd visit | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| | 3rd visit | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| **5) INTERVIEW** | | | | | | | | | | | | | | | | | | |
| Language Barrier | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Refused to Participate | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Interview begun, not finished | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Interview Completed | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Survey # (i.e., 1-7) from Completed Questionnaire: | | | | | | | | | | | | | | | | | | |

Each team worked to get all the interviews completed; they conducted interviews all day June 6th and June 7th, with the teams returning back to base camp at approximately 5:00pm (sundown). All completed questionnaires were immediately entered into the statistical software Epi Info™. Shortly after data entry, analysis was conducted to determine results. In total, the interviewers were able to complete 207 questionnaires.

**Q10. Name at least two roadblocks or challenges interviewers might encounter while in the field.**

- *Language barriers: If possible, someone on the team should be conversant in the native language or have translated versions of the questionnaire on hand*
- *Nonresponsive, unavailable interviewees: All refusals should be recorded on a tracking form, and interviewers should make individual judgment calls as to whether to revisit an HU would be feasible in the event someone asks to reschedule*
- *Choosing a household from multiple family units (apartment complexes): Randomly select a floor of the building, assign numbers to each of the possible units, and randomly select one to interview.*
- *Neighborhood inaccessible due to road closures, down power lines, etc.*

regarding the public health hazards of the flood as supplemental education to the residents of the affected communities. These procedures are common in disaster situations as many times affected populations do not have an easy means of getting information regarding safety and/or treatment options.

By June 8th, after analyzing the data and producing the results (Table 14), the team presented a complete report on their findings to the GMOH Emergency Preparedness and Response Director.

**Table 14. Characteristics of households in affected areas following the flood, El Progreso**

| Characteristic | % of households (n=207) | 95% CI | Projected households | Estimate 95% CI |
|---|---|---|---|---|
| **Residence** | | | | |
| Feels residence not safe | 40.4 | 29.2 – 51.6 | 8454 | 6078 – 10830 |
| Needs tarp | 47.3 | 34.6 – 60.0 | 9945 | 7376 – 12514 |
| **Utilities** | | | | |
| No electricity | 11.2 | 2.6 – 19.8 | 2751 | 755 – 4747 |
| **Drinking water** | | | | |
| Drinking bottled water from agency | 17.4 | 8.2 – 26.5 | 3633 | 1412 – 5853 |
| Drinking bottled water from other source | 44.4 | 34.2 – 54.6 | 9206 | 6721 – 11690 |
| Drinking from stream | 1.4 | 0.0 – 2.9 | 300 | 0 – 657 |
| **Healthcare needs since the flooding** | | | | |
| Illnesses | 35.1 | 270 – 43.2 | 6936 | 5484 – 8387 |
| Injuries | 9.9 | 4.6 – 15.2 | 2033 | 922 – 3134 |
| Required medical care | 24.6 | 16.5 – 32.8 | 5036 | 3439 – 6633 |
| Emotional concerns | 17.8 | 8.8 – 26.8 | 3466 | 1612 – 5321 |
| **Other** | | | | |
| Needs clothes | 28.1 | 17.98 – 38.30 | 6033 | 3922 – 8144 |

**Q11. What can you conclude from these findings? Using your response, what recommendations would you make to decision-makers?**

- *Nearly half of respondents need tarps*
- *A majority of households still have electricity*
- *A majority of households still have access to clean and safe water*
- *Some households reported emotional concerns as health issues*
- *Some households reported illness and injury as medical concerns*

*Using these results, you will need a strategy built around distributing tarps, given that a majority of respondents voiced this as a need. Additionally, given that both physical and mental health related issues were widely reported, recommending accessible health services would also be important, especially for more vulnerable populations.*

The director shared the information with the Governor's Office. The report was instrumental in helping to provide mental health services in addition to distributing necessary items, such as clothing and tarps, and medication to the affected communities

*This is the completion of Module Two. Please thank the learners for attending (or let them know the schedule if continuing on to Module Three), ask if they have any remaining comments or questions, and provide any contact information for any additional follow-up questions.*

## Appendix A. Flood assessment form, June 2010

| Question | Response |
|---|---|
| **Q1.** Date (MM/DD/YY) | |
| **Q2.** Interviewer Name | |
| **Q3.** Team Number: | |
| **Q4**. County: | |
| **Q5.** Cluster number: | |
| **Q6.** How many people lived in your household before the flood? | Number: _____ |
| **Q7.** How many people slept here last night? | Number: _____ |
| **Q8.** How many in your household were children less than 2 years old? | Number: _____ |
| **Q9**. How many in your household were 65 years of age or older? | Number: _____ |
| **Q10.** If one or more children are currently living in the household, do you have access to enough diapers and formula for 7 days (if needed)? | □Yes □No □Don't Know □Ref □NA |
| **Q11**. Is anyone in your household pregnant?<br><br>**Q11a.** If *YES*, how many? | □Yes □No □Don't Know □Ref □NA<br><br>Number: _____ |
| **Q12**. Did your whole household evacuate your home to sleep somewhere else?<br><br>**Q12a.** If *YES*, what day did your household evacuate your home? (MM/DD/YY)<br><br>**Q12b.** If *YES*, what day did your household return (spend the first night back)? (MM/DD/YY) | □Yes □No □Don't Know □Ref<br><br>Date evacuated: ___/___/___<br><br>Date returned: ___/___/___ |
| **Q13.** What is the primary type of construction of this dwelling (majority of exterior as observed by interviewer)? | 1=Brick/stone/concrete<br>2=Siding (e.g., wood, aluminum, vinyl)<br>88=Other, specify _____ |
| **Q14.** Would you describe the damage to your home as _____<br><br>**Q14b.** If *DAMAGED*, do you need a tarp? | 1=None or minimal<br>2=Damaged and habitable<br>3=Damaged and uninhabitable, but repairable<br>4=NOT repairable<br><br>□Yes □No □Don't Know □Ref |

| | |
|---|---|
| **Q15.** Do you feel the home is safe to live in?<br><br>**Q15a**. If *NO*, when do you expect this home to be safe to live in? | □Yes □No □Don't Know □Ref<br><br>1=Less than a month<br>2=1–3 months<br>3=4–6 months<br>4=More than 6 months<br>5=Never<br>99=DK |
| **Q16.** Has your household noticed any increase in problems with the following? | □Mosquitoes □Flies □Rats □No problems |
| **Q17.** Does your household currently have running water? | □Yes □No □Don't Know □Ref |
| **Q18.** Does your household have a working indoor toilet?<br><br>**Q18a**. If *NO*, does your household have access to a functioning toilet? | □Yes □No □Don't Know □Ref<br><br>□Yes □No □Don't Know □Ref |
| **Q19.** Are there screens on the windows in this residence? | □Yes □No □Don't Know □Ref<br>□Broken screens |
| **Q20**. Does your household have electricity from the utility company? | □Yes □No □Don't Know □Ref |
| **Q21**. Has your household used a generator at any time since the flood?<br><br>**Q21a.** If *YES*, where is or was the generator located? | □Yes □No □Don't Know □Ref<br><br>1=Inside<br>2=Garage/shed<br>3=Carport<br>4=Outside, greater than 25 feet from home<br>5=Outside, less than 25 feet from home<br>88=Other<br>99=DK |
| **Q22.** Since the flood, has your household used any of the following appliances <u>indoors</u>? | □Charcoal, wood or propane cooking stove<br>□Other gasoline or diesel powered equipment *specify*: _____<br>□No □Don't Know □Ref |
| **Q23**. Where is your household getting your drinking water from? | 1=Well<br>2=Public utility |

| | |
|---|---|
| | 3=Bottled, supplied by Red Cross or other relief agency<br>4=Bottled, not supplied by relief agency<br>5=No drinking water<br>99=DK |
| **Q24**. Is your household treating your drinking water?<br><br>**Q24a.** If *YES*, how is your household treating your drinking water? | □Yes □No □Don't Know □Ref<br><br>1=Boiling<br>2=Bottled<br>3=Chemical treatment<br>4=No treatment<br>88=Other |
| **Q25.** Do you or your household members need clothes? | □Yes □No □Don't Know □Ref |
| **Q26.** Has anyone living in this household ever been told by a doctor, nurse, or other healthcare professional that he or she has the following health problems? | a. Asthma<br>b. Emphysema<br>c. Hypertension<br>d. Heart disease<br>e. Diabetes<br>f. Physical disability<br>g. Hearing impairment<br>h. Visual impairment/legally blind<br>i. Gastrointestinal illness<br>j. Renal disease<br>k. Neurological (stroke, seizures, Transient Ischemic Attack (TIA))<br>l. Dementia/Alzheimer's<br>m. Arthritis and joint pain<br>n. Cancer<br>o. Anemia<br>p. Psychiatric disorders<br>q. Other _____ |
| **Q27.** Has any household member become ill since the flood?<br><br>**Q27a**. If *YES*, how many household members have had the following since the flood: | □Yes □No □Don't Know □Ref<br><br>___a. Stomachache/diarrhea<br>___b. Dehydration/ heat stress |

| | |
|---|---|
| | ___c. Respiratory (cough, flu)<br>___d. Hearing or visual impairment<br>___e. Injury/ Physical disability<br>___f. Stroke (heat, hypertension, other)<br>___g. Heart attack (chest pain)<br>___h. Chronic illness that worsened<br>___i. Skin condition/rash/sunburn<br>___j. Stress/sleep disturbance<br>___k. Inability to perform daily task<br>___l. Other _____ |
| **Q28.** Has any household member been injured since the flood?<br><br>**Q28a.** If *YES*, how many household members have been injured or died from the following since the flood? | □Yes □No □Don't Know □Ref<br><br>___a. Drowned<br>___b. Motor vehicle-related injury or other blunt trauma<br>___c. Electrical injury<br>___d. Burn, including sunburn<br>___e. CO poisoning<br>___f. Laceration, abrasion<br>___g. Bruise/contusion<br>___h. Impalement/puncture wound<br>___i. Brain injury/concussion<br>___j. Strain/sprain/dislocation<br>___k. Fracture<br>___l. Dog bite<br>___m. Insect bite<br>___n. chemical exposure<br>___o. Other_____ |
| **Q29.** Since the flood, has anyone in your household required medical care? | □Yes □No □Don't Know □Ref |
| **Q30**. Does anyone in your household need medical care or supplies now? If yes, collect referral information. | □Yes □No □Don't Know □Ref |
| **Q31**. Will anyone in your household need medical care or supplies in the next 3 days to 1 week? | □Yes □No □Don't Know □Ref |
| **Q32.** Can everyone in your household get the medical care and supplies he or she needs? | □Yes □No □Don't Know □Ref<br><br>1=Lack of transportation |

| | |
|---|---|
| **Q32a.**If *NO*, what is preventing you/them from getting the medical attention you/they need? | 2=No medical services available<br>3=Financial reasons<br>4=Debris or damage roads<br>5=Afraid to travel<br>6=Other:_____ |
| **Q33.** Has any household member died during or after the flood? | □Yes □No □Don't Know □Ref |
| **Q34.** Has anyone in your household had any of the following since the flood?<br>*(select ALL that apply)*: | 1=No symptoms<br>2=Difficulty concentrating<br>3=Trouble sleeping<br>4=Loss of appetite<br>5=Racing or pounding heartbeat<br>6=Agitated or frantic behavior<br>7=Violent behavior or threatening violence<br>8=Suicidal thoughts or attempts<br>9=Drug or alcohol intoxication or withdrawal<br>10= Bereavement: loss of family members, friends, neighbors<br>88=Others<br>99=Don't Know |
| **Q35.** Are emotional concerns preventing you or any household members from taking care of yourself/himself or others? | □Yes □No □Don't Know □Ref |
| **Q36.** What is your households greatest need right now? *(select one)* | 1=No current needs<br>2=Food<br>3=Electricity<br>4=Water<br>5=Medical care<br>6=Medications<br>7=Transportation<br>8=Physical help with cleanup and repairs<br>9=Financial help with cleanup and repairs<br>10=Trash removal<br>88=Other, specify _____<br>99=Don't Know |

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# Module Three: Disaster-related Morbidity and Mortality Surveillance Methods™

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**Disclaimer**

The findings and conclusions in this facilitator guide are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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# MODULE 3: DISASTER-RELATED MORBIDITY AND MORTALITY SURVEILLANCE METHODS

## TABLE OF CONTENTS

***Estimated Time:*** *6 hours (30 minute introduction, up to 1.75 hours of independent reading, up to 1.25 hours of group discussion, up to 1.25 hours of practice exercises, up to 45 minutes of skills assessment, and 30 minute module review and wrap-up)*

***Distribute****: Participant Workbook for this module (if not already distributed)*

***Explain****: The skills the learners will learn and how they will learn them by reading this Workbook. Note that learners will have opportunities to apply what they learn by completing practice exercises and skill assessments. Explain that brief, facilitator-led discussions will clarify or elaborate key concepts*

***Provide****: An overview of how the skills taught in the third module, Disaster-related Morbidity and Mortality Surveillance methods, will build on the information from the previous module to prepare them further to support disaster response activities and conduct epidemiological responses and surveillance*

- *Module 1 provides an overview of disaster types, how they occur, and the consequences they have for society.*
- *Module 2 contains information about the use of a rapid needs assessment (RNA) for disaster response and the various components needed to plan, execute, and report results collected from the assessment.*
- *Module 3 introduces disaster-related morbidity and mortality surveillance, the importance of surveillance during a disaster, different types of disaster surveillance methods, and challenges or difficulties you might face when conducting surveillance during a disaster.*

***Introduce***: *Lessons in Module Three*

***Tell****: Learners to read each lesson until they see the STOP sign*

# OVERVIEW OF MODULE THREE – DISASTER SURVEILLANCE METHODS

**Surveillance** is the ongoing, systematic collection, analysis, and interpretation of injuries, illnesses, and deaths for planning, implementation, and evaluation of public health practice.[31] Surveillance enables public health to track and identify any adverse health effects in the community.[32] During a disaster, you should consider surveillance when you need to understand a disaster's impact on affected populations. You should have a clear understanding of how you as an epidemiologist can plan for and put disaster surveillance activities in place.

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In this module, you will learn about disaster-related morbidity and mortality surveillance, the importance of surveillance during a disaster, various disaster surveillance methods, and challenges or difficulties you might face when conducting surveillance during a disaster. This module consists of two lessons:

- Lesson 1: Overview of Disaster Surveillance
- Lesson 2: Disaster Surveillance Methods

Content is drawn from several sources, including the following:

- Pan American Health Organization, Epidemiologic Surveillance After Natural Disaster
- The Johns Hopkins and the International Federation of Red Cross and Red Crescent Societies, Public Health Guide for Emergencies
- World Health Organization, Disaster Surveillance

## LEARNING OBJECTIVES

After completing Module Three, you will be able to do the following:

- Describe the purpose and importance of disaster surveillance
- Explain the differences in surveillance methods
- Explain the steps for setting up a surveillance system during a disaster
- Describe the challenges in establishing a surveillance system during a disaster
- Explain how to conduct morbidity and mortality surveillance in a disaster setting

## ESTIMATED COMPLETION TIME

Module Three will take approximately six hours to complete, including some discussion time with your mentor or facilitator.

## PREREQUISITES

Before participating in this training module, we recommended that you complete the following training courses:

- Module One: Epidemiologic Response to Disasters
- Introduction to surveillance (FETP core curriculum)
- Surveillance system development (FETP core curriculum)
- Surveillance data collection (FETP core curriculum)

***Lesson 1**: Overview of Disaster Surveillance*

***Overview:** This lesson describes the purpose and importance of surveillance, particularly as it relates to controlling or reducing disaster-caused injuries, illnesses, and deaths, as well as some of the common public health disaster surveillance challenges.*

***Total Estimated Time**: 70 minutes*

***Reading and Activities**: up to 40 minutes*

***Group Discussion**: up to 30 minutes*

# LESSON 1: OVERVIEW OF DISASTER SURVEILLANCE

***Independent Reading**: Tell learners to read the first two sections of Lesson 1—Introduction and Defining Disaster Surveillance – until they see the STOP sign (pages 3-5).*

***TIME**: 10 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## INTRODUCTION

As you learned in Module One, many significant damages can happen after a disaster, such as illness, potential disease outbreaks, death, displaced populations and crowded shelters, short- and long-term psychological effects, significant damage to buildings and other structures, and devastating financial loss.[33]

In this lesson, you will learn about the purpose and importance of surveillance, particularly as it relates to controlling or reducing disaster-caused injuries, illnesses, and deaths, as well as some of the common public health disaster surveillance challenges.

After completing this lesson, you will be able to do the following:

- Describe the purpose and importance of disaster surveillance
- Discuss the objectives of disaster surveillance
- Describe challenges in establishing a surveillance system during a disaster

[33] Noji EK. The Public Health Consequences of Disasters. New York, NY: Oxford University Press: New York.1997.

## DEFINING DISASTER SURVEILLANCE

To respond appropriately and effectively to disasters, government and health officials must have timely and accurate information. One way to gather such information is through disaster surveillance. In simple terms, **disaster epidemiology** is the use of epidemiology to measure the short- and long-term health effects of disasters and to predict the consequences of future disasters.[34] **Disaster surveillance** is an epidemiology tool that assesses health effects, monitors the effectiveness of relief efforts, responds to public concerns and media inquiries, and assists in planning for future disasters.[35] Disaster surveillance systems provide information and feedback from the data you collect. That information and feedback provides the basis on which interventions are planned as well as insights into future disasters.

### Purpose of Disaster Surveillance

After a disaster, you might be called on to help answer questions, such as which problems are occurring, where and why they are occurring, who is impacted, and what problems are causing the most injury, illness, or death. Disaster surveillance is one method by which you answer these questions. As an epidemiologist, your role in disaster surveillance is to

- define and detect outbreaks and health problems,
- estimate the magnitude of a health problem,
- identify groups at risk for negative health outcomes,
- inform and monitor the effectiveness of response and relief efforts, or
- assist with planning for future disasters and recommend ways of decreasing the consequences of future disasters.

When you implement your disaster surveillance system, you should promptly analyze and disseminate your findings because health and other government officials need your results to take action. In fact, this is the primary purpose of surveillance: to provide timely, accurate, and relevant information to drive decisions and interventions during a disaster.[36]

### Importance of Disaster Surveillance

You should put together a surveillance system to receive timely information about health problems. In this way, diseases and outbreaks can be detected early and programs and

[34] Centers for Disease Control and Prevention. Preparedness and response for public health disasters: Disaster epidemiology. Atlanta: CDC [ updated 2012 Jan 13; cited 2013 Nov 10]. Available from: http://www.cdc.gov/nceh/hsb/disaster/epidemiology.htm
[35] CDC. Disaster Surveillance. Presentation at COCA conference call: disaster surveillance; December 18 2007.
[36] Last JM. A Dictionary of Epidemiology. 2nd ed. New York: Oxford University Press; 1988.

interventions can be most effective.[37] In other words, you can use disaster surveillance to uncover potential disease outbreaks and track when and where injuries, illnesses, and deaths occur.

Also, disaster surveillance helps you to make informed decisions on which actions to take. For example, it can help you determine where to direct resources (e.g., humanitarian aid or financial) and how to target interventions and relief efforts. Surveillance can also help in planning for future disasters. Here are potential objectives of a public health disaster surveillance system:

- Follow disease trends for early detection and control
- Estimate the magnitude of a health problem
- Monitor a population's health and identifying priority, immediate, and long-term health needs
- Ensure resources are targeted to the most vulnerable groups
- Evaluate the coverage and effectiveness of program interventions
- Identify research needs and evaluating control strategies[38]

Implementing a disaster surveillance system provides situational awareness; provides information that can prevent or reduce injury, illness, or death; and helps guide prevention strategies for future disasters.

*Lead a discussion to review key lessons learned. Complete the Knowledge Checks and Discussion Questions. To guide additional discussion, you may use the following questions and suggested answers. (15 minutes)*

[37] Johns Hopkins Bloomberg School of Public Health; International Federation of Red Cross and Red Crescent Societies. Public Health Guide for Emergencies, 2nd ed. Geneva: IFRCRCS; 2008 [cited 2013 Nov 10]. Available from: http://www.jhsph.edu/research/centers-and-institutes/center-for-refugee-and-disaster-response/publications_tools/publications/_CRDR_ICRC_Public_Health_Guide_Book/Forward.pdf

[38] Wetterhall SF, Noji EK. Surveillance and epidemiology. In: Noji EK, editor. The public health consequences of disasters. New York: Oxford University Press; 1997. P. 37-64.

***Potential Discussion Question***

*Why is disaster surveillance important?*

*Possible answers:*

*Disaster surveillance allows you to receive timely information about health problems which allows diseases and outbreaks to be detected early and programs and interventions can be most effective. It can help you make informed decisions such as directing resources and targeting interventions. Some examples of objectives are as follows:*

- *Follow disease trends for early detection and control*
- *Estimate the magnitude of a health problem*
- *Monitor a population's health and identifying priority, immediate, and long-term health needs*
- *Ensure resources are targeted to the most vulnerable groups*
- *Evaluate the coverage and effectiveness of program interventions*
- *Identify research needs and evaluating control strategies*

**KNOWLEDGE CHECK**

_____ is an epidemiology tool that assess health effects, monitors the effectiveness of relief efforts, responds to public concerns and media inquiries, and assists in planning for future disasters.

A. Disaster epidemiology

B. Rapid needs assessments

**C. Disaster surveillance**

D. Disaster response

**DISCUSSION QUESTION #1**

Why should you conduct surveillance during a disaster?

*Possible answers include the following:*

- *To follow trends in the health status of a population over time*
- *To detect and respond to epidemics/outbreaks*
- *To establish health care and public health priorities*
- *To ensure those with greatest need are prioritized*
- *To evaluate the effectiveness of programs and services*

***Independent Reading**: Tell learners to read the next two sections of Lesson 1 – Disaster Surveillance and Surveillance Challenges in a Disaster Setting – until they see the STOP sign (pages 6 - 10).*

***TIME**: 30 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## DISASTER SURVEILLANCE: MORBIDITY AND MORTALITY CONSIDERATIONS

Two indicators often define disaster-related surveillance: morbidity and mortality. Your surveillance system objectives, as well as local health and government priorities, will help you determine which indicator(s) to track.

**Morbidity** refers to the state of being ill or diseased or the incidence of illness in a population; **mortality** refers to incidence of death in a population.[39] The **mortality rate** is the most important indicator of serious stress affecting a displaced population.

.**Equation 1. Mortality rate**

$$\text{Mortality Rate} = \frac{\text{Death occurring during a given time period}}{\text{Size of the population among which the death occurred}} \times 10^{n}$$

During a disaster, you may collect morbidity and mortality data to[40]

- Identify potential threats to person(s) requiring immediate public health action(s);
- estimate the magnitude of a health problem;
- monitor a population's health and identify priority, immediate, and long-term health needs;
- provide data for situational awareness;
- ensure resources are targeted to the most vulnerable groups;
- identify research needs and evaluate control strategies; and
- communicate findings to decision makers within the preparedness community.

[39] Agency for Toxic Substances and Disease Registry. Glossary of Terms. Atlanta: ATSDR [updated 2009 Jan 1; cited 2013 Nov 10]. Available from: http://www.atsdr.cdc.gov/glossary.html#G-M-

[40] Spears, J. Partners in Data Recovery and Reporting; Presentation from National Disaster Epidemiology Workshop; 2013 May 8; Atlanta, GA.

## Morbidity Surveillance

Morbidity surveillance in a disaster measures the disease state of an individual or the incidence of illness in a population. Disaster-related morbidity surveillance helps you detect disease outbreaks and track disease trends, as well as inform decisions about action items, such as allocating resources, targeting interventions to meet specific needs, and planning for future disasters.[41] Morbidity surveillance collects information on

- incidence rate,
- prevalence rate,
- age- and sex-specific morbidity rate.

Data sources for morbidity surveillance in a disaster include

- hospitals,
- clinics and other medical care facilities,
- community health and relief workers, and
- shelter service and delivery sites.

Additionally, the CDC has developed multiple, ready-to-use templates for morbidity and mortality surveillance. You can use these tools to supplement existing surveillance systems or temporarily replace disaster-damaged surveillance systems. Access these tools on the CDC Emergency Preparedness and Response Web site (http://www.emergency.cdc.gov/disasters/surveillance/).

## Mortality Surveillance

As stated, the mortality, or death rate, is the most important indicator by which to measure the effect of a disaster on a population.[42] Important mortality data to collect include

- demographic characteristics,
- time and location of death, and
- cause and manner of death.

Common data sources for mortality data include

- medical examiner or coroner's office,

[41] Centers for Disease Control and Prevention. Disaster Epidemiology: Frequently Asked Questions. Atlanta: CDC [updated 2012 Jan 13; cited 2013 Nov 10]. Available from http://www.cdc.gov/nceh/hsb/disaster/faqs.htm

[42] Johns Hopkins Bloomberg School of Public Health; International Federation of Red Cross and Red Crescent Societies. Public Health Guide for Emergencies, 2nd ed. Geneva: IFRCRCS; 2008 [cited 2013 Nov 10]. Available from: http://www.jhsph.edu/research/centers-and-institutes/center-for-refugee-and-disaster-response/publications_tools/publications/_CRDR_ICRC_Public_Health_Guide_Book/Forward.pdf

- 911 call centers,
- hospitals,
- mortuary service providers (e.g., funeral homes), and
- religious institutes (e.g., churches, mosques, synagogues)

## SURVEILLANCE CHALLENGES IN A DISASTER SETTING

Although we have discussed many of the benefits of conducting disaster surveillance; you may encounter challenges while in the field. The following describes some difficulties in implementing public health disaster surveillance and steps you can take to overcome those difficulties

**Table 1. Surveillance challenges and solutions**[43]

| Challenge | Description |
|---|---|
| Missing baseline data | **Challenge**: Baseline information about a disease or the health status of those affected is usually missing or nonexistent. This can occur because large amounts of the population are displaced, health infrastructure is severely damaged, or no previous surveillance system is available. Thus, it will be difficult for you to determine a true increase in a disease or a worsening health status in the affected population since you do not have a starting number for comparison. |
| | **Potential solution**: Missing baseline data is a very difficult challenge to overcome. While a perfect solution may not exist, when possible, you should gather available data through previously established surveillance systems, published data, census records, or surveys of the affected population. |
| Difficulty obtaining denominator data | **Challenge**: You need data on the size of the at-risk population (the denominator data) to calculate health condition rates. Rates permit valid comparisons of morbidity and mortality between populations that differ in size and composition. Difficulty obtaining denominator data may occur because the population under surveillance changes frequently (e.g., moving in and out of shelters or refugee camps), is unpredictable, or traditional census or population data may not adequately reflect the current affected population as residents may have evacuated an area or may have been displaced. As a result, your population denominator may not be accurate or stable. |

[43] Pavignani E, Colombo S. Analyzing Disrupted Health Sectors: A Modular Manual. Geneva: World Health Organization, Department of Recovery and Transition Programmes Health Action in Crises.2009. Available from: http://www.who.int/hac/techguidance/tools/disrupted_sectors/adhsm_en.pdf?ua=1

| | |
|---|---|
| | **Potential solution**: You may need census data to determine parameters, such as rates of infection in well-defined populations (e.g., refugee camps). You can usually obtain such data from the agency running the camp. Still, while this might be appropriate in refugee camps with good registration data, in a war scenario with shifting populations such reliable data rarely exists and limits this method's use. In this case, when possible, you may need to conduct a survey to obtain denominator data |
| Damaged infrastructure | **Challenge**: The local hospitals and health care systems might be severely damaged or destroyed, which means limited or no healthcare services. If this happens, outside relief and health organizations (e.g., Red Cross) may provide temporary medical assistance and care. For example, hospital surveillance cannot occur if hospitals are not operating. In such cases, temporary medical care is often established, but may not have the same surveillance capacity as do hospitals. Additionally, the few operating medical care facilities are likely to be overwhelmed and unable to conduct surveillance.<br><br>Logistical problems or obstacles to surveillance can, and often do, occur in a disaster setting. Electricity (power) and telephone outages affect communication networks and transportation systems, or destroyed roads or affected transportation systems slow or stop data collection. Such problems can interrupt the usual reporting mechanisms, leading to an underreporting of health events. |
| | **Potential solution**: During times of damaged or destroyed infrastructure, flexibility is important. For example, collect data with pencil and paper if technology is not functioning or available. Think about creative ways to gain information from resources unaffected by the disaster. Satellite imagery can identify the extent of a disaster by providing overhead photos both before and after the event.<br><br>For damaged healthcare systems, collect data by working with temporary onsite healthcare providers (e.g., Red Cross) and community leaders. |
| Lack of standardization in data collection and reporting | **Challenge**: The need to repeatedly collect the same types of information quickly from multiple sources under difficult conditions can be challenging. |
| | **Potential solution**: Ideally, you should standardize data collection and reporting. During the preparedness phase, epidemiologists |

| | |
|---|---|
| | should develop methods to standardize surveillance, with a process that is simple, flexible, and acceptable to multiple organizations. Preexisting, standardized surveillance templates are available. |
| Competing priorities | **Challenge**: During a disaster, competing priorities (e.g., providing medical care, restoring infrastructure) that involve many different stakeholders, including government and health agencies. may affect what data you are able to collect and when you are able to collect it. |
| | **Potential solution**: Competing priorities are difficult obstacles to overcome. Having a clear surveillance objective may help with decision-making among interested parties. Working to establish cross-sectional coordination, between, for example, disaster management officials and ministries of health, may help facilitate disaster surveillance activities. |

Thus, while disaster-related morbidity and mortality surveillance has many uses, it is important to take into account that data must be collected rapidly under poor conditions and be pulled together quickly in a logical format while potentially being hindered by forces beyond your control.

*Lead a discussion to review key lessons learned. Complete the Knowledge Checks and Discussion Questions. To guide additional discussion, you may use the following questions and suggested answers (15 minutes)*

***Potential Discussion Question***

*In a disaster setting, what does morbidity and mortality measure?*

*Possible answer:*

*Morbidity measures a person's disease state or the incidence of illness in a population.*

*Mortality measures the incidence of death (number of deaths) in a population. The mortality rate is the most important indicator by which to measure the effect of a disaster on a population.*

## KNOWLEDGE CHECK

In a disaster setting, what does mortality measure?

**A. The number of deaths in a population**

B. The incidence of illness in a population

C. The prevalence of illness and death in a population

D. The number of people affected by the disaster in a population

## DISCUSSION QUESTION #2

What are three challenges you might face when putting together a disaster surveillance system?

*Possible answers include the following:*

- *Missing baseline data*
- *Difficulty obtaining denominator data*
- *Damaged healthcare infrastructure*
- *Lack of standardized data collection and reporting*
- *Competing priorities*

*After you are completed with the discussion, summarize the key learning points from Lesson 1 outlined in the Lesson 1 Summary*

## LESSON 1 SUMMARY

In this lesson, we define surveillance as the ongoing, systematic collection, analysis, and interpretation of injuries, illnesses, and deaths, for the use in planning, implementation, and evaluation of public health practice. Similarly, disaster surveillance is an epidemiology tool that assesses health effects, monitors relief effort effectiveness, responds to public concerns and media inquiries, and assists in planning for future disasters. Data derived from disaster surveillance activities provide timely, accurate, and relevant information that drives decisions and interventions during a disaster. The two indicators of disaster surveillance are morbidity and mortality. Morbidity is the tracking of injury or illness related to a disaster, and mortality is the tracking of fatalities or deaths. Although public health disaster surveillance is a useful and important tool, when conducting surveillance activities, challenges often arise. Understanding these challenges and preparing for or developing potential solutions will benefit you when you undertake surveillance activities during a disaster.

***Lesson 2**: Disaster Surveillance Methods*

***Overview:** This lesson focuses on planning for disaster surveillance, considerations for designing or using existing surveillance systems, and morbidity and mortality surveillance during a disaster*

***Total Estimated Time**: approximately 3 hours*

***Reading and Activities**: up to 65 minutes*

***Group Discussion**: up to 45 minutes*

***Practice Exercise #1**: 75 minutes, including a 45-minute review*

# LESSON 2: DISASTER SURVEILLANCE METHODS

***Independent Reading**: Tell learners to read the first three sections of Lesson 2—Introduction, Planning for Disaster Surveillance, Steps for Designing and Conducting a Disaster Surveillance System – until they see the STOP sign (pages 12-17).*

***TIME**: 30 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## INTRODUCTION

In Lesson 1, you learned about the purpose and importance of public health disaster surveillance and common challenges or problems encountered when conducting surveillance during a disaster. In this lesson, you will learn about planning for disaster surveillance, considerations for designing or using existing surveillance systems, and morbidity and mortality surveillance during a disaster.

After completing this lesson, you will be able to do the following:

- Explain the steps for setting up a surveillance system during a disaster
- Describe disaster surveillance methods
- Identify considerations for designing or using existing surveillance systems
- Describe how to conduct morbidity and mortality surveillance during a disaster

## PLANNING FOR DISASTER SURVEILLANCE

Recall from Lesson 1 that surveillance is the systematic or regular collection of data, data analysis, and distribution or sharing of information to people (e.g. health officials or government officials) who can use it.[44] The ultimate surveillance goal is public health actions based on data collected from surveillance activities. Particularly for disaster surveillance, public health actions and interventions are geared toward estimating the magnitude of an illness or disease, detecting outbreaks, or documenting the distribution and spread of injury or death in populations affected by a disaster.

Disasters are chaotic and may require you to conduct surveillance activities in an unstable environment. In disaster settings, the routine surveillance system normally in place may not function, may be severely compromised or disrupted, or may not provide data quickly enough for timely decisions.[45]

As you plan and prepare to conduct surveillance activities, several considerations will help you address some of the unique difficulties you may face as a result of a disaster's challenging circumstances:

**Syndromic surveillance** – If routine surveillance is disrupted during a disaster's early stages, we recommended that you temporarily establish a local, syndromic surveillance system. The syndrome-based surveillance model should be flexible and provide a fast reporting system. Reestablish the routine surveillance system as soon as possible.[46]

**Logistics** – Consider limiting the number of diseases under surveillance, taking into account the limited skill or willingness of relief workers to collect health data and the compromised logistical or infrastructure networks (e.g., limited or no Internet access, power outages, damaged laboratories).[47]

**Partners and stakeholders** – In working with government officials, health care organizations, relief agencies and other stakeholders and partners, make sure you take into account the political, financial, and human resources needed to set up a successful public health disaster surveillance system. The support of high-ranking government or

[44] Thacker SB, Stroup DF. Public health surveillance. In: Brownson, RC and Petitti, DB, editors. Applied epidemiology: theory to practice. New York: Oxford University Press; 1998a. p. 105–35.
[45] Pan American Health Organization. Natural Disasters: Protecting the Public's Health. Washington, D.C. 2000. Report No.: 575. Available from: http://www.preventionweb.net/files/1913_VL206114.pdf
[46] *ibid*
[47] United States. Pan American Health Organization. Epidemiologic Surveillance after Natural Disaster. By Josefa Ippolito-Shepherd. Washington, DC: PAHO, 1982. Available from http://helid.digicollection.org/en/d/Jph09ee/2.html. 12 Sept. 2013.

ministry of health officials is important to ensure political commitment and funding to mobilize resources.[48] For example, you will need someone or some agency to assign you adequate epidemiologic and clerical staff who also have transportation to the field and priority access to health records.

As part of the planning and preparation process, gather background data on the disaster-affected geographical areas, the major disease risks in the affected area (e.g., cholera or malaria), and the at-risk and affected populations. In addition to information provided by the health system, by relief workers, and by local community groups, consider gathering information from unconventional sources – such as newspaper, Internet, or blog accounts – each of which can provide important early warnings.[49]

## STEPS FOR DESIGNING AND CONDUCTING A DISASTER SURVEILLANCE SYSTEM

Careful planning is important for developing a strong disaster surveillance system. The information collected and analyzed from surveillance activities helps ensure direction of resources to the areas or populations with the most need, evaluation of program or intervention outcomes, and provision of data for future disaster surveillance systems. While some slight variations might occur, take the following steps to develop a disaster surveillance system:

- Establish objectives
- Determine variables to survey (e.g., case definitions)
- Determine data sources and collect data
- Analyze data
- Disseminate data

The following steps are important in establishing a strong, disaster-situation surveillance system.

### Establish Objectives

During disaster, surveillance systems provide data to drive program or intervention activities, monitor poor health outcomes in affected populations, or track injury and death in affected communities. To achieve this purpose, the objectives should be clear and should describe how to use the surveillance information to inform public health action. According to the *Objectives of Surveillance – Inputs and Outputs in Field Epidemiology Manual*, objectives may include a)

[48] Nsubuga P, White ME, Thacker SB, et al. Public Health Surveillance: A Tool for Targeting and Monitoring Interventions. In: Jamison DT, Breman JG, Measham AR, et al., editors. Disease Control Priorities in Developing Countries. 2nd edition. Washington (DC): World Bank; 2006. Chapter 53. Available from:: http://www.ncbi.nlm.nih.gov/books/NBK11770/

[49] Pan American Health Organization. Natural Disasters: Protecting the Public's Health. Washington, D.C. 2000.xi, 119 p.—(Scientific Publication, 575). Available from: http://www.preventionweb.net/files/1913_VL206114.pdf

assess public health status to inform actions to control occurrence of disease, b) define public health priorities to inform policy and planning, c) evaluate programs to inform decisions about interventions, or d) initiate a research agenda to inform follow-up activities and mitigation efforts.[50]

## Determine Variables (Case Definitions)

After you have developed the objectives, you will need an operational definition of the health problem or condition for surveillance. This definition is necessary for accurate recognition and counting of the problem or condition. The operational definition consists of one or more criteria and is known as the **case definition** for surveillance. A case definition is a set of standard criteria for classifying whether a person has a particular disease, syndrome, or other health condition. A case definition must be simple, clearly defined, understandable, and must be practical for use in a disaster setting. Categorize a case using one of the following methods:[51]

**Clinical case** – a clinical syndrome generally compatible with the disease, as described in the clinical description. A general clinical impression that this is a case of disease.

**Epidemiologic case** – a case in which a) the patient has had contact with one or more persons who either have or have had the disease or have been exposed to an infection point source (i.e., a single source of infection, such as an event leading to a food borne-disease outbreak to which all confirmed case-patients were exposed) and b) plausible transmission of the agent by the usual modes of transmission. A case may be considered epidemiologically linked to a laboratory-confirmed case if at least one case in the chain of transmission is laboratory-confirmed.

**Laboratory case** – a case that is confirmed by one or more of the laboratory methods listed in the case definition under laboratory criteria for diagnosis

Some case definitions require laboratory confirmation, while others rely on multiple signs or symptoms for a condition where no laboratory test is readily available. When developing a case definition, the elements can include the degree of certainty in the diagnosis:

- Suspected – a case classified as suspected for reporting purposes
- Probable – a case classified as probably for reporting purposes
- Confirmed – a case classified as confirmed for reporting purposes

[50] Pan American Health Organization. Natural Disasters: Protecting the Public's Health. Washington, D.C. 2000. Report No.: 575. Available from: http://www.preventionweb.net/files/1913_VL206114.pdf
[51] *ibid*

It is important that you carefully develop the case definition(s) as the definition must meet the surveillance system's needs.[52] When diagnosing an illness, disease, or other health condition for disaster surveillance, the case definition criteria might differ from the clinical criteria.[53] And in a disaster situation you may have to depend on initial impressions such as a chief complaint rather than confirmatory information such as laboratory results or discharge diagnoses. You will need to find a balance between diagnosis degree of certainty and reporting timeliness.

## Data Sources and Data Collection

The surveillance system objectives will help determine the data sources. In a non-disaster event, data will typically come from medical and death records from healthcare providers and medical facilities. If traditional information channels are disrupted or missing, consider using nontraditional sources for information such as humanitarian aid agencies, civil defense organizations, religious officials, or police.[54]

## Analyze Data

After you have gathered surveillance data, analyze those data by person, place, and time. Generally, analysis of data to determine the attack rate or incidence proportion seeks to compare occurrence of illness and death in different geographic areas or periods. **Incidence** is the occurrence of new cases of disease or injury in a population over a specified period. **Incidence proportion** is the proportion of an initially disease-free population that develops disease, becomes injured, or dies during a specified (usually limited) period of time.

### Equation 2. Incidence proportion

$$\textit{Incidence Proportion} = \frac{\textit{Number of new cases of disease or injury during specified time interval}}{\textit{Total population at start of the time interval}}$$

A rate is helpful because it takes into account the size of the population where cases were derived. Usually, a calculation of the number of cases and rates is followed by a description of the population in which the condition occurs (person), where the condition occurs (place), and the period over which the condition occurs (time).[55] When analyzing data by person, age and

[52] Centers for Disease Control and Prevention. Case definitions for infectious conditions under public health surveillance. MMWR 1997; 46(RR10): 1-55.
[53] Centers for Disease Control and Prevention, Office of Workforce and Career Development. Principles of Epidemiology in Public Health Practice. 3rd ed. Atlanta: GA. CDC. 2012. Available from: http://www.cdc.gov/ophss/csels/dsepd/SS1978/SS1978.pdf
[54] *ibid*
[55] Centers for Disease Control and Prevention, Scientific Education and Professional Development Program Office. Principles of Epidemiology in Public Health Practice, 3rd ed. Available from: http://www.cdc.gov/osels/scientific_edu/ss1978/lesson3/section2.html

sex are common variables. When analyzing data by place, the rate is often calculated by adjusting for differences in the size of the population in the assigned geographical areas. The results are typically shown on a map or table. Analyzing data by time is usually done when you want to describe trends and detect changes in disease occurrence or frequency. In the disaster setting, calculating proportions might not be possible due to a lack of denominator data. Analysis might then be limited to calculating incidence only. Often epi curves are created to produce a visual display of the onset of health problems associated with the disaster. The epi curve displays the time trend, distribution, pattern of spread, and magnitude of health problem [56]

## Disseminate Data

As state, data from disaster surveillance estimate the magnitude of a disease health condition, detect outbreaks, or document the distribution and spread of injury or death in populations impacted by a disaster. Thus timely, regular data dissemination is a critical surveillance component. You must disseminate (i.e., spread abroad) or distribute (i.e., apportion) data in a clear and concise manner. Decision-makers, stakeholders, and partners at all levels must understand your data so they can readily act on the recommendations your data support. Graphs and maps are useful tools that assist in rapid data review and comprehension

*Lead a discussion to review key lessons learned. Complete the Knowledge Checks and Discussion Questions. To guide additional discussion, you may use the following questions and suggested answers (20 minutes)*

***Potential Discussion Question***

*What are the key steps in setting up a disaster surveillance system?*

*Possible answer:*

*First, you must establish objectives* that are *clear and should describe how to use the surveillance information to inform public health action. Then, determine which variables to survey including their case definitions. You must determine the data sources based on your objectives and available resources. Remember both traditional and nontraditional sources. After you collect the data, you should analyze those data by person, place, and time. Finally, it is critical that you disseminate the information in a clear, concise, and timely manner.*

[56] Centers for Disease Control and Prevention. Create an epi curve. CDC [cited 2013 Nov 10]. Available from: http://www.cdc.gov/training/QuickLearns/createepi/1.html

## KNOWLEDGE CHECK

Which of the following is not a key step of a disaster surveillance system?

A. Establish objectives

B. Determine variables

**C. Conduct a needs assessment**

D. Analyze data

## DISCUSSION QUESTION #3

What are the differences between the degrees of certainty in the diagnosis to meet the need of the surveillance system?

*Some case definitions require laboratory confirmation, while others rely on multiple signs or symptoms for a condition where no laboratory test is readily available. When developing a case definition, the elements can include the degree of certainty in the diagnosis:*

- *Confirmed – a case classified as confirmed for reporting purposes*
- *Probable – a case classified as probably for reporting purposes*
- *Suspected – a case classified as suspected for reporting purposes*

## DISCUSSION QUESTION #4

Why is determining the incidence proportion important?

*Incidence proportion is the proportion of an initially disease-free population that develops disease, becomes injured, or dies during a specified (usually limited) period of time. It is important for the following reasons:*

- *To compare occurrence of death and illness in different geographic areas or periods.*
- *To determine the proportion of an initially disease-free population that develops disease, becomes injured, or dies during a specified (usually limited) period.*
- *A rate is helpful because it takes into account the size of the population from which cases were derived.*

***Independent Reading**: Tell learners to continue to read the next sections of Lesson 2 – Considerations for Designing or Using Existing Surveillance Methods and Surveillance Methods – until they see the STOP sign (pages 18-21).*

***TIME**: 20 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## CONSIDERATIONS FOR DESIGNING OR USING EXISTING SURVEILLANCE METHODS

As discussed in Lesson 1, disaster surveillance is the ongoing, systematic collection, analysis, and interpretation of data for use in planning, implementation, and evaluation of public health programs. In designing or using an existing disaster surveillance system, set clear, prioritized objectives. Ensure the surveillance system is sustainable for short- or long-term use, depending on the objectives. Once you have established the objectives, use them to limit your data collection and sites to the simplest possible, objective-oriented solution. Surveillance is time and resource intensive, so only use the most efficient method of reaching your objectives. Take into consideration data quantity versus timeliness and simplicity. During a disaster, data collection conditions are often chaotic and unpredictable. Because you do not want to burden or overwhelm staff, you should only collect needed information. You should balance the quantity of the data with how long it will take to collect and analyze those data.

As an epidemiologist, your role in a disaster is to determine the extent of damage to human health, identify the needs of a population, and recommend interventions to reduce further illness or death. Disaster-related morbidity and mortality surveillance is one tool to accomplish these goals. In preparing to set up a disaster surveillance system, several considerations will help you determine whether you need to design and set up a new system or whether you can modify a preexisting system. Begin by determining whether surveillance is the most efficient way to meet your objectives, or could you use an existing, in-place system which, with slight modifications or enhancements, would meet your objectives.[57] To help you decide on the best course of action, consider the following:

> **Preexisting information** – The preferred method or course of action is to maximize the use of preexisting surveillance data for "baseline" information and modify established, epidemiologic surveillance systems for disaster settings. Determine whether working within the parameters of health resources and systems already available is a viable option, particularly if you are not familiar with preexisting systems and surveillance

[57] Western KA. Epidemiologic surveillance after natural disaster. Washington (DC): Pan American Health Organization; 1982. Report No.: 420. [cited 2013 Sept 12]. Available from: http://helid.digicollection.org/en/d/Jph09ee/2.html

resources. With scarce resources and limited time, avoiding duplication of efforts is very important.[58]

**Syndromic surveillance** – If the health infrastructure is severely damaged or if establishing a new surveillance system will be too time-consuming, consider using syndromic surveillance. Syndromic surveillance integrates signs and symptoms, primary complaints or presumptive diagnoses, or other characteristics of the disease, rather than specific clinical or laboratory diagnostic criteria. In areas particularly devastated by a disaster, syndromic surveillance can provide an earlier indication of an unusual increase in illnesses, injury, or death to shape early intervention efforts. Keep in mind, however, that syndromic surveillance is intended to supplement, not to replace, traditional disaster surveillance.[59]

**Sentinel surveillance** – Different surveillance strategies meet different needs for timely, accurate, and reliable data. Sentinel surveillance occurs when data are gathered from a limited number of sites and is an alternative to population-based surveillance and national surveillance. Although sentinel surveillance is extremely useful for detecting large public health problems, it might not capture rare events, such as the early emergence of a new disease—these infections might emerge anywhere in the population. Sentinel surveillance is particularly useful for monitoring trends. It is less costly than other surveillance methods, but that is because data collection is limited.[60]

**Ad hoc surveillance** – In addition to using the existing surveillance system, in a disaster setting you have the opportunity to develop and employ a supplemental or ad hoc surveillance system in which medical relief workers take part. A supplemental or ad hoc surveillance system will be useful for areas hit by a disaster that lack a preexisting surveillance infrastructure. Or in circumstances where tents, temporary shelters, or other venues provide medical care because the hospitals and clinics are overwhelmed or unavailable due to road closures, damaged buildings, or other infrastructure challenges.[61]

If available data and alternative sources of data will not suffice, establishing a new disaster surveillance system might be your only option. Carefully consider whether you can use existing

[58] *ibid*
[59] *ibid*
[60] Nsubuga P, White ME, Thacker SB, Anderson MA, Blount SB, Broome CV, et al. Public health surveillance: a tool for targeting and monitoring interventions. In: Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans DB, et al., editors. Disease Control Priorities in Developing Countries. 2nd ed. Washington: World Bank; 2006. P. 997-1015. Available from http://www.ncbi.nlm.nih.gov/books/NBK11770/
[61] *ibid*

data collection methods—even if not ideal—rather than establishing a new surveillance system. An existing system requires less effort to establish than would a new disaster surveillance system.

Whether you design a new system or modify an existing system, when collecting health data, use generally recognized and accepted data collection forms. You might like to use some other available forms, but the Environmental Hazards and Health Effects, Health Studies Branch (DEHHE/HSB) at the Centers for Disease Control and Prevention (CDC) have also prepared Morbidity and Mortality Disaster Surveillance Forms (http://emergency.cdc.gov/disasters/surveillance/). And with any form you use, you need to watch for whether that form asks for personal identifying information as extra precautions should be taken to ensure the confidentiality and privacy of respondents or cases.

## SURVEILLANCE METHODS

Surveillance is either active or passive. **Active surveillance** employs staff members to regularly contact heath care providers or the population to seek information about health conditions for a limited time period (usually weeks or months). Active surveillance provides the most accurate and timely information, but is expensive. Active surveillance has several benefits in a disaster setting.[62]

- Active surveillance activities complement regular reporting functions that might be disrupted because of the disaster
- Active surveillance can be used in non-traditional settings. If, for example, a segment of the population is moved to an evacuation center, regular reporting mechanisms lack the flexibility to set up in such locations.
- Active surveillance allows for public health officials to quickly detect infectious disease outbreaks, define or measure morbidity or illness among an affected population, and target relief efforts. Similarly, active surveillance can monitor relief effort effectiveness.

**Passive surveillance** is a system in which a health jurisdiction regularly receives reports from hospitals, clinics, public health units, or other sources. Passive surveillance is a relatively inexpensive strategy that can cover large areas. It has a low data collection burden and it provides important information for monitoring a population's health. Nevertheless, because passive surveillance depends on people in various institutions to provide data, data quality and

[62] CDC. Disaster Surveillance. Presentation at COCA conference call: disaster surveillance; December 18 2007.

timeliness are difficult to control.[63] Also, passive surveillance relies on health officials to submit health reports. Reporting can be slow if the responsible health officials do not report regularly.

*Lead a discussion to review key lessons learned. Complete the Knowledge Checks and Discussion Questions. (10 minutes)*

**KNOWLEDGE CHECK**

_____ integrates signs and symptoms, primary complaints or presumptive diagnoses, or other characteristics of the disease, rather than specific clinical or laboratory diagnostic criteria.

A. Sentinal surveillance

**B. Syndromic surveillance**

C. Ad hoc surveillance

D. Mortality surveillance

**DISCUSSION QUESTION #5**

What is the difference between active and passive surveillance?

***Active**: employs staff members to contact regularly heath care providers or the population to seek information about health conditions for limited periods (usually weeks or months). Active surveillance provides the most accurate and timely information, but it is expensive.*

***Passive**: a system in which a health jurisdiction receives reports submitted from hospitals, clinics, public health units, or other sources for unlimited period. It is inexpensive, has a low data collection burden, and can cover a large area. Data quality and timeliness, however, are difficult to control.*

[63]Nsubuga P, White ME, Thacker SB, Anderson MA, Blount SB, Broome CV, et al. Public health surveillance: a tool for targeting and monitoring interventions. In: Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans DB, et al., editors. Disease Control Priorities in Developing Countries. 2nd ed. Washington: World Bank; 2006. P. 997-1015. Available from: http://www.ncbi.nlm.nih.gov/books/NBK11770/

***Independent Reading**: Tell learners to continue to read the next section of Lesson 2 – Disaster Surveillance Indicators and Data Collection Forms – until they see the STOP sign (pages 22-24).*

***TIME**: 15 minutes*

*NOTE: If learners have read the material and completed the activities before class, skip this step*

## DISASTER SURVEILLANCE INDICATORS AND DATA COLLECTION FORMS

Recall from Lesson 1 that morbidity (disease or illness) and mortality (deaths) are the two essential indicators of a disaster surveillance system. In most countries, morbidity and mortality reporting is a legally required part of a vital statistics program; many countries have complete data available for these indicators. During a disaster, however, these traditional reporting systems may not function. And you may want to collect data on health conditions not traditionally reported (e.g., amputations, watery diarrhea).

One example of a supplemental surveillance system used in a disaster-setting is the Surveillance in Post Extreme Emergencies and Disasters (SPEED) launched by the Philippine Department of Health and World Health Organization in 2010. SPEED is an early warning disease surveillance system for disaster situations. Its aim is to determine early and potential disease outbreaks and monitor disease trends. During a disaster, SPEED captures data and generates in a timely manner information relevant to health emergency managers from the grassroots up to the national level. SPEED uses syndromic surveillance and focuses on the 21 most common health conditions encountered after a disaster. Since 2010, SPEED has been used in a number of disasters, including in 2011 Typhoon Quiel (international name Nalgae) and Typhoon Sendong (international name Washi).[64]

### Disaster-related Morbidity and Mortality Surveillance Indicators

The following table has morbidity and mortality indicators and potential information sources.

[64] Surveillance in post extreme emergencies and disasters. Center for Health Market Innovations; c2014 [cited 7 July 2014]. Available from: http://healthmarketinnovations.org/program/surveillance-post-extreme-emergencies-and-disasters-speed

**Table 2. Morbidity and mortality surveillance indicators and sources of information**[65]

| Surveillance | Indicators | Sources of Information |
|---|---|---|
| Morbidity | • Incidence rate<br>• Prevalence rate<br>• Age/sex-specific morbidity rate<br>• Proportional morbidity rate | • Outpatient and admission records, shelters, refugee camp clinics<br>• Laboratories<br>• Feeding center(s) records<br>• Community health worker records |
| Mortality | • Crude Mortality Rate (CMR)<br>• Age-specific mortality rate<br>• Cause-specific mortality<br>• Case Fatality Rate (CFR) | • Hospital death registers<br>• Religious leaders or centers (e.g., churches or mosques)<br>• Community reporters (including Community Health Workers)<br>• Burial shroud distribution<br>• Graveyards<br>• Camp administration |

## Disaster Surveillance Data Collection Forms

Traditional data sources can be used during a disaster to collect surveillance information. However, you may also need supplemental active surveillance if traditional systems are disrupted or if persons seek care outside typical acute care settings.[66] In these situations, you can use surveillance forms to collect standardized data. Surveillance forms capture morbidity and mortality data. Table 3 describes supplemental form purpose and use.

[65] Johns Hopkins Bloomberg School of Public Health; International Federation of Red Cross and Red Crescent Societies. Public Health Guide for Emergencies, 2nd ed. Geneva: IFRCRCS; 2008 [cited 2013 Nov 10]. Available from: http://www.jhsph.edu/research/centers-and-institutes/center-for-refugee-and-disaster-response/publications_tools/publications/_CRDR_ICRC_Public_Health_Guide_Book/Forward.pdf

[66] Schnall AH, Wolkin AF, Noe R, Hausman LB, Wiersma P, Soetebier K, Cookson ST. Evaluation of a standardized morbidity surveillance form for use during disasters caused by natural hazards. Prehospital and Disaster Medicine. 2011; 26(2):90.

**Table 3. Description of form types**[67]

| | Morbidity | Mortality |
|---|---|---|
| Purpose | Capture individual-level active surveillance of health conditions | Identify the number of deaths related to the disaster and provide basic mortality information |
| Setting | Acute care facilities (e.g., hospitals)<br>Nontraditional health care setting (e.g., shelter with medical tent) | During a disaster, medical examiners and coroner's office, hospitals, religious institutes (church, mosque) or funeral homes |
| Use | Use the form to record information about chief complaints and specific infectious syndromes, mental health conditions, injuries, and chronic diseases that best describe the reason the patient seeks immediate care | Use this form for all known deaths related to the disaster. This form does not replace the death certificate |

The CDC has developed standardized morbidity and mortality forms you can access at: http://www.emergency.cdc.gov/disasters/surveillance/. Abbreviated forms can be used if summary or less-detailed information is sufficient or when the burden of collecting detailed, individual information is substantial.

*Lead a discussion to review key lessons learned. Complete the Knowledge Checks and Discussion Questions (15 minutes). After you are finished with the discussion, continue on to the practice exercise (instructions below)*

[67] Centers for Disease Control and Prevention. Emergency preparedness and response: public health assessment and surveillance after a disaster. Atlanta: CDC [updated 2014 Sept 5; cited 2014 Sept 5]. Available from: http://www.bt.cdc.gov/disasters/surveillance/

## KNOWLEDGE CHECK

Which of the following is not a surveillance indicator for morbidity?

A. Proportional morbidity rate

**B. Case Fatality Rate (CFR)**

C. Incidence rate

D. Prevalence rate

## DISCUSSION QUESTION #6

What is the purpose of surveillance forms? Do you have any pre-existing standard surveillance forms to use in a disaster in your jurisdiction?

*Surveillance forms capture morbidity and mortality data. While traditional data sources can be used during a disaster to collect surveillance information, you may need supplemental active surveillance if traditional systems are disrupted or if persons seek care outside typical acute care settings. In these situations, you can use surveillance forms to collect standardized data.*

***Practice Exercise Instructions***

*Depending on the size of the group, tell learners to complete this exercise individually, with a colleague, or as part of a small group. Instruct them to read through the case study and answer the questions related to each case. Have learners record their answers in the space provided in the participant workbook. Once completed, review the exercise and discuss possible answers.*

***TIME**: up to 30 minutes to complete, then reconvene the group to discuss the answers (up to 45 minutes)*

## PRACTICE EXERCISE

### PRACTICE EXERCISE #1

*In this practice exercise, you will apply the concepts learned in this module. Please read through the following case study and answer the questions.*

**Background**

On April 18th, a radiation contamination incident occurred at a nuclear fuel processing plant in Eastern Europe. Due to human error, one of the reactors at the plant underwent a partial nuclear meltdown. The tank temperature rapidly increased, causing the uranium fuel rods to melt and spill into the containment systems. Reactor temperature rose precipitously. Then a chemical explosion released dried radioactive waste into the air, creating a radioactive cloud reaching over 525 kilometers. Although no immediate casualties occurred as a result of the explosion, the rapid spread of the radioactive cloud resulted in the long-term contamination of a more than 800-square kilometer area. The International Nuclear Event Scale (INES) rated the accident a Level 6 (serious accident) that would likely require a long-term disaster response effort.

As part of their response effort, the Ministry of Health and government officials wanted to monitor health status in the affected areas and wanted to respond to immediate, blast-related health threats.

Adapted from: World History Project. Kyshtym Disaster. http://worldhistoryproject.org/1957/9/29/kyshtym-disaster; Kyshtym disaster. http://www.spiritus-temporis.com/kyshtym-disaster/explosion.html; International Nuclear Event Scale. http://www.iaea.org/ns/tutorials/regcontrol/refs/39inesleaflet.pdf; http://www.merriam-webster.com/dictionary/meltdown.

**What are the initial steps in setting up surveillance for the radiological event?**

- *First the ministry of health and government officials should establish decontamination zones, population monitoring in community reception center and address uncertainty of health care infrastructure, staff and resource remaining in radiation affected localities and surrounding areas.*
- *Establish surveillance objectives (Discuss potential objectives for this event. Examples include assess public health status of those living in fallout zone and determine emerging health threats such as acute radiation sickness. Determine case definition and associated variables. (Discuss case definition. Examples include those exhibiting acute radiation sickness or those with blast injuries. Discussion should be around ability to have clinical, epidemiologic, and laboratory cases, as well as distinction between confirm, probable and suspect case)*
- *Determine data sources (Discuss potential places to collect data and the feasibility of data collection. Potential answer: all hospital emergency rooms within fallout zone)*

**Describe the considerations to help you determine whether you need to design and set up a new surveillance system, or modify a preexisting system.**

- *Do you have an electronic, hospital-based surveillance system available?*
  - *If yes, is the system operational?*
  - *If yes, does the system capture the variables you outlined above?*
- *If a preexisting system is not available, determine whether a new system is feasible.*
  - *How would you design the ad hoc system?*
  - *What hospitals would be included in the new system?*
- *How would you capture the surveillance data (e.g., paper forms, electronic submission)?*

**What types of data would you collect as part of your surveillance? Describe why.**

- *Chief complaints – provides information on the primary symptoms associated with suspected or confirmed illness following the explosion.*
- *Number of new cases (incidence) of suspected or confirmed disease(s) following the accident – provides information on the number of new cases reported within a specific period following the explosion.*
- *Age – provides insight on whether the exposure affected different age groups differently.*
- *Sex – provides insight on whether the exposure affected males and females differently*
- *Geographic location – given the spread of the radioactive cloud, geographic location of cases will provide insight into the geographic spread of disease.*
- *Time of symptoms onset – Knowing when symptoms started with respect to the timing of the explosion is helpful to determine possible chronic, ongoing explosion effects.*

**Traditional (passive) systems were disrupted and many persons needed care outside typical acute care settings. How then do you collect morbidity and mortality data?**

*Initiate active surveillance to capture morbidity and mortality data using supplemental surveillance forms.*

- *Morbidity: Use forms to record information about the chief complaints, such as injuries, chronic diseases of those affected by the explosion, and mental health conditions.*
- *Mortality: Use forms for all known deaths related to the explosion. This form does not replace the death certificate.*

*After you are completed with the scenario, summarize the key learning points from Lesson 2 outlined in the Lesson 2 Summary*

## LESSON 2 SUMMARY

In this lesson, we have defined disaster surveillance as the systematic collection, analysis, and interpretation of relevant health data. Data derived from disaster surveillance activities are useful to establish morbidity and mortality trends, set priorities, and plan and assess relief efforts. The information obtained from the surveillance activities is useful in preparing for future disasters.

## SKILLS ASSESSMENT

***Independent Skills**: Tell learners to complete this exercise individually. This is designed to test knowledge gained from Module Three. Instruct them to read each of the questions in the practice exam and select the best answer. Have participants record their answers in the space provided in the participant workbook. Once completed, review the exercise and discuss possible answers.*

***TIME**: up to 30 minutes to complete, then reconvene the group to discuss the answers (up to 15 minutes)*

1. **Which of the following is NOT a characteristic of public health surveillance?**
   A. Systematic data collection
   B. Ongoing
   **C. One-way**
   D. Timely dissemination of data

2. **Morbidity measures the disease state of a person or the incidence of illness in a population**
   **A. True**
   B. False

3. **What does mortality surveillance measure in a disaster setting?**
   A. The incidence of illness or disease in a population
   **B. The incidence of death in a population**
   C. The rate of live births during a disaster

4. **Which of the following best describes passive surveillance?**
   **A. Laboratories, physicians, or other healthcare providers regularly report cases of disease to health officials using a standard case definition of that particular disease.**
   B. Local health agencies initiate the collection of specific cases of disease from laboratories, physicians, or other healthcare providers.
   C. The ongoing, systematic collection, analysis, interpretation, and application of real-time disease indicators that allow for detection before public health authorities would otherwise identify them.

5. **Surveillance is essentially concerned with the gathering of information necessary for rational planning, operation, and evaluation of activities.**
   **A. True**
   B. False

6. **Which of the following best describes active surveillance?**
   A. Laboratories, physicians, or other health care providers regularly report cases of disease to the local health officials using a standard case definition of that particular disease
   **B. Local health officials initiate the collection of specific cases of disease from laboratories, physicians, or other health care providers**
   C. The ongoing, systematic collection, analysis, interpretation, and application of real-time indicators for disease that allow for detection before public health authorities would otherwise identify them.

7. **Which of the following is a disadvantage of syndromic surveillance?**
   **A. Small outbreaks are not detected**
   B. Data collection is through automated means
   C. Early, real-time information gathering
   D. Health department staff burden is low for data collection

8. **The lack of baseline surveillance data before a disaster makes no difference in confirming certain disease increases.**
   A. True
   **B. False**

9. **A(n) _____ is a set of standard criteria for classifying whether a person has a particular disease, syndrome, or other health condition**
   A. Sentinal surveillance
   **B. Case definition**
   C. Syndromic surveillance
   D. Objective

10. **An epidemiologist's role in disaster surveillance is to**
   A. Define quickly and detect outbreaks and health problems
   B. Identify groups at risks for poor health outcomes
   C. Identify and determine the needs of groups in a population who have a high risk for poor health outcomes
   D. Inform the relief response efforts and monitor their effectiveness; and
   E. Assist in planning for future disasters and recommend ways to decrease the consequences of future disasters.
   **F. All of the above**

*This is the completing of Module Three. Please thank the learners for attending, ask if they have any remaining comments or questions, and provide any contact information for any additional follow-up questions.*

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