CHAPTER OBJECTIVES

After reading this chapter, you should be able to:
1. Describe ways in which disaster events may vary.
2. Describe the elements of a disaster.
3. Describe two aspects of disaster-related assessment.
4. Identify biophysical, psychological, physical environmental, sociocultural, behavioral, and health system considerations to be assessed in relation to a disaster.
5. Describe two aspects of primary prevention related to disasters.
6. Discuss the principles of community disaster preparedness.
7. Identify the component elements of an effective disaster response plan.
8. Analyze the role of community health nurses in primary, secondary, and tertiary prevention related to disaster situations.

KEY TERMS

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Advocacy in Action

Mobilizing the Hispanic Community for Disaster Preparedness

U.S. public health officials face the challenge of disaster preparedness and response, particularly for ethnically diverse populations. A graduate nursing student, fluent in Spanish, developed a much-needed “risk communication plan” for the local Hispanic population.

The student completed a targeted assessment of needs and resources in the Hispanic community and noted that approximately two thirds of the population needed assistance in speaking and reading English. Key informant interviews, focus groups, and surveys were conducted to determine important sources of news and emergency information for Hispanic community members. The student also contacted local Hispanic radio and television stations for ideas about disseminating emergency information.

Three goals for risk communication were formulated: (a) raising community awareness, (b) conveying disaster preparedness information to Hispanic community members, and (c) promoting development of a disaster plan in every Hispanic family. The communication plan addressed precrisis and crisis response phases. Components of the precrisis plan included establishing collaborative relationships with local Spanish radio stations and selecting and disseminating printed preparedness materials in church bulletins and at local Hispanic markets. Crisis response plan elements included training interpreters, updating Spanish media sources, disseminating specific messages in Spanish, enlisting trusted community spokespersons to assist with communication, and utilizing a Spanish information call-in line with prerecorded messages. The importance of word-of-mouth and cell phone communication was emphasized in both phases of planning.

This project was conducted in the true spirit of advocacy. A comprehensive assessment was conducted in partnership with members of the Hispanic community, and the resulting plan, developed to reflect the diverse voices of community members, was reviewed by key stakeholders prior to being finalized.

Veronica Vogt, Graduate Student
Pamela A. Kulbok, DNSc, APRN, BC
Associate Professor of Nursing
University of Virginia/Charlottesville
One can hardly open a newspaper today without reading of a disaster that has occurred somewhere in the world. In the last 25 years, the United States has witnessed more than 442 natural disasters and 902 disaster declarations. The top 10 U.S. disasters in the previous century caused more than 16,500 deaths and adversely affected 2.3 million people (Bissell, Pinet, Nelson, & Levy, 2004), and these figures do not reflect the devastating effects of Hurricanes Katrina and Rita in 2005.

A disaster has been defined by the American Red Cross as “an occurrence, either natural or man-made, that causes human suffering and creates human needs that victims cannot alleviate without assistance” (as quoted in Langan & James, 2005, p. 4). This definition highlights the difference between an emergency and a disaster. An emergency is a serious threatening event that falls within the coping abilities of the individual, family, or community. A house fire, for example, is an emergency. A disaster, on the other hand, cannot be addressed with usual procedures and requires assistance beyond the ordinary. The wildfire that destroyed more than 300 homes and caused 16 deaths in San Diego in 2003 is an example of a fire-related disaster.

**DISASTER TRENDS**

Disasters seem to be occurring with greater frequency than ever before. In part this may be due to more extensive news coverage of catastrophic events around the world. It is clear, however, that disasters are having more horrendous effects than in the past. For example, Hurricane Katrina in 2005 was the deadliest hurricane since 1928 and the most costly natural disaster ever to occur in the United States (Daley, 2006b). The December 24, 2004, tsunami that arose in the Indian Ocean resulted in more than 230,000 deaths in India, Indonesia, the Maldives, Somalia, Sri Lanka, and Thailand. In addition, 500,000 people were displaced in Northern Sumatra, Indonesia, and more than 37,000 people were missing and presumed dead (Widyastuti et al., 2006).

Between August 2004 and October 2005, Florida experienced eight major hurricanes (Kay et al., 2006), and 2005 was the first season in recorded history that four hurricanes made landfall in the United States in one year (Daley, 2006b). Table 27-1 provides information on some of the more notable disaster events in recent years.

The increasing severity of disaster effects is due to a number of societal changes. Human populations are more densely concentrated and increasingly found in areas with high disaster potential (Landesman, 2005). For example, the majority of deaths related to Hurricane Katrina occurred when New Orleans levees were breached, allowing flooding of portions of the city constructed below sea level (Daley, 2006a, 2006b).

Global climate changes are also altering weather patterns, creating more severe storms with resulting damage. In addition, technological advances increase the potential for human-caused disasters such as toxic leaks, transportation disasters, and massive electrical power outages. Finally, recent events have demonstrated the willingness of some radical groups to engineer massive disasters to achieve their political goals through terrorism.

**TYPES OF DISASTERS**

Disasters are typically classified as natural or human-caused. Natural disasters result from some force of nature such as major storms (hurricanes, tornadoes, severe thunderstorms, blizzards), floods, earthquakes, wildfires, drought, famine, and eruptions (Langan & James, 2005). Naturally occurring epidemics of communicable diseases are another example of a natural disaster (Vale & Campanella, 2005). Epidemics that affect major segments of the world are called pandemics. The World Health Organization (WHO) has identified a cyclic sequence of phases of a pandemic. Phase zero is the interpandemic stage and occurs at four levels, as indicated in Table 27-2. In phase one, confirmed outbreaks have occurred in one country with spread to other countries. Phase two is characterized by outbreaks and epidemics in multiple countries and the potential for significant morbidity and mortality. Phase three encompasses the end of the first wave of cases and may be followed by a subsequent resurgence of infection in phase four. The pandemic ends with phase five as a result of increasing immunity levels within the population due to disease or vaccination. The cycle then returns to the zero phase (U.S. Department of Health and Human Services [USDHHS], 2004). Table 27-2 summarizes the phases and levels of a pandemic.

**Human-caused or technological disasters** are “complex emergencies, technological disasters, material sources, and other disasters not caused by natural hazards” (Langan & James, 2005, p. 4) that arise from human activity. Human-caused disasters may be accidental or intentional. Categories of unintentional human-caused disasters include hazardous materials releases and other industrial accidents (e.g., an explosion in a coal mine), transportation disasters, and technological disasters such as major power outages or interference with communication systems. Some of the same categories of disasters may also be deliberately caused. Two additional types of intentional disasters are civil conflict (e.g., war, rioting) and terrorism. War may include civil or international conflict, and terrorism may take a variety of forms, as discussed below. Urban renewal, with its consequent displacement of low-income populations, has also been considered a category of human-caused disaster by some authors (Vale & Campanella, 2005). Table 27-3 presents types and subtypes of disaster events.
Terrorism is a form of intentional disaster that is of significant concern in today’s world. Terrorism was defined in Chapter 6, and according to the Federal Emergency Management Agency (FEMA, 2006c) involves the “use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom” (p. 1). Another definition is the “deliberate creation and exploitation of fear for bringing about political change” (Hoffman, as quoted in Langan & James, 2005, p. 5). This latter definition embodies the four elements that characterize terrorism: inducement or ideologic activities” (Nolte et al., 2004, p. 3).

Biologic terrorism makes use of biological threats or “organisms or toxins that can kill or incapacitate people, livestock, or crops” (FEMA, 2006a, p. 1). When biologic organisms are directed against plants or animals intended as food, the term agroterrorism is used (Cupp, Walker, & Hillison, 2004). The Centers for Disease Control and Prevention (CDC) has defined biologic terrorism as “the use or threatened use of biologic agents against a person, group, or larger population to create fear or illnesses for the purposes of intimidation, gaining an advantage, interruption of normal activities, or ideologic activities” (Nolte et al., 2004, p. 3).

Biologic agents are categorized by the CDC (2004) on the basis of their potential for destruction. Category A agents are those that have high priority for preparedness activity due to the threat posed to national security based on their ease of dissemination or high interpersonal communicability, high rates of mortality

### Table 27-1 Selected Recent Disasters and Their Effects

<table>
<thead>
<tr>
<th>Disaster</th>
<th>Year</th>
<th>Selected Effects</th>
</tr>
</thead>
</table>
| Earthquake, Indonesia           | 2005 | - Second earthquake after major tsunami  
- 300 deaths; thousands displaced  
- Hampered tsunami relief operations |
| Florida hurricanes               | 2004 | - 124 deaths  
- 20% of homes sustained at least some damage |
| Freight train collision,        | 2005 | - 11,500 gallons of chlorine gas released  
- Nine deaths; 529 people received medical treatment |
| North Carolina                  |      |                                                                                  |
| Hurricane Katrina                | 2005 | - 400,000 persons displaced from New Orleans  
- 500 evacuation centers established in 18 states  
- Estimated 1,000 deaths in Louisiana, 200 in Mississippi, 20 in Florida, Alabama, and Georgia  
- 80% of New Orleans flooded  
- 1,037 injuries/illnesses among rescue personnel |
| Multiple terrorist attacks       | 2003 | - 208 events (190 international events)  
- 307 deaths, 1,593 injured |
| Tsunami, India Ocean             | 2004 | - Estimated 225,000 deaths in eight countries on two continents  
- 120,514 deaths, 897 missing, and 403,428 displaced persons in Banda Aceh  
- 80% of health care workers in Banda Aceh killed |
| War in Darfur, Sudan             | 2003 | - 1 million internally displaced persons  
- 200,000 refugees in camps in Chad  
- Limited access to food, water, sanitation, shelter, and health care |
| World Trade Center attack        | 2001 | - 2,726 related deaths as of August 16, 2002  
- 343 New York firefighters killed; 240 sought emergency treatment in the first 24 hours after the attacks |


### Table 27-2 Disaster Year Selected Effects

<table>
<thead>
<tr>
<th>Disaster</th>
<th>Year</th>
<th>Selected Effects</th>
</tr>
</thead>
</table>
| Patterns of global terrorism,   | 2003 | - 1,037 injuries/illnesses among rescue personnel  
- 20% of homes sustained at least some damage  
- 120,514 deaths, 897 missing, and 403,428 displaced persons in Banda Aceh  
- 80% of health care workers in Banda Aceh killed |
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- 307 deaths, 1,593 injured |
| Tsunami, India Ocean             | 2004 | - Estimated 225,000 deaths in eight countries on two continents  
- 120,514 deaths, 897 missing, and 403,428 displaced persons in Banda Aceh  
- 80% of health care workers in Banda Aceh killed |
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- Limited access to food, water, sanitation, shelter, and health care |
| World Trade Center attack        | 2001 | - 2,726 related deaths as of August 16, 2002  
- 343 New York firefighters killed; 240 sought emergency treatment in the first 24 hours after the attacks |

TABLE 27-2 Phases and Characteristic Features of a Pandemic

<table>
<thead>
<tr>
<th>Phase</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero</td>
<td>Interpandemic phase</td>
</tr>
<tr>
<td></td>
<td>Level 0: No human cases of infection have been found.</td>
</tr>
<tr>
<td></td>
<td>Level 1: One case has been identified in a human being.</td>
</tr>
<tr>
<td></td>
<td>Level 2: Two or more cases have been identified, but there is no documented person-to-person spread.</td>
</tr>
<tr>
<td></td>
<td>Level 3: Pandemic alert; person-to-person spread has been documented and there has been an outbreak in one country lasting two or more weeks.</td>
</tr>
<tr>
<td>One</td>
<td>An outbreak has been confirmed in one country with spread of infection to other countries and potential for serious morbidity and mortality.</td>
</tr>
<tr>
<td>Two</td>
<td>Outbreaks and epidemics have occurred in multiple countries, with widening global spread of infection.</td>
</tr>
<tr>
<td>Three</td>
<td>End of the first wave of infection</td>
</tr>
<tr>
<td>Four</td>
<td>Subsequent seasonal wave of infection</td>
</tr>
<tr>
<td>Five</td>
<td>End of the pandemic as a result of increasing herd immunity due to disease or vaccination.</td>
</tr>
</tbody>
</table>


and potential for major public health impact, high potential for panic and social disruption, and requirements for special public health preparedness efforts. Category A agents include anthrax, botulism, plague, smallpox, tularemia, viral hemorrhagic fevers (e.g., Ebola virus infection), and adenoviruses. Category B agents are given the second-highest priority for action because of their moderate ease of dissemination, moderate morbidity and low mortality, and requirements for enhanced, but not totally different, diagnostic and surveillance capabilities on the part of the CDC. Category B agents include brucellosis, epsilon toxin of *Clostridium perfringens*, food safety threats (e.g., salmonellosis, shigellosis, *E. coli*), glanders, melioidosis, psittacosis, Q fever, Ricin toxin, staphylococcal enterotoxin, typhus fever, viral encephalitis, and water safety threats (e.g., cholera). Category C agents are those assigned third-highest priority for preparation and consist of emerging pathogens, such as *Nipah* and hantaviruses, that could be readily available and easily produced and disseminated. Biologic agents have been identified as the most significant type of terrorist threat because of the small quantities needed to create extensive morbidity, their low cost, strategic impact, and insidious nature. Another factor in the significance of biologic agents is the existence of weak international controls on biologic materials and ease of access to them (Horton, 2003).

Chemical terrorism employs poisonous aerosols, vapors, liquids, or solids to damage people, plants, or animals (FEMA, 2006b). Types of chemical agents include nerve agents that affect central nervous system function, vesicants that cause chemical burns on epithelial membranes of the skin and respiratory tract, and pulmonary agents that cause pulmonary edema. Additional chemical agents include blood agents and cyanides and riot control agents such as tear gas, which can be toxic in large doses. The effects of chemical attacks are influenced by the duration of the hazard and the persistence of the chemical in the environment as well as the route of entry (e.g., respiratory tract versus skin) and the ambient temperature, which may increase the volatility of chemicals and enhance respiratory inhalation (Spanjaard & Khabib, 2003). Chemical releases may be either overt or covert. In an overt release the nature of the event reveals itself as intentional. A covert release may go unrecognized until large numbers of people have been affected (National Center for Environmental Health, 2003).

Explosive devices such as conventional bombs, nuclear weapons, and radiological dispersion devices may also be used for terrorist purposes. Nuclear weapons create intense heat and light as well as damaging pressure waves and widespread radioactivity. Nuclear blasts may also cause electromagnetic pulses (EMPs) that act like lightning to damage electrical devices. Although the level of electrical impulse generated is probably insufficient to harm most humans, EMPs can destroy computers, communication systems, appliances, and vehicle ignitions within 1,000 miles of a high-altitude nuclear detonation. They can also interfere with pacemaker conductivity (FEMA, 2006d). A radiological dispersion device (RDD) uses conventional explosives to disperse dangerous amounts of radioactive material. RDDs are also known as “dirty nukes” or “dirty bombs” (FEMA, 2006e; Sutton & Gould, 2003).

**CHARACTERISTICS OF DISASTERS**

Disasters vary with respect to a number of characteristics, including their frequency, predictability, preventability, imminence, and duration. Disasters also vary in terms of the extent of their effects.
Some disasters occur relatively frequently in certain parts of the world. Consequently, people in those areas have some knowledge of what to expect and what can be done to minimize the effects of the event. For example, earthquakes occur periodically in California, and residents in earthquake-prone areas are encouraged to be prepared in the event of a large quake. Similarly, hurricanes and other severe storms are frequently experienced during certain seasons in other parts of the country.

Some disaster events are predictable. In general, the probability of destructive tornadoes increases from April through June in the United States. Similarly, many rivers are known to flood periodically with heavy spring rains. Severe blizzards can also be predicted, allowing people to stockpile food supplies, medications, or fuel for heating in case they are isolated by the storm. Other events, such as a plane crash, a fire in a chemical plant, or a terrorist attack are not predictable.

Disasters also vary with respect to their imminence in terms of their speed of onset and may have a period of forewarning before striking. Some disasters provide evidence of their imminent occurrence and allow time for preparation prior to impact. For example, blizzards, hurricanes, and other severe storms can be tracked and their probable path determined. People along that path usually have sufficient warning to take preventive actions that minimize the potential for death and destruction. Other disasters such as fires and explosions occur instantaneously, with no prior warning. In some cases, the disaster event itself is of short duration, as in the case of an earthquake or a transportation disaster. At other times, the disaster event lasts some time. Examples of prolonged disasters are epidemics, famine, and war. Disasters such as hurricanes and blizzards have an intermediate duration.

Finally, disasters vary in terms of their impact and their destructive potential. Some disasters are fairly limited in scope, affecting a small geographic area or a relatively small number of people. For example, the effects of a mine cave-in are generally restricted to the area where the mine is located. The effects of war or famine, on the other hand, may be much broader-reaching. The extent of disaster effects will be discussed in more detail later in this chapter.

THE ROLE OF THE PUBLIC HEALTH SYSTEM IN A DISASTER
Disasters are events that have significant effects on the health of the public. It is not surprising, then, that the public health system should play a major role in planning for and responding to a wide variety of disaster occurrences. Public health systems have responsibilities before, during, and after a disaster event. Before a disaster, members of the public health care system should be involved in identifying disaster risks and populations particularly vulnerable to their effects. They should then educate those populations regarding disaster prevention and preparedness. In addition, they should cooperate with other agencies in the use of public health science to develop plans to prevent disasters when possible and to limit the morbidity and mortality of disasters that cannot be prevented. They can also assist in the identification of resources available for disaster response. This may include the recruitment and training of volunteer health professionals to deal with the potential health effects of a disaster. Finally, public health professionals, including community health nurses, can advocate for and help develop public policies that reduce the potential for and effects of disasters (Landesman, 2005). For example, they might advocate for building codes that create structures that will withstand major earthquakes, or brush removal ordinances in fire-prone areas.

During a disaster event, public health professionals will assess and communicate information regarding health-related effects to relevant government agencies. They would also coordinate the provision of needed emergency and routine health care immediately after the disaster. They would also advise and assist in the prevention of injury and promotion of food and water safety, vector control, and control of communicable diseases. They may also be involved in inspecting shelter sites for health risks (Landesman, 2005).

Following a disaster, public health professionals would be involved in assuring that follow-up care is available to disaster victims with continuing needs. They would also participate in a collaborative evaluation of the disaster response and subsequent redrafting of response plans for future disasters (Landesman, 2005).

The public health system also has a similar role in responding to the health consequences of terrorist activities. Responsibilities center on prevention, preparedness, and response (Levy & Sidel, 2003). Public health activities to prevent terrorism may include reducing access to biological agents. In addition, public health professionals should ensure that a balance is maintained between terrorism preparedness and addressing other public health issues and between preventing terrorism and protecting individual civil rights. Both of these latter responsibilities may require concerted advocacy initiatives on the part of public health professionals, particularly community health nurses. Several public health authorities have cautioned that preparedness, in particular, should not lead to inappropriate responses that infringe on civil rights or that draw resources from other elements of terrorism preparedness or other...
important public health initiatives (Berkowitz, 2002; Cohen, Gould, & Sidel, 2004; Levy & Sidel, 2003).

**ELEMENTS OF A DISASTER**

Disaster literature typically addresses three main elements of a disaster occurrence: the temporal element, the spatial element, and the role element. In this chapter, we will also address a fourth element, the effects element.

**The Temporal Element: Stages of Disaster Response**

Disaster experts characterize disasters as cyclic phenomena unfolding in five stages: the nondisaster or interdisaster stage, the predisaster stage, the impact stage, the emergency stage, and the recovery stage (Langan & James, 2005).

**The Nondisaster Stage**

The nondisaster stage, also referred to as the interdisaster phase, is the period of time before the threat of a disaster materializes. This period should be a time of planning and preparation. During this stage, communities should engage in such activities as identifying potential disaster risks and mapping their locations in the community. Vulnerability assessment and capability inventory are other features of this stage in which the community assesses the potential consequences of disasters likely to occur within the community and its ability to cope with these consequences. **Vulnerability assessment** involves predisaster identification of groups within the population who would be particularly vulnerable to the adverse effects of a disaster. Elderly persons are an example of a highly vulnerable population. The extent and location of vulnerable populations should be determined and plans made for meeting their unique needs in the event of a disaster. Capability inventory involves determination of the adaptive capacity of the community through inventory of resources that are likely to be needed in the event of specific types of disasters and their availability in the community.

During the nondisaster stage, the community should also engage in prevention, preparedness, and mitigation activities. **Mitigation** is action taken to prevent or reduce the harmful effects of a disaster on human health or property (Bissell et al., 2004). Mitigation is sometimes referred to as “hard” or “soft.” Hard mitigation involves construction of the built environment to withstand the force of natural hazards (Lichterman, 2000). Retrofitting or reinforcing major highway overpasses is an example of hard mitigation being used in California to prevent the collapse of highways and bridges in the event of an earthquake. Soft mitigation is intended to minimize the adverse effects of disasters that cannot be prevented, for example, developing communication strategies that enhance the capability of multunit response to major brush fires.

The final area of activity in the nondisaster planning period is the education of both professionals and the public regarding disaster prevention and preparation. Unfortunately, many communities deny the need for disaster planning when they are not faced with the direct threat of a disaster. Even when disaster planning occurs, if the plan is not widely disseminated, disaster response can be impeded.

**The Predisaster Stage**

The predisaster stage occurs when a disaster event is imminent but has not yet occurred. This stage may also be referred to as the warning or threat stage. Major activities during this stage are warning, preimpact mobilization, and, in some cases, evacuation. Warning involves apprizing members of the community of the imminence of a disaster event and of the actions that should be taken to minimize its consequences. For example, storm warnings are broadcast in many areas when there is potential for a severe storm, but people do not immediately go to a storm cellar or leave the area, because the possibility remains that the storm will bypass the area.

For recurrent disasters, such as hurricanes, warnings may occur in four stages (Holland, 2003). The first stage involves routine reminders of the upcoming hurricane (or tornado, fire, etc.) season and the need to take general precautions. The second stage is an early warning stage in which the public is notified of a possible threat. The third stage involves a direct warning of the likelihood of imminent disaster and danger. The fourth level of warning involves an ongoing update on the development of the disaster conditions and effects as they occur.

Just as communities may accept or deny the need for disaster planning, members of the community may respond positively or negatively to warnings of possible disasters. Several factors can influence a person’s response, including the source, content, and mechanism for warning, and individual perceptions and beliefs. Warning messages that are clear, practical, and relevant or that originate from credible sources are more likely to be acted on than vague or impractical warnings. Warnings need to specify the exact nature of the threat and provide specific recommendations for action. For example, vague warnings of the potential for additional terrorist activities following the September 11, 2001, attacks provided little direction for action. Specific guidelines on how to handle mail potentially contaminated with anthrax spores, on the other hand, were more effective in promoting action. Warnings should also contain sufficient information to allow people to decide on an appropriate course of action. It is sometimes erroneously believed that detailed information about a disaster will cause panic. In effect, failure to provide information usually leads to failure to act on warnings; providing information does not seem to contribute to panic among
individual citizens. On occasion, overwarning, particularly for predictable disasters such as hurricanes, has resulted in unnecessary activity and expense (Pielke, 2003).

Response to a warning is also affected by each individual’s perceptions about the possibility of disaster. These perceptions arise from past experiences with disaster, psychological traits, and sociocultural factors. For example, if people have previously been only on the fringes of a hurricane path, they may not perceive a hurricane as a very frightening event, and they may ignore storm warnings. Similarly, if the individual has a fatalistic attitude that one’s own actions will not make much difference in the outcome of an event, he or she might not act in response to warnings. Such an attitude may be the result of an individual personality trait or a sociocultural norm in the group.

Warning confirmation also influences the way people respond. Warnings tend to be believed if the source of the warning is official, if the probability of the event is increasing, and if one is in close geographic proximity to the area where the disaster is likely to occur. For example, people who live on a recognized geological fault line are more likely to take warnings about potential earthquakes seriously than those who do not live on a fault.

Belief also influences action with respect to warnings. Again, belief in the potential for disaster is enhanced if the source of the warning is an official agency and if that agency has credibility. For example, if there have been numerous false alarms in the past, people are less likely to pay attention to warnings. Belief is also enhanced if the medium of the warning is personal rather than impersonal. People are more likely to evacuate their homes if someone comes to their door to warn them than if they hear a warning on the radio. Previous experience also influences the likelihood of belief. If one has experienced the full force of a hurricane before, one is more likely to believe and act on a hurricane warning than would otherwise be the case.

The frequency with which the warning is received also influences belief, as do observable changes in the situation. For example, if people see evidence of flames on a nearby hill, they are more likely to believe in the imminence of danger posed by a brush fire. Perceived behavior of others can influence belief either positively or negatively. When others act in response to the warning, belief is enhanced. If others appear to be ignoring the warning, however, belief is less likely. Factors influencing responses to disaster warnings are summarized in Table 27-4.

Preimpact mobilization is action aimed at averting the disaster or minimizing its effects. Activities involved in this stage might include efforts to prevent the disaster or its effects, seeking shelter from the effects of the disaster, evacuating people from areas threatened by the disaster, and implementing plans to deal with the effects of a disaster. For example, in the threat of a flood, people may sandbag riverbanks to divert floodwaters from a town, or board up windows and tie down equipment when a hurricane is forecast. People may seek shelter from tornadoes or other storms by moving to a basement, a storm cellar, or an interior room of a house. Preimpact mobilization might also involve evacuating people from an area threatened by fire, radiation, or chemical leakage. Finally, the initial phases of a disaster response plan may be implemented. For example, off-duty health care personnel may be recalled to health facilities in preparation for treating anticipated casualties.

<p>| TABLE 27-4  Factors Influencing Response to Disaster Warnings |</p>
<table>
<thead>
<tr>
<th>Warning Feature</th>
<th>Influencing Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning message</td>
<td>Clarity</td>
</tr>
<tr>
<td></td>
<td>Practicality</td>
</tr>
<tr>
<td></td>
<td>Relevance</td>
</tr>
<tr>
<td></td>
<td>Informativeness</td>
</tr>
<tr>
<td>Individual</td>
<td>Past experience with disasters</td>
</tr>
<tr>
<td>perceptions</td>
<td>Psychological traits</td>
</tr>
<tr>
<td></td>
<td>Sociocultural attitudes</td>
</tr>
<tr>
<td>Warning</td>
<td>Official source</td>
</tr>
<tr>
<td>confirmation</td>
<td>Increasing evidence and probability of disaster</td>
</tr>
<tr>
<td></td>
<td>Geographic proximity to the expected disaster location</td>
</tr>
<tr>
<td>Beliefs</td>
<td>Credibility of warning sources</td>
</tr>
<tr>
<td></td>
<td>Personal rather than impersonal contact</td>
</tr>
<tr>
<td></td>
<td>Previous experience of disaster</td>
</tr>
<tr>
<td></td>
<td>Observable changes in the situation</td>
</tr>
<tr>
<td></td>
<td>Frequency of warning</td>
</tr>
<tr>
<td></td>
<td>Belief and action by others</td>
</tr>
</tbody>
</table>

Lasker (2004) reported a study of the American public that explored their potential response to two terrorist scenarios, smallpox dissemination and release of a “dirty bomb” with radioactive materials. Recommended actions in the scenarios were receipt of vaccination for smallpox at a public mass immunization site and staying indoors, respectively. Only two fifths of those surveyed reported they would comply with the smallpox recommendation, and three fifths would shelter in place. Reasons for intended noncompliance related to other priorities such as fear of exposure to smallpox in a public venue, fear of vaccine consequences, and concerns related to family members’ safety. Lack of trust in public officials also influenced intentions to comply with the recommendations. What are the implications of these findings for planning public health responses to these two possible terrorist activities? How might these findings be used to guide response planning? How might community health nurses be involved in research to determine public perspectives on disaster preparedness in a particular jurisdiction?
The Impact Stage
In the impact stage of a disaster, the disaster event has occurred and its immediate effects are experienced by the community. One major activity in this stage is the assessment of the impact of the disaster with an inventory of the immediate needs of the community. Inventory is a rapid assessment of the damage to buildings and the type and extent of injuries suffered. This information is used to determine actions needed in carrying out the efforts of the emergency stage.

The Emergency Stage
The focus of the emergency stage of a disaster is on saving lives through rescue efforts, first aid, and emergency treatment (Landesman, 2005). The emergency response to a disaster usually begins with community members because there has not been time for assistance to arrive from outside sources. If the community is geographically isolated or access to the community is impeded by the disaster, this isolation period will be prolonged. Later, relief assistance is provided from sources outside of the area affected by the disaster. The activities performed are essentially the same, although performed by different agents in the two phases, and include search and rescue operations, first aid, emergency medical assistance, establishment or restoration of modes of communication and transportation, surveillance for public health effects of the disaster (e.g., infectious diseases, mental health problems), and, in some cases, evacuation of community members from affected areas.

The Recovery Stage
In the recovery stage, the focus is on returning the community to equilibrium. This stage can be divided into substages of restoration and actual reconstruction and ends in reconstitution. Mitigation may also occur in the recovery stage with efforts to prevent a recurrence of a disaster or to enhance preparedness and response capabilities.

Restoration is the reestablishment of a basic way of life and occurs within the first 6 months of a disaster. Activities of this stage include returning to homes or seeking alternative shelter, removing debris, and replacing lost or damaged property. At the community level, restoration involves reestablishing community services that may have been disrupted by the disaster (Landesman, 2005). After a flood, for example, people may return to their homes, clean up the mud, and replace water-damaged furniture. Schools reopen, and residents return to work. If a prominent community official was killed in the flood, someone is appointed to fill that post until an election can be held.

Reconstruction involves the rebuilding and reordering of the physical and social environments (Landesman, 2005). Homes, schools, businesses, and other structures may need to be rebuilt. Dams or levees may be constructed to prevent future flooding. Reconstruction may also entail alterations in the social environment. For example, terrorist activity has led to enhanced security provisions in airports, at international borders, and even in educational institutions, which are now required to more closely account for the activities of foreign students.

Reunification is a special instance of reconstruction for refugee families who have often been separated during their travels in search of safety. Immigration restrictions in permanent host countries may result in lengthy separations of family members as portions of families migrate in sequence. Refugee literature has identified three stages of separation and reunification for families—before the separation, during separation, and afterwards—each of which creates an imbalance in family function and challenges families’ abilities to function effectively (Rousseau, Rufagari, Bagilishya, & Measham, 2004).

Reconstitution occurs when the life of the community has returned, as far as possible, to normal. This return to normal may take from several months to several years, depending on the degree of damage sustained in the disaster. It may take several years after a flood, for example, to restore the landscape of the community to its former state or to replenish the city treasury after disaster costs have depleted it. It may also take some time for individuals to adjust to the loss of loved ones or for the community government to be reconstituted. In extreme disasters, full reconstitution may never occur. For example, many people believe that life in the United States was completely changed by the terrorist attacks on September 11, 2001, and the full effects of that disaster are not yet known. The extent to which New Orleans will achieve full reconstitution following Hurricane Katrina may also be in question.

The final stage of recovery after a disaster is mitigation, which involves future-oriented activities to prevent subsequent disasters or to minimize their effects. For example, a community that has experienced a flood may take engineering action to prevent the likelihood of subsequent floods, or a community that was unprepared for disaster may develop a disaster response plan. Increased security measures and irradiating mail are other examples of efforts aimed at preventing subsequent terrorist activities and their effects. These activities cycle the community back into the nondisaster stage. Stages and related activities in the development of and response to a disaster are summarized in Table 27-5.

The Spatial Element
The spatial elements of a disaster refer to the extent of its effects on specific geographic regions. These regions include the area of total impact, the area of partial impact, and outside areas (Figure 27-1).
from the state governor. The governor may initiate for outside assistance. Local officials request assistance ment officials of the extent of the problem and the need for outside assistance. Local officials request assistance from the state governor. The governor may initiate further damage assessment or make an immediate request to the U.S. Department of Health and Human Services (USDHHS). The Secretary of Health and Human Services reviews the request and makes a recommend-ation for a presidential emergency disaster declaration. Once the President of the United States has made the official declaration, the USDHHS response plan is implemented and federal disaster assistance is provided to the local jurisdiction (FEMA, 2003).

Spatial elements of a disaster vary greatly from event to event. For example, the total and partial impact areas affected by a nuclear accident would be far larger than those affected by a fire at an industrial chemicals plant. The area from which assistance might be requested would also be larger given the greater magnitude of the problem, the number of victims involved, and the damage sustained.

Spatial elements of a potential disaster can also be explored prior to a disaster event. The World Health Organization (2004) suggested the creation of hazard maps to identify and locate potential disaster hazards in a country. At the community level, community risk maps and community resource maps are used to help delineate spatial dimensions in disaster planning. **Community risk maps** pinpoint the locations of disaster risks within the community. Risk maps also delineate probable areas of effect for different types of disasters. Figure 27-3 is an example of a community risk map. Two primary disaster risks are identified in the community risk map in the figure: a dam and reservoir that could result in flooding and a chemical manufacturing plant on the south side of the river. In addition, this community is in an area that experiences periodic tornadoes. The community risk map delineates the areas of the community likely to be affected by a flood (along the river) and a fire or explosion at the chemical plant. The area affected by a tornado would depend on where the tornado touched down. The map also indicates several pockets of particularly vulnerable populations in areas likely to be affected by disasters. These include residents of a nursing home, prison inmates, and schoolchildren in the vicinity of the chemical plant. These same groups, along with patients at the hospital at F and North River Streets and children in the school just north of the river, would be at risk in the event of a flood on the river.

**Community resource maps** indicate the locations of resources likely to be needed in the event of each of the types of disasters for which the community is at risk. Notations on a community resource map include, for example, potential shelter locations, designated command headquarters (and alternates if advisable), storage places for supplies, areas where heavy equipment is available, health care facilities, and proposed emergency morgue areas for the dead. Resource maps also indicate primary and alternate evacuation and transportation routes. Figure 27-4 is a sample resource map related to the community risks identified in Figure

<table>
<thead>
<tr>
<th>TABLE 27-5</th>
<th>Stages and Activities in Disaster Occurrence and Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disaster Stage</td>
<td>Related Activities</td>
</tr>
<tr>
<td>Nondisaster/interdisaster stage</td>
<td>Identification of potential disaster risks, Vulnerability analysis, Capability inventory, Prevention and mitigation, Response planning and plan dissemination, Stockpiling necessary supplies, Public and professional education</td>
</tr>
<tr>
<td>Predisaster stage</td>
<td>Warning, Preimpact mobilization, Evacuation</td>
</tr>
<tr>
<td>Impact stage</td>
<td>Damage inventory, Injury assessment</td>
</tr>
<tr>
<td>Emergency stage</td>
<td>Search and rescue, First aid, Emergency medical assistance, Restoration of communication and transportation, Public health surveillance, Further evacuation, as needed</td>
</tr>
<tr>
<td>Recovery stage</td>
<td>Restoration of functional capabilities, Reconstruction of physical and social environments, Reunification of families, Reconstitution, Mitigation of future disaster events</td>
</tr>
</tbody>
</table>

The area of total impact is the zone where the most severe effects of the disaster are found. In an earthquake, for example, this would include the area where the greatest damage to buildings has occurred and where the greatest number of injuries was sustained.

In the area of partial impact, evidence of the disaster can be seen but the effects are not of the magnitude of those in the total impact area. Using the earthquake example, windows may be broken or objects shaken from shelves in the partial impact area, but buildings are intact. Injuries, if any, are infrequent and relatively minor, or only telephone and electrical services might be disrupted in the partial impact area.

The outside area is not directly affected but may be a source of assistance in response to the disaster. Areas immediately adjacent to the disaster area are called on first to provide assistance, with further outlying areas being involved later as needed. In a major disaster, the federal government may be called on to provide assistance. This occurs once the area affected has been declared an official disaster area. Figure 27-2 depicts the process by which a presidential declaration of a major disaster or emergency is initiated and federal assistance is provided. As indicated in the figure, when a disaster occurs, local emergency personnel respond and assess the magnitude of the disaster. They inform local government officials of the extent of the problem and the need for outside assistance. Local officials request assistance from the state governor. The governor may initiate

Spatial elements of a disaster vary greatly from event to event. For example, the total and partial impact areas affected by a nuclear accident would be far larger than those affected by a fire at an industrial chemicals plant. The area from which assistance might be requested would also be larger given the greater magnitude of the problem, the number of victims involved, and the damage sustained.

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27-3. Looking at Figure 27-4, we see that city hall is adjacent to the river and likely to be affected by a flood. Therefore, the command headquarters has been situated at the television station in the northern part of town. It was believed that placement at the station would facilitate communication because of the equipment available there. A southern command post has also been established in the event that both bridges are impassable and response operations on the two sides of the river cannot be coordinated. Because of the potential for splitting the community and lack of access across the river, potential shelter sites have been established and supplies have been stored on both sides of the river. Health services are also available on both sides even if the hospital at F and North River Streets has to be evacuated due to flooding. Rescue operations for people stranded along the river would have to be handled from the north side of the river because that is where the boat docks are located. Personnel and supplies can be brought in from other towns in several different directions and could be brought directly to tent shelter sites if necessary. Only the road from Phildon is likely to be impassable if flooding reaches that far from the reservoir. Both the community risk and resource maps allow disaster planners to visualize what is likely to occur in a disaster event and to plan the most effective response to a disaster.

The Role Element

The third element of a disaster is its role element. Two basic roles for people involved in a disaster are victim and helper roles.

Six levels of disaster victims have been identified in the disaster literature (Taylor & Frazer, as identified in Langan & James, 2005). Primary victims are those who experience maximum exposure to the disaster event. Secondary victims are not themselves directly affected by the disaster but are indirectly affected as friends and family of primary victims. Third-level victims include first responders and health care personnel involved in rescue and recovery efforts. Fourth-level victims are other community members who offer help or share the grief and loss experienced by the primary victims. Fifth-level victims are those who are not directly affected by the disaster, but who suffer psychological upset as a result. Sixth-level victims are those who are indirectly or vicariously affected by the disaster. In the case of the terrorist attacks of September 11, 2001, those who died or...
were injured in the collapse of the World Trade Center towers and those who survived the collapse uninjured were the primary victims of the disaster. Their friends and family members and other close associates (e.g., colleagues of the fire and rescue personnel who died) were secondary victims. Rescue and health personnel who attempted to meet the needs of those trapped in the rubble or injured were third-level victims. Other residents of lower Manhattan or members of church congregations who lost members to the disaster are examples of fourth-level victims. Fifth-level victims included people who developed post-traumatic shock disorder as a result of watching the disaster on television as well as people whose existing mental health problems were exacerbated by news of the disaster. Finally, most Americans could be considered sixth-level victims in terms of the indirect effects on feelings of security and curtailment of individual rights. Members of ethnic minority groups who were accosted or threatened in retaliation for perceived responsibility for the attacks were a specific subcategory of sixth-level victims.

Refugees and internally displaced persons are special categories of primary victims of disasters. Internally displaced persons (IDPs) are those who are forced by the disaster to leave their homes but relocate in another part of their own country. Displacement may occur for a variety of reasons, including destruction of one’s home, temporary hazardous conditions, and war, and may persist for varying periods. New Orleans residents displaced by Hurricane Katrina in 2005 relocated at least temporarily in as many as 18 different states. Refugees are a subgroup of displaced persons defined as those who have fled their own country “because of fear of persecution due to their belonging to a particular social, political, or religious group” (Steele, Lemieux-Charles, Clark, & Glazier, 2002, p. 118). Another group of
displaced people are economic refugees, those who have fled due to poverty, famine, or natural disaster rather than war or persecution. Economic refugees are not recognized by the United Nations and are often not eligible for the kinds of assistance provided to designated refugee populations. Refugee populations are often at higher risk for multiple health, environmental, and social problems than the general public. For example, in one study of Cuban refugee children, 31% suffered some sort of infectious disease, and 23% had lead poisoning (Entzel, Fleming, Trepka, & Squicciarini, 2003). Similarly, among 200,000 refugees from Darfur, Sudan, relocated in refugee camps in Chad, only 39% had access to food assistance and fewer yet had access to clean water, sanitation, or health care services (Pinto et al., 2005). Many refugees have also been subjected to torture or other abuse. In one study, for example, the prevalence of torture experiences among Somali and Oromo refugees ranged from 25% to 69% among both men and women, and those who had experienced or witnessed torture were more likely than other refugees to experience PTSD and other mental health problems (Jaranson et al., 2004).

One of the ways in which the role aspect of a disaster influences disaster response lies in the actions taken by those affected by the disaster. As we will see later, disaster planning needs to take into consideration the likely response of people to the occurrence of a
disaster. Disaster planning can be completely ineffective if it fails to account for public response. As a case in point, a recent study was conducted to gauge potential public response to recommendations in two terrorist scenarios (Barclay, 2004). A sample of the U.S. public were asked if they would attend public immunization sites in the event of a smallpox epidemic or remain indoors as recommended with the detonation of a “dirty bomb.” Results indicated that only 40% of the public would go to a mass immunization site due to fears of being exposed to disease at the site or fear of adverse consequences from the vaccine. Similarly, only 60% indicated that they would remain indoors in the event of a dirty bomb, citing concerns about the safety of family members as a reason for leaving refuge (Lasker, 2004).

Clearly the activities of disaster victims, whether positive or negative, will influence the effectiveness of disaster response.

The second aspect of the role element of a disaster involves persons that play helper roles. As we saw earlier, helpers have been identified as one level of disaster victim, but their role in the disaster is a different one than that of primary victims. Helpers include designated rescue and recovery personnel as well as community members who help provide care or who assist in the provision of necessities such as food, shelter, and clothing. Victim and helper roles may overlap, and rescue and recovery personnel or other community helpers may themselves have suffered injury or loss as a result of the disaster.
Both victims and helpers are under stress as a result of the disaster. Stressors for victims may be quite obvious and include injury and the loss of loved ones or property. Additional stressors for helpers during the rescue and recovery periods include encounters with multiple deaths that are frequently of a shocking nature, experiencing the suffering of others, and role stress. Frequently, the overwhelming nature of role demands or needs for assistance by victims leads to feelings of helplessness and depression. Other sources of role stress include communication difficulties, inadequacies in terms of resources or staff, lack of access to people needing assistance or resources to help them, bureaucratic difficulties, exhaustion, uncertainties regarding role or authority, and intragroup or intergroup conflicts. Stress may also arise from conflicts between the demands of the helper’s family members and the needs of victims, and between the demands of one’s regular job and one’s disaster role.

The Effects Element
The final element of a disaster is the effects element. We have already discussed the geographic distribution of disaster effects in the spatial element of a disaster, but there are also various categories of effects that may result from disasters.

Many experts distinguish between primary or direct and secondary or indirect effects of disasters (Paul, 2005). Primary disaster effects are the immediate effects of the disaster event itself, such as the extent of death, injury, and destruction of property. Rapid-onset natural disasters, such as earthquakes, often have severe primary effects. Secondary disaster effects are those that occur indirectly as a result of the disaster. Examples include malnutrition due to disruption of food supplies, psychological problems such as post-traumatic stress disorder, and the disruption of the U.S. economy following the World Trade Center attack. Disaster effects may also be tangible or intangible. Tangible effects are usually those that can be measured in economic costs. Intangible effects are those that cannot be measured in terms of monetary losses, such as death and suffering (Paul, 2005).

Disasters also vary in terms of the severity of their effects. Some disasters cause moderate loss of life or property and result in only temporary inability to function, whereas others are devastating. The destructive potential of a nuclear explosion, for example, is far greater than that of a single plane crash.

Another way of categorizing the effects of disasters is into physical and mental health effects, economic effects, structural effects, and social effects. Physical health effects may arise as a direct result of the disaster itself (e.g., deaths or injuries) or as secondary effects (e.g., an epidemic of diarrheal disease among shelter residents). Mental health effects may be seen immediately after a disaster or surface days, weeks, or months later. Structural effects include homes, roads, and other structures destroyed by the disaster, and economic effects include the cost of rebuilding these structures as well as the economic costs of lost productivity, lost income, and care for disaster victims. Finally, social effects may occur that are either positive or negative. An example of a positive social effect might be an increased sense of community cohesion, whereas distrust and scapegoating of persons believed responsible for a disaster would be a negative effect. Change in the health care delivery system is another example of a social effect of a disaster. Each of these categories of disaster effects will be addressed in more detail in the discussion of disaster assessment later in this chapter.

COMMUNITY HEALTH NURSING AND DISASTER CARE
As public health professionals, community health nurses have a significant role to play in both disaster preparedness and response. Their involvement parallels the stages of the nursing process and involves collaboration in assessment, diagnosis, and disaster response planning, implementation, and evaluation.

Disaster-related Assessment
The assessment activities of community health nurses with respect to disaster care have two major aspects, the types of assessment conducted and specific assessment considerations.

Types of Assessment
Assessment with respect to disaster preparation and response occurs in two stages, before and after a disaster occurs. Community health nursing involvement in predisaster assessment involves assessing the potential for disaster and response capabilities within a specific community. Assessment during a disaster focuses on identification of disaster effects and related health needs.

ASSESSING DISASTER RISK AND CAPACITY Earlier we discussed the need to create community risk and resource maps. Because of familiarity with communities and their physical and social features, community health nurses are often in a prime position to identify potential disaster risks in a community. Not only are they aware of the types of industries in a community that may pose disaster hazards, but they may also recognize early signs of pending civil unrest among segments of the population that they serve. Identifying the potential for disaster in a particular community involves forecasting the types of disasters possible and the likelihood of their
occurrence. The possible types of disasters, of course, vary from community to community. Disaster potential and the probable effects can be systematically assessed by examining factors related to each of the six dimensions of health. The dimensions-of-health perspective can also be used to assess the effects of an actual disaster. Both of these aspects of disaster assessment are discussed below in the section on assessment considerations.

Assessment of response capability is another aspect of predisaster assessment. This is closely tied to an assessment of the degree of disaster preparedness in the community and community attitudes to disaster planning. The community health nurse should assess the attitudes of community members toward disaster preparedness. To what extent are individuals and families in the area prepared for potential disasters? Have families in an earthquake-prone region, for example, gathered supplies that will be needed in the event of an earthquake and placed them in an accessible location? Have emergency escape routes from homes, schools, and other buildings been identified? Have families discussed an emergency contact person who can relay messages for and about family members separated in a disaster? Or are these types of preparation largely ignored?

Community health nurses also have knowledge of resources that might be brought to bear in a disaster situation. For example, they may be aware of community residents who should be involved in disaster response planning, or they may have a better grasp of potential public response to proposed disaster response initiatives than others involved in disaster planning. Again, specific categories of response capability are addressed in the discussion of the dimensions of health as they result to a disaster presented below.

POSTDISASTER RAPID ASSESSMENT Following the occurrence of an actual disaster event, community health nurses will be actively involved in rapid assessment of disaster effects. Rapid assessment involves determination of the extent of damage caused by the disaster as well as the number of deaths, injuries, and/or illnesses resulting from the disaster. Community health nurses may be involved in identifying and reporting the extent of health-related disaster effects.

Assessment Considerations
Both risk and capacity assessment and assessment of the health-related effects of an actual disaster can be framed in terms of the dimensions of health as they influence a disaster situation.

BIOPHYSICAL CONSIDERATIONS One determinant in forecasting potential disasters is that of human biology. Certain groups of people are more likely than others to be affected by a disaster. For example, if the anticipated disaster is an epidemic of influenza, those most likely to be severely affected are the very young and the elderly; however, there also will be illness among the health care workforce that may impede efforts to halt the spread of disease. On the other hand, if there is potential for an explosion in a local chemical plant, those affected are likely to be company employees and persons in surrounding buildings. Again, this might include children if there is a school nearby. In disasters requiring evacuation, the elderly and disabled are at particular risk because of potential mobility limitations. The elderly and disabled are also the most likely groups to have necessary health care services disrupted and quality of life diminished by a disaster (Little et al., 2004).

Human biology is also a factor in predicting the types of effects expected as a result of the disaster. In the case of an influenza epidemic, illness potentially accompanied by dehydration and electrolyte imbalance may be expected. In an earthquake, many deaths result from injuries due to falling debris. Earthquakes may also result in a high incidence of crushing syndrome, a condition in which extensive injury to muscle tissue results in the release of endotoxins that lead to kidney failure (Doctors Without Borders, 2005b). In the classic 1906 San Francisco earthquake, however, the majority of damage was caused by the ensuing fires and rupture of city water mains (Rozario, 2005). Floods result primarily in drownings, but the floodwaters in New Orleans after Hurricane Katrina also led to clusters of diarrheal disease, wound infections, and skin infestations from working in contaminated water (Jablecki et al., 2005). Terrorist dissemination of anthrax spores, on the other hand, may result in cutaneous, inhalation, or intestinal forms of disease with related symptoms and complications (CDC, 2006).

The overall health status of the community also influences disaster planning requirements. For example, if hypertension is prevalent in the community, provisions need to be made in a disaster plan for ongoing
treatment of hypertension or other prevalent diseases. It has been suggested that people with disabilities and other complex chronic conditions establish “go packs” that can be ready in case of the need for evacuation. Go packs should contain essential medication for at least 7 days, easily accessible assistive devices (e.g., canes), food and water for guide animals, and emergency health information. People with chronic conditions should also know where to evacuate so their own particular needs can be met (Landesman, 2005). Among households in evacuation centers in San Antonio, Texas, after Hurricane Katrina, 42% had at least one family member with a chronic illness that required ongoing health care (Rogers et al., 2006).

Clients with conditions such as tuberculosis (TB) and HIV infection are in particular need of continuing therapy following a disaster, and response plans should include mechanisms for locating these clients and continuing their treatment. For example, 195 persons in the Alabama, Louisiana, and Mississippi counties most affected by Hurricane Katrina were on TB medications at the time of the disaster (Jablecki et al., 2005). In New Orleans alone, 130 clients were undergoing active TB therapy when Katrina struck. Within 6 weeks, concerted community health efforts had relocated all 130 people and enabled reintiation of treatment (DeGraw et al., 2006).

In the event of disaster, the community health nurse assesses the physiologic effects of the event on human biology. The most catastrophic effect of disasters is, of course, death. Disaster-related deaths may be of three types: direct deaths, indirect deaths, and disaster-related natural deaths (Jones et al., 2004). Direct deaths are those caused by the disaster itself. For example, fires directly cause death through burns and smoke inhalation. Indirect deaths are due to circumstances caused by the disaster. For example, starvation is indirectly attributable to drought and famine. Disaster-related natural deaths are the result of existing conditions that are exacerbated by the disaster. For example, a death due to myocardial infarction during a hurricane would most likely be a disaster-related naturally caused death. The terrorist attacks of September 11, 2001, actually led to development of a new category of mortality and morbidity in both the World Health Organization International Classification of Diseases, Tenth Revision (ICD-10) and the U.S. ICD-9, clinical modification to classify deaths and injuries related to terrorist activities (CDC, 2002).

The nurse appraises the extent of injuries incurred by victims and relief workers and may also assess other needs for health care. For example, the nurse might need to assess the health status of a disaster relief worker with diabetes or of a child with a fever. The nurse assists in assessing the health status of groups of people including both victims and rescue workers. For example, nearly a third of rescue workers and volunteers, including nonsmokers, exposed to the stress and environmental toxins caused by the World Trade Center collapse on September 11, 2001, had abnormal spirometry readings (Levin et al., 2004), and 21% of surviving New York fire and EMS personnel were treated for respiratory irritation (Banauch et al., 2002). Other people not immediately affected by the disaster may also develop disaster-related illnesses. For instance, 27% of adults in the general Manhattan population reported worsening asthma following the WTC attacks (Fagan, Galea, Ahern, Bonner, & Vlahov, 2002). Similarly, high school and college personnel within 5 miles of the WTC were significantly more likely than those further away to report eye, nose, and throat irritation (Bernard et al., 2002). Possible biophysical effects of several types of disasters are presented in Table 27-6.

### PSYCHOLOGICAL CONSIDERATIONS

Components of the psychological dimension can also influence the effects of a disaster on health. As noted earlier, a number of psychological factors can affect the way people respond to a warning of disaster. For example, interviews with people who escaped from the World Trade Center indicated that four factors influenced their decision to leave the building. These factors included a perceived ability to walk down multiple flights of stairs and prior experience in evacuating one of the towers, including knowledge of stairwell locations and where they led. A third factor that impeded the decision to evacuate was concern over leaving the work area without supervisory permission. Finally, dissemination of information on what was happening, what floors were affected, and what to do influenced decisions (Gershon, Hogan, Qureshi, & Doll, 2004).

Similarly, four factors have been identified that influence the psychological response of communities to disaster. The first factor is the occurrence of extreme and widespread property damage in the area affected, and the second is the realization of serious and ongoing economic problems in the community. A high incidence of deaths and traumatic injuries is another influencing factor, and the last factor is the perception of human carelessness or intent as the cause of the disaster (Patterson, 2005). For individuals, influencing factors include bereavement or injury to self or loved ones, threat to life, panic during the disaster, separation from family members (especially for children), extensive property loss, and relocation or displacement. The effects of these factors on psychological response to a disaster seem to be additive; the more factors experienced, the greater the likelihood of psychological problems arising after a disaster (Patterson, 2005). Generally speaking, communities and persons with good coping skills usually respond more effectively in a disaster situation than those who have poor coping skills.

As noted earlier, both victims and relief workers may experience stress related to a disaster, and the nurse should be alert to signs of emotional distress in both...
groups. The immediate response to a traumatic event is an attempt to answer five questions, the answers to each of which promote adaptation. The first question is “What happened?” Discussion of this question helps people to verbalize their experiences and discharge some of the fear and anxiety generated by their experience. The second question, “Why did it happen to me?” may assist survivors to find meaning in the event and to address perceptions of personal guilt. The question “What did I do during and right after the disaster?” helps people examine their own behavior and the circumstances and emotions that motivated that behavior. A fourth question, “Why have I acted as I have since the disaster?” may help people identify areas where help is needed to deal with the psychological effects of the disaster. Finally, an affirmative answer to the last question, “Will I be able to cope if it happens again?” helps to strengthen self-confidence and coping abilities (Figley & Figley, 2002).

Types of immediate psychological responses to disasters range along a continuum from calm, collected action to confusion and hysteria. Plans should be made for services to address each level of response. Health care providers should also keep in mind that psychological responses may change with time and with the progression of the disaster event. Psychological recovery occurs

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<table>
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<tr>
<th>TABLE 27-6</th>
<th>Potential Biophysical Effects of Selected Disasters</th>
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</thead>
<tbody>
<tr>
<td><strong>Type of Disaster</strong></td>
<td><strong>Potential Biophysical Effects</strong></td>
</tr>
<tr>
<td>All disasters</td>
<td>Greater loss of life and injury among the elderly, young children, and chronically ill and disabled persons</td>
</tr>
<tr>
<td>Avalanches</td>
<td>Asphyxiation, Frostbite and other effects of exposure to cold, Fractures or other forms of trauma</td>
</tr>
<tr>
<td>Bioterrorism</td>
<td>Widespread communicable disease, death, and disability</td>
</tr>
<tr>
<td>Chemical spills or chemical terrorism</td>
<td>Chemical burns of the skin, Respiratory irritation and illness, Poisoning, with a variety of symptoms depending on the chemical involved, Eye irritation</td>
</tr>
<tr>
<td>Earthquakes</td>
<td>Crushing injuries and fractures from falling bricks, masonry, and other objects; may also cause crushing syndrome, Burns suffered in fires and explosions due to ruptured natural gas mains, Waterborne diseases because of ruptured water mains and lack of safe drinking water, Electrocutions from fallen power lines</td>
</tr>
<tr>
<td>Epidemics</td>
<td>Communicable diseases with a variety of symptoms depending on the disease involved</td>
</tr>
<tr>
<td>Explosions</td>
<td>Burns due to associated fires, Fractures or crushing injuries due to explosion impact or falling masonry, bricks, and other debris</td>
</tr>
<tr>
<td>Famine</td>
<td>Developmental delay in young children, Failure to thrive in nursing infants because of inadequate lactation by mothers, Protein-energy malnutrition and other nutritional deficiencies</td>
</tr>
<tr>
<td>Fire</td>
<td>Minor to severe burns, Respiratory problems due to inhalation of smoke and hazardous fumes from burning objects</td>
</tr>
<tr>
<td>Floods</td>
<td>Drownings, Waterborne and insect-borne diseases from contaminated water supplies and insect breeding grounds</td>
</tr>
<tr>
<td>Nuclear attacks or radiation leakage</td>
<td>Radiation burns or radiation sickness, Later cancer, Later infertility, spontaneous abortion, or fetal defects</td>
</tr>
<tr>
<td>Storms</td>
<td>Crushing injuries due to windblown objects and debris, Minor to severe lacerations due to flying glass from broken windows</td>
</tr>
<tr>
<td>Transportation disasters</td>
<td>Crushing injuries and other trauma, Burns from associated vehicle fires, Drownings or asphyxiation if disasters occur over water or in tunnels, Exposure to the elements if disaster occurs in a remote area</td>
</tr>
<tr>
<td>Volcanic eruptions</td>
<td>Toxic gas or radiation exposure, respiratory or eye irritations</td>
</tr>
</tbody>
</table>
PHYSICAL ENVIRONMENTAL CONSIDERATIONS  Many disasters arise out of features of the physical environment. For example, the presence of a river near the community and the likelihood of heavy rainfall both contribute to the potential for flooding, as does the construction of homes and businesses on floodplains. A geological fault, a nuclear reactor, and a chemical plant are other examples of factors in the physical environment that may increase the potential for a disaster.

Elements of the physical dimension can either help or hinder efforts to control the effects of a disaster. For example, limited traffic access to the part of town where an explosives plant is located could hinder movement of emergency vehicles in the event of a fire or explosion. Similarly, the physical isolation of a mountain community may impede rescue efforts in the event of a forest fire or flood. For example, during the recent severe earthquake in India and Pakistan, many of the villages most seriously affected could only be reached on foot (Doctors Without Borders, 2005b). On the other hand, such isolation might spare the community from the effects of an epidemic in the surrounding area.

In conducting a community assessment, the community health nurse identifies physical environmental factors that might contribute to the occurrence of a disaster. The nurse also determines whether the community is prepared for potential disasters. When the community is not prepared, the nurse would advocate the community’s preparedness for potential disasters.

The nurse also identifies factors that might impede the community’s response in the event of a disaster. The nurse can then share these observations with others involved in disaster planning, and interventions to modify or circumvent these factors can be incorporated into the community’s disaster response plan. Unfortunately, many environmental factors, such as blocked escape routes, stairway congestion, and lack of familiarity with building layout, impeded effective evacuation of the WTC towers (Gershon et al., 2004).

Disasters may also contribute to a wide variety of environmental health hazards. For example, Hurricane Katrina gave rise to many wound infections with methicillin-resistant *Staphylococcus aureus* and other pathogens due to exposure to floodwaters (Engelthaler et al., 2005; Jablecki et al., 2005; Sniffen et al., 2005). Flooding may also contaminate drinking water supplies, whereas fires and explosions result in exposure to smoke and other air pollutants. Extensive growth of a variety of molds was another environmental result of the flooding in New Orleans during Hurricane Katrina, and the failure of residents and workers to use respiratory protection led to respiratory health issues (Ratard et al., 2006). Mosquito infestations were another result of the extensive flooding (McNeil et al., 2006). Community health nurses can be actively involved in educating the public to prevent health effects of environmental hazards arising from disasters.

Crowding and congregate living in shelters, as well as lack of access to adequate sanitary facilities and facilities for bathing, washing clothes and bedding, and washing dishes, may also contribute to health problems for survivors (Jablecki et al., 2005). Community health nurses can identify poor shelter conditions and assist in planning to improve environmental conditions in shelters and refugee camps.

Finally, community responses to disaster conditions may give rise to environmental conditions that imperil health. For example, power outages following several hurricanes led residents to use portable generators as a power source, contributing to deaths and illness related to carbon monoxide (CO) poisoning (Kay et al., 2006). After Hurricane Katrina, for instance,
51 cases of CO poisoning were reported in three affected states, all of which were related to use of portable generators or other gasoline-powered devices (Hampson et al., 2005). Many people connected portable generators to central electrical panels, not only creating the potential for CO poisoning but also placing utility personnel working on power lines at risk for electrocution (Tucker et al., 2006). Community health nurses can advocate for safe use of such equipment and help educate residents on the hazards of portable generators and their safe use based on the client education tips provided below.

**SOCIOCULTURAL CONSIDERATIONS** In assessing disaster potential, the community health nurse identifies social factors that might influence the way people respond to a disaster or even give rise to one. For example, the presence of racial tensions could trigger outbreaks of violence in some communities. War is another disaster arising out of social environmental conditions. For example, a report by Medact, the United Kingdom affiliate of the International Physicians for the Prevention of Nuclear War and the U.S. Physicians for Social Responsibility, estimated that the U.S. war in Iraq and the subsequent 3 months resulted in 48,000 to 260,000 deaths. They predicted that civil war in Iraq would result in another 20,000 directly caused deaths and an additional 200,000 postwar deaths due to indirect consequences. This number could rise to 3.9 million if nuclear weapons were used. In addition, war, like other disasters, has economic costs. The report estimated possible total U.S. costs of the war in Iraq at $150 to $200 billion dollars, more than $50 billion for the war itself and $5 to $20 billion each year for occupying forces (Salvage, 2002).

Terrorism, like war, arises out of sociocultural factors. Perceptions of the United States as arrogant, decadent, and indifferent to the plight of others fuel terrorist activity. Similarly, terrorism is often a strategy used by those who lack political or military power to address what they perceive as social wrongs. Poverty is another sociocultural factor that motivates terrorist activity, particularly in the face of affluence in other segments of society. Environmental justice issues, such as loss of biodiversity or perceived highjacking of natural resources without consideration for others who depend on them for their livelihood, also fuel terrorist initiatives (Easley & Allen, 2003). These and other politically motivated terrorists are generally motivated by a single issue, which if addressed may defuse terrorist activity (Simon, 2002).

Terrorism also has roots in religious beliefs and may surface in conflicts between religious groups at the national or international level or in the bombing of U.S. abortion clinics. It has been noted that religiously inspired terrorists may have fewer psychological constraints than others against killing or injuring large numbers of people (Simon, 2002). Concepts of national honor and shame may also motivate terrorist activity (Easley & Allen, 2003)—for example, in response to perceptions that adoption of Western values is corrupting women or youth. Ethnic/nationalist conflicts may have a religious component to them, but there is often a long history of intolerance of social and cultural differences outside of religious belief (Simon, 2002). Finally, terrorism may arise out of general Occidentalism, a rejection of all Western values (Easley & Allen, 2003).

Sociocultural factors may also contribute to the ability of terrorists to achieve their goals. Media attention to terrorist attacks, for example, provides perpetrators with the public attention to their position that they need. Some authors have described terrorism as a Western phenomenon dependent on a free press. Media coverage can be controlled in countries without a free press, thereby denying terrorists the showcase for their political ideology that is one of the major intents of terrorism (Brauer, 2002). The same may be true of media coverage of other disasters in what is termed disaster pornography, designed to promote giving or to highlight specific political perspectives (Martone, 2002). Treating disaster victims as individuals with dignity rather than as objects of disaster pornography is one of the tenets of the Code of Conduct for the International Red Cross and Red Crescent Movement and Non-Governmental Organizations, discussed on page 779.

Media coverage of disasters may also have beneficial effects. For example, news coverage of the September 11, 2001, attacks on the WTC and the Pentagon provided the comfort of familiar faces and an avenue to reduce public panic and provide information on what to do or not do. Media coverage also created a renewed connection between press and public when the press dropped its usual cynical stance and did not sensationalize or pursue reluctant victims for commentary. Finally, media coverage facilitated dialogue regarding Islam and may have prevented more scapegoating than actually occurred. One major disadvantage was that the
ETHICAL AWARENESS

The International Conference of the Red Cross and Red Crescent in 1995 adopted a Code of Conduct for the International Red Cross and Red Crescent Movement and Non-Governmental Organizations intended to guide international relief efforts (Hilhorst, 2005). Many organizations, however, have political objectives in addition to humanitarian aid purposes, leading to what has been called the "politicization of aid." Drafters of the Code of Conduct have argued that humanitarian organizations should maintain a strict policy of neutrality. The code consists of 10 articles that support four basic principles of humanitarian aid: humanity, impartiality, neutrality, and independence. The articles are as follows:

- The humanitarian imperative takes precedence over other objectives.
- Aid is provided without distinction with respect to race, creed, nationality, or other characteristics of recipients.
- Aid should not be used to promote a particular political or religious view.
- Humanitarian agencies should strive not to be used as instruments of government policy.
- Humanitarian agencies should respect the culture and customs of beneficiaries.
- Disaster response should be built on local capabilities.
- Program beneficiaries should be involved in the management of aid.
- Relief activities should reduce future vulnerabilities as well as meet basic needs.
- Aid agencies should be accountable to both recipients and donors.
- Information, publicity, and advertising activities should treat disaster victims with respect and dignity rather than as hopeless objects.


repeated airing of scenes of horror increased the psychological trauma of viewers (Nacos, 2002).

Other social purposes to be achieved by terrorism include establishing the legitimacy of the terrorist group with its target audiences, demonstrating weakness on the part of the victim nation or organization, creating fear, and possibly undermining civil liberties and creating domestic unrest (Nacos, 2002). Terrorism appears to occur in cycles that promote achievement of these purposes. Significant terrorist events result in increased security, which leads to a lull in activities. When attention wanes and security becomes less strict, terrorist activity increases (Brauer, 2002).

Other aspects of society may lend themselves to terrorism. For example, dependence on mass-produced foods makes the United States more vulnerable to agroterrorism. Widespread destruction of food crops or animals would have significant effects on the health of the population as well as on national economics. For example, in California alone, 89,000 farms and ranches, 10,000 food processors, and 200,000 retail facilities provide ample opportunity for contamination of food supplies (Little Hoover Commission, 2003). Similarly, disruptions in electrical power or telecommunications could bring much of everyday life to a halt. Access to the Internet and other technological advances also make information on weapons that can be used for terrorist activity readily available to the general public (Simon, 2002).

Elements of the sociocultural dimension also may increase or limit the effects of a disaster on a community. For example, the economic status of community members and of the community at large may limit the ability of people to prepare for potential disasters or to recover after a disaster event. Language barriers may hamper evacuation or rescue efforts. Strong social networks in the community that can be tied into disaster planning aid in effective disaster response, whereas intragroup friction hampers response effectiveness. The nurse identifies social and cultural factors present within the community that may decrease the effectiveness of the community’s response to a disaster and participates in planning efforts to modify these factors. The nurse also identifies social factors that enhance the community’s ability to respond effectively in the event of a disaster. Planning groups could then capitalize on these factors in designing an effective disaster plan. For example, well-established cooperative relationships between groups and agencies in the community are an asset in designing and implementing a disaster plan, whereas the presence of relatively isolated cultural groups may impede planning and response efforts.

Occupational factors are another element of the sociocultural dimension that contribute to the potential for disaster in a community and should be assessed by the nurse. Occupational disasters are events related to a particular business or industry in which more than five deaths occur. The community health nurse should be aware of industries in the area that pose hazards related to fire or explosion. The potential for radiation exposure or leakage of toxic chemicals in the community should also be determined. The nurse may also want to appraise the extent to which local industries adhere to safety regulations related to hazardous conditions. Community health nurses working in industrial settings would be particularly likely to have access to this type of information on weapons that can be used for terrorist activity readily available to the general public (Simon, 2002).

BUILDING OUR KNOWLEDGE BASE

Different cultural groups may have different perspectives on the need for and advisability of disaster preparedness as well as what constitutes effective preparedness. Cultural differences may also influence disaster response. How would you design a study to examine the cultural influences on disaster preparedness and response in your community? What would be the most appropriate approach to developing local knowledge on which to base community disaster planning? Whom would you ask to participate in your study and how would you obtain data?
CULTURAL COMPETENCE

You live and work in a highly ethnically diverse community in which residents come from multiple different cultural backgrounds and where 38 different languages are spoken. Major sources of disaster potential in the area include the possibility of earthquakes and brush fires. How would you design community notification systems related to evacuation in the event of a major fire, accounting for the language barriers to communication and the fatalistic attitudes of some cultural groups in the area?

of information. Other community health nurses may need to advocate regular inspection of industrial conditions by the appropriate authorities.

The community health nurse also identifies occupational factors that may enhance a community’s abilities to respond effectively in the event of a disaster. The nurse and others involved in disaster planning would explore the adequacy of rescue services and personnel for dealing with potential disasters. Is the number of firefighters in the community, for example, adequate to deal with an explosion and fire in a local chemical plant? Do fire-fighting units possess the equipment needed to deal with such an event? Planners also assess the existence of other occupational groups that may assist with disaster response. For example, are there construction companies in the community that could supply heavy equipment that might be needed for rescue operations?

In the event of an actual disaster, the nurse might also assess sociocultural factors influencing the community’s disaster response. For example, the nurse might identify growing intergroup tensions in shelters for disaster victims or disorganization in efforts to reunite families separated by the disaster. Other areas for consideration include the degree of cooperation among groups providing disaster relief and, following the disaster, the availability of recovery assistance to individuals and families. Failure of government agencies and other organizations to interact effectively may be a sociocultural factor that hampers adequate disaster response. For example, some authors have noted that lack of agreement over jurisdiction, absence of conflict resolution mechanisms, and difficulty integrating a response over several sectors of society hampered rescue efforts at the WTC on September 11, 2001 (Klitzman & Freudenberg, 2003). Similarly, lack of coordination between local, state, and federal agencies delayed control of the San Diego wildfires in 2003, resulting in increased loss of life and extensive property damage.

Another social response to disasters, particularly those caused by terrorist activities, may include anger and hostility toward groups deemed responsible for the disaster. These emotions may be demonstrated in prejudice, discrimination, and attacks on innocent parties believed to be related to the perpetrators. In a study conducted after the 2001 terrorist attacks in Washington, D.C., and New York, 29% of respondents favored establishing internment camps for legal immigrants from hostile nations (The Pew Research Center for the People and the Press, 2001). News media also reported a variety of unprovoked attacks against Muslims and other ethnic minority groups. Community health nurses may need to be involved in advocacy to prevent discrimination and violence against such groups.

Even well-intentioned social responses to disaster may have adverse effects. For example, food aid provided to countries experiencing famine may do as much harm as good. Famine has been described as “a disaster for the poor, but an opportunity for the rich” (Martone, 2002, p. 39). Potential negative effects of food aid include undermining the local economy and promoting black market sales of food goods. For example, in one instance an influx of food aid resulted in a 75% decrease in prices for locally grown produce. In addition, when food aid cuts into the revenue of profiteers, aid workers may be subjected to threats or violence. Other effects may include promoting rural to urban migration of people seeking relief assistance. Foreign aid may also create national dependency rather than promoting self-sufficiency. Misuse of supplies is also a problem. For example, people have eaten grain intended for planting that has been coated with pesticides, contributing to cases of poisoning. In addition, the costs and problems of shipping, storage, and dissemination of food supplies exhaust funds that could be used more effectively to promote local economies and infrastructures that prevent disaster. A balance of food and economic aid is recommended to promote the ability of developing countries to address their own needs while meeting the current survival needs (Martone, 2002).

Another element of assessment of sociocultural considerations in a disaster involves the social effects of the disaster for specific groups. For example, the effects of a disaster on family dynamics should be explored. Families most at risk for adverse consequences of disasters include the homeless, the poor, the elderly, single-parent families, and refugee families (Langan & James, 2005). Community health nurses can help identify families experiencing difficulties that are interfering with adequate family function and make referrals for assistance. They can also advocate for the availability of such assistance. Other sociocultural effects of disasters that are often overlooked in planning and response include the economic costs of business disruption (especially for small businesses) and the cost to individuals of resulting health and safety expenses (e.g., the expense of evacuation or preparation for a disaster) (Myers & White, 2003). Again, those with the fewest resources will have the most difficulty in adequately preparing for or responding to a disaster.
One particular social group that needs to be considered in disaster response planning is jail and prison inmates. Evacuation of these populations poses special considerations related to public safety and security. Correctional officials may need to be able to safely relocate major inmate populations to multiple locations. For example, during Hurricane Rita, more than 10,000 inmates needed to be evacuated from 10 Texas prisons. In addition to planning for evacuation and continued efforts to meet the survival and health needs of inmates, there is a need to consider the transfer of medical and other records (Murray, 2006).

Health responses to disaster effects may also have social consequences. For example, isolation of disaster victims with communicable diseases may be difficult when families already traumatized by loss are faced with further enforced separation to prevent the spread of disease (Palacio et al., 2005). Finally, assessment of sociocultural considerations in a disaster setting includes exploration of the availability and adequacy of basic social services. Areas to be addressed include the availability of shelter, transportation, financial assistance, communication networks, and other goods and services. For example, more than 726,000 people were without power following Hurricane Isabel in 2003, which affected their access to food, water, and medical care. Two days after the hurricane, 65% of households in affected areas were without power, 4% had no access to water, and 21% were without access to a working land or cellular telephone (Morrow et al., 2004). Similarly, 93% of homes in Charlotte County, Florida, were damaged by Hurricane Charley in 2004; 19% of homes in Desoto County were uninhabitable; and 54% of Desoto County homes were without adequate sanitation (Little et al., 2004). After Hurricane Katrina in 2005, 53% of households surveyed in Hancock County, Mississippi, had no telephone service; 37% had no working indoor toilet; 21.5% were without running water; and 26% had no access to transportation (McNeil et al., 2006). Community health nurses can help in the rapid assessment of postdisaster conditions, making referrals for assistance, and planning to assure that assistance is available to those in need.

**BEHAVIORAL CONSIDERATIONS** Behavioral factors related to consumption patterns and even leisure pursuits can influence the occurrence of disasters and their effects on the health of community members. Consumption patterns such as smoking, drinking, and drug use can contribute to disasters. Smoking, for example, is often the cause of residential fires and forest and brush fires that result in loss of life as well as extensive property damage. Drinking and drug abuse have both been known to contribute to transportation disasters, and they may also contribute to industrial disasters when the abuser is working in a setting with disaster potential. For example, if a person responsible for monitoring the safety of a nuclear reactor is intoxicated, he or she is unlikely to recognize or respond appropriately to signs of danger. The community health nurse assesses the extent of smoking and substance abuse in the community in relation to the potential for disaster. The nurse may also want to assess (or encourage others to assess) the effectiveness of substance abuse policies in transportation services and industries where there is potential for disaster. Another area for assessment is the extent of safety education in regard to smoking (e.g., not smoking in bed) that occurs in the community. Community health nursing advocacy may be needed to assure attention to these concerns.

Consumption patterns may also intensify the effects of a disaster on the health of a population. A community whose members are poorly nourished, for example, is at greater risk for consequences of disaster such as communicable diseases. Substance abuse may limit one’s potential for appropriate behavior in an emergency and lead to injury and even death due to failure to respond appropriately. For example, intoxication may prevent someone from fleeing a burning building.

Consumption patterns and their effects are particularly relevant in disasters involving famine and large displaced or refugee populations. Famine is a population-wide condition involving substantial mortality from malnutrition. Common nutritional effects of famine among refugee populations include protein-energy malnutrition (PEM), a severe state of undernutrition that may be either acute or chronic, and deficiencies of specific micronutrients such as vitamin A, iron, vitamin C, niacin, and thiamine. In some cases, famine is less a function of lack of food than of the inability of some segments of the population to afford what food is available (Martone, 2002). Technological advances that have resulted in new products to treat severe malnutrition at home rather than in in-patient settings have increased survival rates of malnourished children in Niger to 85% to 90% (Doctors Without Borders, 2005a). Those in need, however, must have access to this new therapy.

Lack of exercise in the population can limit the ability to engage in strenuous labor that might be demanded in a disaster situation. Unaccustomed activity may result in exhaustion or heart attack. The nurse assesses the levels of exercise engaged in by the general population. Community health nurses in occupational...
settings may also be responsible for determining the physical fitness of personnel who would be involved in rescue operations in the event of a disaster (e.g., firefighters).

The leisure pursuits of community members may, on occasion, contribute to the occurrence of a disaster event. Careless campers, for example, could ignite a forest fire, or skiers might trigger an avalanche. Fires can be started by sparks from recreational vehicles. The community health nurse and others involved in disaster planning assess the extent of such leisure pursuits in the community, the existence of safety regulations related to these pursuits, and the degree of adherence to safety regulations. Advocacy may also be required for the development or enforcement of such regulations.

Leisure pursuits can also enhance the community’s response to a disaster event, and the nurse assesses the presence of leisure pursuits that may have this effect. For example, the existence of a group with an interest in wilderness survival may be an advantage in the event of an avalanche or a plane crash in a remote area, or people with citizens-band radios may assist with communications in the event of an emergency.

Another behavioral consideration related to disasters is the extent of disaster preparedness among members of the population. For example, following Hurricane Katrina, 17% of households in Hancock County, Mississippi, did not have the recommended 3-day supply of food and water available (McNeil et al., 2006). Finally, disasters may affect consumption patterns other than dietary intake. For example, alcohol consumption among women, but not men, increased as a result of September 11, 2001, and the increase was further compounded by stress experienced by women in the work setting (Richman, Wislar, Flaherty, Fendrich, & Rospenda, 2004). In another study, 21% of people surveyed in Connecticut, New Jersey, and New York reported smoking more and 3% reported drinking more alcohol as a result of the attacks (Melnik et al., 2002). A similar study among New York City high school students found that increased smoking was not directly associated with the WTC attacks, but was associated with increased incidence of PTSD following the attacks (Wu et al., 2006). Drug and alcohol abuse may be seen as a means of coping with the negative psychological effects of a disaster.

HEALTH SYSTEM CONSIDERATIONS The adequacy of the health care system’s response capability in the event of a disaster influences the extent to which a disaster affects a community and the health of its members. Assessing the ability of the health care system to respond to a disaster includes examining facilities and personnel as well as the organizational framework in which they operate. A community that has a variety of health care facilities joined in a cooperative network can respond more effectively to the health care demands of a disaster situation than can a community with limited facilities or no existing system for coordinating efforts.

The nurse and other disaster response planners identify the types of health care facilities available in the community and the number and type of health care personnel that could be called on in the event of a disaster. Categories of health-related personnel included in federal disaster response planning include Disaster Medical Assistance Teams (DMATs), National Nurse Response Teams (NNRTs), National Pharmacy Response Teams (NPRTs), Veterinary Medical Assistance Teams (VMATs), and Disaster Mortuary Operational Response Teams (DMORTs) (Landesman, 2005).

Planners might also determine the existence and adequacy of disaster plans developed by health care facilities. For example, has a local hospital developed a plan for evacuating patients if the hospital is affected by the disaster? Is there a plan for handling mass casualties of various types in the event of a disaster? In one study by the National Association of County and City Health Officials (2001), only 20% of hospitals surveyed were prepared for bioterrorist attacks, 56% were developing response plans, and 24% were not prepared at
all. Similarly, 15% of countries responding to a 2001 survey indicated that they had bioterrorism response plans (Sandhu, Thomas, Nsubuga, & White, 2003). From 2001 to 2003, 100% of U.S. state health departments hired personnel specifically to develop surveillance for terrorist agents and infectious diseases, 98% had hired personnel to train public health workers regarding terrorist threats, and 91% were engaged in training health care providers (CDC, 2003). By 2004, however, only 38% of state and territorial health departments reported full or almost full capacity to deal with bioterrorism and emergency preparedness (Boulton, Abellera, Lemmings, & Robinson, 2005). A 2003 study of hospital preparedness indicated that 87% of metropolitan and 62% of nonmetropolitan hospitals had plans for dealing with major fires or explosions, but only 30% and 8% of the reporting hospitals conducted disaster drills related to their plans (National Center for Health Statistics, 2005).

Health care systems need to assess the likelihood of specific disasters in the area and prepare accordingly. As several authors have concluded, however, preventive measures for bioterrorist activities should be placed in priority with other existing public health needs and resources allocated based on those priorities (Geiger, 2003; Cohen, Gould, & Sidel, 2004; Sidel, Cohen, & Gould, 2001). For example, from 2002 to 2006, bioterrorism preparedness funding varied from $1.4 million to $1.7 million, averaging 22% of CDC’s entire annual budget, and some public health proponents have decried the use of these funds that could be better spent addressing health problems with a higher probability of affecting the health of the public, such as obesity (Dowling & Lipton, 2005). Others have made the point that one-time funding does not markedly increase the capability of the system for dealing with everyday emergencies, much less disasters, and does not address the ongoing training needs to prepare health care professionals to recognize health effects resulting from bioterrorist or chemical attacks or other disaster effects (Scipioni, 2002).

In 2000, CDC published guidelines for preparedness for and response to biological and chemical terrorism. Acts of chemical terrorism are likely to be overt because their effects tend to be immediate and obvious. Some chemical agents are capable of covert dissemination in food and water, however. Biological terrorism tends to be covert in that its effects are more insidious and occur over sometimes extended incubation periods.

The two main facets of state and local public health preparedness to be assessed by community health nurses and other disaster response planners are the existence of surveillance systems capable of identifying unusual disease patterns and the availability of expertise and resources needed to respond to chemical or biological terrorist attacks. Specific preparation for biological attacks includes:

- Enhancing surveillance and response capabilities
- Providing for diagnostic services
- Establishing effective communication systems
- Educating health care providers on recognition and treatment of diseases caused by bioterrorism
- Educating the general public
- Obtaining and storing needed drugs and vaccines
- Supporting development of diagnostic tests, vaccines, and appropriate treatments (Centers for Disease Control and Prevention Strategic Planning Workgroup, 2000)

These guidelines were expanded by the National Center for Infectious Diseases (2001) to encompass the specific roles of health care providers in the recognition, reporting, and treating of high-priority biological agents. Laboratory personnel are also advised to test findings on cultures that would normally be discarded as contaminants when they occur in suspicious circumstances (e.g., febrile illness in a previously healthy person) and to be alert to unusual clusters of laboratory results. Laboratory precautions for handling suspected contaminants are also addressed, and unusual specimens should be sent to specialty laboratories as appropriate.

State health departments are charged with reeducating health care providers to recognize unusual diseases. For example, many U.S. providers will never have seen a case of smallpox and will need to be reminded of typical signs and symptoms of this disease. State health departments also need to remind providers of reporting requirements and procedures, improve capacities for immediate response to suspected bioterrorism, investigate unusual illness clusters, and develop and implement plans for collecting and transporting specimens to appropriate laboratory facilities and reporting suspected release of biological agents to CDC.

Guidelines for public health agency preparation for chemical attacks have also been provided by CDC (Centers for Disease Control and Prevention Strategic Planning Workgroup, 2000). Public health responsibilities in this area include developing capabilities for detecting and responding to chemical attacks, educating first responders and health care personnel regarding chemical terrorism, and obtaining and storing supplies of chemical antidotes (Spanjaard & Khabib, 2003). Additional responsibilities include developing diagnostic processes for chemical injuries and educating the public about potential effects and actions to be taken in the case of chemical attacks. Community health nurses and others assessing disaster preparedness should determine the extent to which state and large local public health agencies (e.g., those in large metropolitan areas) are capable of carrying out these responsibilities.

Assessment of potential avenues for obtaining health care personnel is also important. For example, local professional organizations might serve as a means
of contacting and organizing health care providers, or area educational programs for health care professionals may provide a source of personnel. Retired or otherwise inactive nurses have been suggested as a group who could be trained to provide disaster response capabilities in addition to those of nurses and other health care professionals employed by health care agencies (Fothergill, Palumbo, Rambur, Reinier, & McIntosh, 2005). Prior to a disaster, training needs for health professional responses to disaster situations should be determined and appropriate education undertaken. Such training may include monitoring hazards, risks, resources, and capabilities; needs assessment; disaster management and coordination; information management; and the development of crisis response standards (WHO, 2004).

In the event of an actual disaster there is also a need to assess the effects of the disaster on the health care system and its ability to respond effectively. For example, are facilities badly damaged or unusable for other reasons? In some instances, health care facilities have collapsed in earthquakes or become inaccessible due to floodwaters or highway damage. After the 2004 tsunami, 80% of health care workers in Banda Aceh, one of the hardest hit areas, were killed, severely impairing the local response to disaster-related illness and injury (Joyce, 2005). Similarly, more than 6,000 physicians were displaced by Hurricane Katrina in 2005, many of them from the central areas of New Orleans. Losses included not only their homes and offices, but also their patient records (Arias, 2005).

Damage to the health system, as well as to other elements of the community infrastructure that permit access to health care services (e.g., roads, electricity, communication networks), can have negative consequences for the population’s health. For example, 2 weeks after Hurricane Katrina, 29% of people surveyed in Hancock County, Mississippi, were unable to get prescriptions refilled (McNeil et al., 2006). Disasters may also have long-term consequences for health care delivery systems. For example, Hurricane Floyd, which affected significant portions of North Carolina in 1999, led to subsequent increases of $13.3 million in Medicaid expenditures due to increased emergency department, outpatient, and pharmacy services (Domino, Fried, Moon, Olmick, & Yoon, 2003).

An example of an organized and systematic response to a national disaster can be seen in the response of the Thai Ministry of Health–US CDC Collaboration (2005) to the 2004 tsunami. The Ministry of Public Health mobilized 100 emergency clinical teams within 24 hours of the disaster. Less than a week after the tsunami struck, area hospitals’ caseloads had returned to normal and extra staff were allowed to return to their normal duties. In the 2 weeks following the disaster, response teams had treated 90,000 people. Rapid assessment and action to prevent spread of disease limited the incidence of diarrheal disease to 2,950 cases per 100,000 people, compared to 87,000 to 120,000 per 100,000 population in prior disasters (Thai Ministry of Health–US CDC Collaboration, 2005).

In part, the effectiveness of Thailand’s response lies in the development of a national preparedness plan. WHO (2004) has developed guidelines for preparedness plans for the national health sector. Based on these guidelines, such a plan would include the entire health sector, providing guidance for health sector involvement in disaster prevention, mitigation, preparedness, response, and recovery. Plans should also employ a multifaceted approach rather than having specific plans for specific types of disasters. Finally, the health care sector should collaborate and coordinate with other sectors in disaster response planning. Health sector disaster planning should include contingency planning, response drills, and simulations. As much as possible, plans should be standardized across organizations and agencies so that all hospitals are responding in similar ways, and so on. Planning should also include mechanisms for minimizing the effects of a disaster on health facilities (e.g., structural design, engineering controls) (WHO, 2004).

Questions for assessing disaster potential and the health-related effects of a disaster are included in the focused assessment provided on page 785. A complete assessment tool to guide assessment in disaster situations is included in the Community Assessment Reference Guide designed to accompany this textbook.

**Diagnostic Reasoning and Care of Clients in Disaster Settings**

Based on the assessment of biophysical, psychological, physical environmental, sociocultural, behavioral, and health system factors, the nurse derives nursing diagnoses related to disaster care. These diagnoses may reflect the potential for disaster occurrence, the adequacy of disaster preparation, or the extent of effects in an actual disaster. A diagnosis related to disaster forecasting is “potential for major earthquake damage and injury due to community location on a geological fault.” A diagnosis of “inadequate disaster planning due to fragmentation of planning efforts among community agencies” is a possible nursing diagnosis related to disaster preparedness. A diagnosis derived from information about the effects of an actual disaster is “need for additional shelter sites due to destruction of planned shelters by fire.”

In the event of an actual disaster, nursing diagnoses might relate to individual clients as well as to the status of the overall community. For example, individual diagnoses include “grief due to loss of husband” and “pain due to leg fracture suffered in building collapse.” Nurses may derive diagnoses related to disaster
FOCUSED ASSESSMENT

Disaster-related Assessment Considerations

Biophysical Considerations
- What is the age, gender, and ethnic composition of the population involved in the disaster? Are the effects of the disaster likely to be worse for some subgroups than others?
- What is the extent of injury or disease resulting from the disaster?
- What existing health problems are prevalent among those involved in the disaster?
- Are there pregnant women involved in the disaster?

Psychological Considerations
- How does the population respond to disaster warnings? What is the public’s attitude to disaster preparedness?
- What is the extent of community/individual ability to cope with the disaster?
- What is the extent of existing mental illness among those involved in the disaster?
- What is the extent of damage or loss of life involved in the disaster?
- Does the disaster present the potential for continuing damage or loss of life?
- What is the effect of the disaster on rescue workers? On victims?
- What are the long-term psychological effects of the disaster on the community?

Physical Environmental Considerations
- What physical features of the community create the potential for disaster? What types of disasters are likely to occur?
- What structures are likely to be threatened by a disaster? To what extent are vital structures likely to withstand a disaster?
- What structures could be used as emergency shelters?
- Will weather conditions influence the effects of the disaster?
- Are there elements of the physical environmental dimension that will hinder response to the disaster (e.g., blockage of roads)?
- Have buildings been structurally damaged? Is there potential for additional structural damage? Does structural damage pose further risk to victims? To rescuers?
- Is there a need for sources of shelter for persons displaced by the disaster?
- Is there a safe water source available to victims of the disaster?
- To what extent are animals involved in the disaster? What health effects might this have?

Sociocultural Considerations
- Do relationships in the community have the potential to create a disaster (e.g., civil strife, war)?
- How cohesive is the community? Are community members able to work together for disaster planning? What level of priority is given to disaster planning by official agencies? By private organizations and individuals?
- What provisions have been made for reuniting families separated by disaster?
- What is the extent of social support available to disaster victims?
- What is the extent of collaborative interaction among relief agencies involved in the disaster?

- Has the community disaster plan been communicated to residents? How are disaster warnings communicated to residents? Are there language barriers that impede communication in the disaster setting? What is the effect of disaster on normal channels of communication?
- What community groups are responsible for disaster planning? Who is available to provide leadership in responding to the disaster? What is the level of credibility of leaders among those affected by the disaster?
- What community industries pose disaster hazards? What type of hazards are present? To what extent do local industries adhere to safety procedures that would prevent a disaster? Is adherence monitored by regulatory bodies?
- What occupational groups in the community are available to respond to the disaster?
- What is the extent of property damage and loss resulting from the disaster?
- What is the economic status of those affected by disaster? Do they have economic resources available to them? What is the effect of the disaster on the local economy?
- What is the effect of the disaster on transportation?
- What is the effect of the disaster on community services? What community services are available to assist with recovery?
- Is equipment needed to deal with the disaster available and in good repair?

Behavioral Considerations
- To what extent do consumption patterns (e.g., drugs or alcohol) create the potential for disaster in the community?
- Do community members engage in leisure pursuits that pose a disaster hazard? To what extent do community members engage in recreational safety practices that can prevent disasters? What leisure pursuits by community members could enhance the community’s disaster response?
- What is the availability of food and water to disaster victims? To rescuers? Are there special dietary needs among those affected by the disaster? What provisions have been made to meet these needs?
- To what extent have psychological effects of the disaster increased the incidence or prevalence of substance abuse?

Health System Considerations
- How well prepared are health service agencies to respond to a disaster?
- What health care facilities are available to care for disaster victims? What are their capabilities? What health care personnel are available to meet health needs in a disaster? How can they best be mobilized?
- What is the extent of basic first aid and other health-related knowledge in the community?
- What is the effect of a disaster on health care facilities? On health care services?
- What physical and mental health care services are needed as a result of disaster? Are available services adequate to meet the need?
Community health nurses may also be involved in identifying and eliminating factors that may contribute to disasters to the extent that they identify these factors and report their existence to the appropriate authorities. For example, the community health nurse working in an occupational setting may note that an employee who is responsible for monitoring pressure levels in a boiler may be drinking heavily. This employee’s drinking problem may lead to lack of attention to rising pressures and an explosion and fire in the plant. In such a case, the nurse would call the employee’s drinking behavior to the attention of a supervisor.

Community health nurses may also become politically active to ensure that risk factors for potential disasters present in the community are eliminated or modified. For example, the nurse might campaign for stricter building codes or barriers such as sea walls or dams (Myers & White, 2003) or serve as a mediator in an attempt to defuse social unrest in the community. Community health nurses can also advocate for maintenance and repairs of structures to promote disaster resistance or the creation of surveillance systems to identify covert biological or chemical terrorism (Scipioni, 2002). There may also be a need for advocacy regarding identification of potential terrorist targets or for strategies to minimize terrorist resources (Brauer, 2002). For example, there may need to be stricter controls on access to agents that can be used for biological or chemical terrorism. Safeguards should be developed related to production, storage, transport, and use of such substances (Little Hoover Commission, 2003). International treaties and national regulation of the sale of weapons and the production, distribution, storage, and use of biological, chemical, and nuclear agents may also be of some help in preventing international terrorist activities (Levy & Sidel, 2003).

As a general policy, hazardous materials should be routed away from highly populated areas during transport, and employees who work with these materials should be educated on appropriate responses to leaks and spills. Preventive maintenance for equipment and vehicles used in transporting hazardous materials can also help to prevent accidental releases (Henry et al., 2005). Similarly, steps can be taken to minimize the risk of agroterrorism through research that increases biodiversity and crop resistance to biological agents and improved veterinary education to recognize unusual disease in animals (Cupp et al., 2004). Community health nurses can engage in political advocacy to promote these preventive interventions as appropriate.

Buildings can also be protected from biological and chemical attacks by increasing the difficulty of introducing agents through security measures for air intake grills and restricting access to building systems and design information. Similarly, development of effective filter capabilities and emergency response capabilities for building ventilation and water systems can help minimize dispersal of hazardous substances. Increasing the ability to prevent terrorist access through building security may also be warranted (National Institute for Occupational Safety and Health [NIOSH], 2002). NIOSH recommendations for protecting buildings from terrorist attacks are available at http://www.cdc.gov/niosh.

Immunization is another primary preventive measure for epidemics of communicable disease that might occur naturally or result from biological terrorism. Community health nurses can educate the public regarding routine immunization as well as immunization for selected bioterrorism agents. For example, the Advisory Committee on Immunization Practices (ACIP) has recommended preexposure vaccination for populations at risk for anthrax (ACIP, 2002). In 2003, smallpox vaccine was administered to more than 39,000 health care workers in preparation for a possible bioterrorist attack (Smallpox Vaccine Adverse Events Coordinators, 2003). Vaccines are also available for plague and tularemia, two of the other Category A biological agents (Nolte et al., 2004).

Community health nurses are often involved in educating the public about how to prevent disasters and minimize their consequences. This may involve planning education for individuals, families, or groups of clients on home safety practices to prevent fires and explosions, how to prepare for a possible community disaster, and what to do in the event of a disaster situation.

The nurse would plan to acquaint clients with whom he or she works with the types of disasters possible in their community and actions they can take to minimize the consequences should an emergency arise. The nurse can also guide clients to resources that help them prepare for the possibility of a disaster. A variety of government agencies publish literature containing...

**MINIMIZING DISASTER EFFECTS** Community health nurses can also assist in the development of community-as-resource strategies for disaster response. These strategies consist of a series of training programs for disaster preparedness at the individual, neighborhood, and advanced level. Individual-level programs focus on basic family preparedness, reduction of household hazards, preparation of family emergency kits and plans, and developing family notification systems. The second level involves training and development of neighborhood response teams to carry out immediate response activities. Advanced training prepares local residents to augment the efforts of public response personnel such as police and firefighters (Lichterman, 2000).

Community health nurses educate people to prevent problems after the occurrence of a disaster. As we saw earlier, nurses can educate people on the safe use of portable generators and can encourage the placement of CO monitors in all homes (Tucker et al., 2006). Public education with respect to response to nuclear or radiological attacks would include staying indoors, limiting consumption of milk and locally produced food, and use of potassium iodide prophylaxis following exposure (Sutton & Gould, 2003). Community health nurses may need to advocate for the availability of prophylactic antidotes for a variety of potentially hazardous substances depending on the disaster potential in the community.

Postdisaster primary prevention may also involve use of personal protective equipment (PPE) for those working in disaster-affected areas. For example, those working in floodwaters should wear heavy boots and other protective gear to avoid wound exposure to contaminated water (Engelthaler et al., 2005). PPE (e.g., respirators) should also be used in disasters such as fires and the collapse of buildings in which smoke and lingering particulate matter pose health hazards for rescue and clean-up workers. PPE should be standardized across agencies when possible, and all responders, including volunteers, should be adequately trained in its use (Prezant et al., 2002). Similarly, work to identify the dead poses risks for morgue personnel, who should use PPE during examinations and arrange for appropriate disposal of bodies and autopsy fluids and samples. In the wake of the December 2004 tsunami, for example, the bodies of people from more than 30 countries had to be identified, and many were buried or cremated without identification in affected countries such as India (Thai Ministry of Public Health, 2005).

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**CLIENT EDUCATION Disaster Preparedness**

- Install and maintain smoke detectors in homes.
- Bolt bookcases and cabinets to walls in areas with earthquake potential.
- Seek shelter in a reinforced area (e.g., a doorway) during an earthquake and face away from windows. Stay indoors.
- Seek shelter from hurricanes or tornadoes in basements or inner rooms without windows.
- Seek high ground in the event of a flood.
- Drop to the ground and roll about to extinguish flaming clothing, or smother flames with a rug.
- Close doors and windows to prevent the spread of a fire, and place wadded fabric beneath doors to prevent smoke inhalation.
- Determine avenues of escape from the home or other buildings.
- Install fire escape ladders as needed at upper windows.
- Keep stairways and doors free of obstacles to permit an easy way out.
- Identify a place for family members to meet after escape from the home.
- Designate a person living outside the area as a family contact if family members are separated during a disaster.
- Learn community disaster warning signals and their meaning.
- Keep a battery-operated radio and extra batteries available (replace batteries periodically).
- Collect and store, in an accessible location, sufficient emergency supplies for one week, including:
  - Nonperishable foods (including pet foods)
  - Drinking water
  - Warm clothing
  - Bedding (blankets or sleeping bags)
  - Tent or other type of shelter
  - Source of light (flashlights or lanterns)
  - Chlorine bleach for treating suspect water supplies to prevent infection
  - First-aid supplies and first-aid manual
  - Medications needed by family members
- Replace stored food, water, and medications periodically.
- Know where natural gas and water valves are located and how to turn them off. Attach a wrench close to valves.
- Determine what valuables are to be taken if evacuation is required.
- Assign activities related to evacuation (e.g., designate the person responsible for taking the baby or family pets).
- Know the general plan and designated routes for evacuating the community.
- Know where proposed shelters will be located.
- Know what actions should be taken when warning is given.
- Know where to seek additional information.
What factors might influence the extent of and elements included in disaster response planning in different countries? Explore disaster preparedness in another country. How does it differ from the elements of disaster preparedness recommended for the United States as presented in this chapter? What are some of the reasons for any differences found?

Postdisaster immunization campaigns (e.g., for hepatitis A, influenza, varicella) may be warranted in shelter settings depending on conditions such as crowding, poor sanitation, or contamination of food and water (Jablecki et al., 2005). The federal pandemic avian influenza response plan calls for mass immunization to prevent the spread of disease, once an effective vaccine has been developed (USDHHS, 2004). Vaccination may also be needed for autopsy workers and mortuary personnel and their families in the event of disease outbreaks with multiple deaths (Nolte et al., 2004). Community health nurses may be involved in the design of immunization campaigns and their implementation and in educating the public about the need for immunization. Table 27-7 presents some of the specific activities of community health nurses related to primary prevention in disaster settings.

**Secondary Prevention: Response Planning**

Secondary prevention involves the response to a disaster occurrence. Disaster response is based on disaster planning that occurs in the nondisaster stage. In discussing disaster response, we will address purposes and principles of disaster preparedness, general considerations in planning, and specific elements of a disaster response plan.

**PURPOSES OF DISASTER PREPAREDNESS**

Disaster preparedness has been defined by WHO as “the set of measures that ensure the organized mobilization of personnel, funds, equipment, and supplies within a safe environment for effective relief” (Bissell et al., 2004, p. 193). The general intent of disaster preparedness is to limit the morbidity and mortality resulting from a disaster and to decrease the population’s vulnerability to the effects of a disaster. A second general purpose of disaster planning is to ensure that resources are available for effective response in the event of a disaster. This aspect of planning involves determining procedures that will be employed in response to a disaster event and obtaining material and personnel that will be required to implement the disaster plan.

The Working Group on “Governance Dilemmas” in Bioterrorism Response (2004) has identified five objectives of response to bioterrorism that have relevance for other disasters as well. The first objective is to limit death and suffering through preventive, supportive, and curative care. The second objective is to maintain preparedness while defending civil liberties, using the least restrictive interventions possible. A third objective involves preserving economic stability. The fourth objective is not relevant to all disasters, but only to those caused by human error or intention, and deals with discouraging scapegoating and hate crimes. The final objective is to promote individual and community ability to rebound from a disaster while providing mental health support for those in need.

**TABLE 27-7 Primary Prevention Activities by Community Health Nurses in Disaster Settings**

<table>
<thead>
<tr>
<th>Primary Prevention Focus</th>
<th>Related Nursing Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disaster prevention</td>
<td>• Assist in the identification of disaster risks.</td>
</tr>
<tr>
<td></td>
<td>• Advise for the elimination or modification of disaster risks.</td>
</tr>
<tr>
<td></td>
<td>• Advocate for appropriate controls on the production, transport, storage, and use of hazardous materials.</td>
</tr>
<tr>
<td></td>
<td>• Advocate for measures to promote human dignity and prevent civil unrest.</td>
</tr>
<tr>
<td></td>
<td>• Advocate for effective building codes, maintenance, and security.</td>
</tr>
<tr>
<td></td>
<td>• Provide immunization services and educate the public on the need for immunization.</td>
</tr>
<tr>
<td>Minimizing disaster effects</td>
<td>• Educate the public regarding disaster preparedness.</td>
</tr>
<tr>
<td></td>
<td>• Educate responders on the use of PPE.</td>
</tr>
<tr>
<td></td>
<td>• Initiate postdisaster immunization campaigns and educate the public regarding the need for immunization.</td>
</tr>
<tr>
<td></td>
<td>• Educate the public to support “community-as-resource” strategies.</td>
</tr>
<tr>
<td></td>
<td>• Advocate for the availability and use of PPE by disaster responders.</td>
</tr>
</tbody>
</table>

**SECOND REVISED**
hazards (Landesman, 2005). The World Health Organization (2004) recommends an all-hazards approach as the most effective way to plan for disaster response. When separate plans exist for different types of disasters, there is potential for confusion regarding roles and responsibilities in any particular situation.

- Disaster plans should be based, as much as possible, on everyday working methods and procedures. This eliminates the need for personnel to learn new procedures and prevents confusion about which procedure is applicable in a given situation.

- Disaster plans should include provisions for extended authority. Time is often a critical factor in effective disaster response and decision latitude should be given to people at the lowest levels of organization to permit immediate response to situations when delaying for higher approval may be costly in terms of lives or property damage (Landesman, 2005; Langan & James, 2005).

- Response plans should be based on knowledge of how people generally behave in emergency situations or how they would behave in specific situations (e.g., in response to an epidemic or a fire) (Landesman, 2005). Unless response plans are developed from a public perspective, members of the target population are unlikely to comply with its provisions, leading to ineffective disaster response (Lasker, 2004). Plans also need to be adjusted to people’s needs and not vice versa. If a large portion of the population does not speak English, for example, it is unreasonable to issue disaster warnings only in English in the hope that someone will be available to translate the message.

- Disaster response should be locally focused, with support as needed from state and federal authorities (Landesman, 2005). As much as possible, communities should develop the capabilities to meet their own needs in the event of a disaster. This will prevent delays in response waiting for outside support. Depending on the extent of a particular disaster, federal and state resources may be stretched to the point that little is left to meet the needs of a specific community. For example, one of the reasons for the extensive damage in the 2003 San Diego wildfires was the fact that many local and state fire response units were already engaged in combating wildfires in another county. It may also be helpful to link the disaster plan for one area with those of surrounding areas to allow coordination of efforts in the face of widespread catastrophe. Conversely, when help is needed from surrounding areas, that help will better complement local efforts if plans are coordinated.

- Response plans should enlist the support and coordinate the efforts of the entire community. Major components of the community that would be involved in a disaster response should be involved in developing the response plan. Some of those that might be involved include police and fire departments, local governing bodies, major health care facilities, and large corporations. Predisaster incorporation of these sectors of the community limits confusion with respect to authority and direction for disaster-related activities and enhances the smooth operation of a disaster effort.

- Disaster plans should specify responsible persons by position or title rather than by name. This prevents a need to revise the plan when one person leaves and another takes over the position. For example, the plan may specify that the chief of police be notified of the emergency situation and put the disaster plan into effect. Then, whoever happens to be chief of police will know that it is his or her responsibility to mobilize personnel in the event of a disaster.

- Disaster response plans need to be acceptable to those who will implement them (Landesman, 2005). As is the case with the general public, compliance with elements of the plan can be undermined if the plan is not acceptable to those charged with its implementation.

- Disaster plans should include provisions for casualty distribution to prevent overloading certain health care facilities (Langan & James, 2005).

- Disaster response plans need to make provision for resource acquisition and management, including management of volunteers, donations, and crowd control as well as supplies and equipment (Langan & James, 2005).

- Response plans need to account for the mental as well as physical health needs of both victims and helpers (Langan & James, 2005).

- Disaster response plans must be widely disseminated to the general public and should be communicated by one or two trusted spokespersons (Langan & James, 2005).

- Finally, disaster response plans should be implemented in disaster drills to determine their potential effectiveness in real-life situations (Langan & James, 2005). Evaluations of drills should be used to revise the plan as needed before an actual disaster occurs.

Disaster preparedness, particularly as it relates to responses to bioterrorist threats, poses several challenges. These include preventing disaster (e.g., the spread of disease) without unduly infringing on individual freedom, supporting economic stability in the face of security controls that may disrupt commerce, supporting and restoring social bonds in the face of suspicion and uncertainty, and alerting the public to the occurrence of a crisis without creating fear and panic. Additional challenges include earning public confidence and support regarding the use of resources in responding to the disaster, maintaining credibility in situations in which information on which to base sound decisions is lacking, and promoting collaboration among multiple social sectors to promote effective response (Working
General Considerations in Disaster Response Planning

General considerations in planning the response to a disaster event include designating authority, developing communication mechanisms, providing transportation, and developing a record-keeping system.

Authority

An effective disaster response plan designates a central authority and delineates the responsibilities that are delegated to specific persons and organizations. For example, if it is clear that evacuation decisions are made by the mayor and implemented by members of a local military installation, while police have the responsibility for keeping roads open, there will be less confusion, and evacuation efforts will be carried out more smoothly. Central authority may be assigned to several people in a hierarchical order so that in the absence of the first person designated, the second person has authority to implement the plan. In this individual’s absence, a third person would assume that authority, and so on.

As we saw earlier, authority for on-the-spot decisions should be delegated to persons at the scene of a disaster to avoid time-consuming delays in response to an emergency situation. At the same time there needs to be a balance between immediate response and overall coordination of activities. Areas in which authority will be needed should be identified and responsibility designated. Gaps in authority should be prevented since this results in inability to engage in timely response. For example, one of the policies that prevented effective response to the San Diego wildfires in 2003 was the routine grounding of U.S. Forest Service helicopters half an hour before sundown. There was no one with local authority to invalidate this policy and allow at least one flight with fire retardant chemicals that could have helped contain the fires. Pilots of one helicopter that was already en route had to return to base even though they believed they could safely drop their load of chemicals before flight conditions became too dangerous.

Communication

Communication is critical to the effective implementation of a disaster response plan. Effective communication serves a number of purposes. First, it increases the likelihood of appropriate action by responders and the general public. Second, it reduces anxiety and unnecessary action by segments of the population that are not threatened by the disaster. Third, and most important, effective communication facilitates relief efforts (Wray, Kreuter, Jacobsen, Clements, & Evans, 2004).

Modes of communication should be established, and disaster personnel and the general public should be familiarized with them. Specific considerations in this area include how warnings of an imminent disaster will be communicated, how communication between various emergency teams and facilities will be handled, and how communication with the outside world will be facilitated. It is important to remember that normal means of communication may be disrupted during an emergency, and that there is a need for “redundant communication systems” using multiple modes of communication from and to multiple locations (Klitzman & Freudenberg, 2003).

Some consideration should also be given to facilitating communication among members of the community. For example, there may be a central bulletin board where messages can be left or a specific agency that is responsible for handling personal communications that permit family members separated by a disaster to locate each other. There should also be two-way communication between authorities and the public so disaster response best meets community needs (Klitzman & Freudenberg, 2003). This may be facilitated by emergency information systems that collect data about disaster effects during impact, response, and recovery phases (Landesman, 2005).

Disaster-related communication should be factual, positive, and reassuring whenever possible (Landesman, 2005), and should convey information about risks and recommended courses of action. Communication mechanisms and messages may need to be targeted to specific audiences, which may necessitate developing ongoing relationships with public media prior to a disaster. For example, ethnic radio and television stations can broadcast warnings and instructions in a variety of languages, but specific contacts should be established before a disaster event occurs. Development of media dissemination plans will support disaster-related communication with the public. Specific messages should be developed based on communication and behavioral theory to promote positive responses, and messages should be accurate, clear, consistent, and timely in their delivery (Wray et al., 2004). Another consideration is the need for interoperable communication systems between response agencies that interface well. In addition, plans should be made to accommodate communication between and among fixed and mobile locations. There is also a need...
for emergency alert systems that will be easily understood by the general public (e.g., the air raid sirens designed to warn of enemy attack in the 1940s and 1950s). Other aspects of communication include designating reporting sites for rescue and health care personnel and mechanisms for identifying who these people are. For example, color-coded vests might be used to distinguish health care providers from rescue workers (Langan & James, 2005).

Communication components of a disaster response plan should consider three possible scenarios and develop contingency plans for each. In the first scenario, normal communication channels remain intact and can be used for disaster response purposes. In the second scenario, some normal channels are intact, but others have been incapacitated. In the third scenario, there is little intact communications technology and other means of communication need to be employed.

Communication considerations in disaster response planning must also include dissemination of the plan to the general public, the scientific and professional community, and other stakeholders to permit them to take appropriate action regarding their own preparation for and response to a disaster. Again, these communications should be targeted to specific audiences and be delivered by trusted spokespersons. Spokespersons play specific roles in a disaster context (Hooke & Rogers, 2005). These roles include removing psychological barriers to action, promoting public support for appropriate public health response to disaster, building trust and credibility for response organizations, and ultimately motivating people to actions that will reduce disaster-related illness, injury, and death. Because of their credibility in the community, community health nurses may function in this role or may help to identify others who can serve as spokespersons for specific segments of the community. Community health nurses can also help to identify appropriate mechanisms for communicating with community members and in drafting meaningful messages.

A final, highly specialized consideration with respect to disaster communication is how notification regarding the death of a family member will be handled. Protocols should be developed regarding how significant others will be notified of deaths and may necessitate coordination with mental health personnel (Landesman, 2005).

**Transportation** General plans for the provision of necessary transportation must also be considered in disaster response planning. There will be a need to transport personnel and equipment to the disaster site as well as to transport victims away from the site. There will also be a need to move personnel to areas where they are most needed. Another consideration with respect to transportation is keeping access roads open so that emergency vehicles can pass. There is a need to provide alternate transportation routes, especially for evacuating people from a high-risk area, in case first-choice routes are blocked.

**Records** Records are needed prior to a disaster regarding the availability of supplies and equipment and areas where they are stored. This information should be updated on a regular basis, and a systematic process for its updating should be established. Local institutions such as schools and businesses should be encouraged to keep records of all those present at any given time so that everyone can be accounted for and those missing can be identified as early as possible. Institutional records may also include emergency contact and health-related information that will facilitate reunification of families or meeting ongoing health needs (Lewis & Bear, 2002).

During the disaster itself, a variety of other types of records are needed. Victims must be identified and their condition and treatment documented. Deaths should also be recorded. Records are also needed of the use of supplies and equipment so that additional materials can be obtained if required. Records of the deployment of rescue personnel are needed to ensure the most effective use of personnel. It would be difficult to develop systematic record-keeping systems during an actual disaster, so it is important that such systems be in place before a disaster occurs.

**ELEMENTS OF A DISASTER RESPONSE PLAN** A comprehensive disaster plan should address notification, warning, control, coordination, evacuation, and rescue. Additional elements of the plan should specify protocols for immediate care, supportive care, recovery, and evaluation. These last two elements will be discussed under tertiary prevention, and the others will be briefly examined here.

**Notification** An effective disaster response plan specifies in a systematic fashion the means of notifying the person or persons who can set the plan in motion. Persons who might be in a position to have advance warning of a disaster (e.g., local weather service personnel) should have a clear understanding of who should be apprised of the potential for disaster. There must also be specific plans for notifying personnel and organizations involved in the disaster response. Notification should always include the fact of occurrence of a disaster, the type of disaster involved, and the extent of damage as far as it is known at the time. Notification should also convey any other relevant information that is known about the situation.

**Warning** The disaster plan should also spell out the procedures for disseminating disaster warnings to the general public. Procedures should specify the content of warnings, who will issue the warnings, and the manner in which warnings will be communicated. For example,
the plan might specify that warnings include the type of disaster involved, the area affected, and specific directions on actions to be taken by community members. Warnings may be issued by local radio and TV stations and by police vehicles with loudspeakers, or sirens may be used to alert people if they have been informed beforehand of the meaning of the siren and where to turn for more information. If warnings are to be communicated by media personnel, the plan should specify contact persons at radio and TV stations. Plans for warning need to achieve a balance between waiting too long for appropriate action to be undertaken and overwarning that leads to unnecessary action (Landesman, 2005; Pielke, 2003).

Control

A disaster plan also specifies how the effects of a disaster are to be controlled. Different control efforts are required for different types of disasters, and a community should be prepared to implement a variety of control activities. In the case of an earthquake, for example, control measures are directed at preventing and extinguishing fires before further damage is caused. Again, the procedures, materials, and personnel needed to carry out control measures must be specified in the plan.

Logistical Coordination

Another element of a community disaster plan deals with logistical coordination. Logistical coordination is the coordination of attempts to procure, maintain, and transport needed materials. The disaster plan specifies where and how supplies and equipment will be obtained, where these will be stored, and how they will be transported to the disaster site. Traffic control is another aspect of logistical coordination. The disaster plan should specify personnel and procedures for controlling access to the disaster site. Traffic control procedures should also specify means by which access to the disaster site is ensured for rescue vehicles and vehicles carrying personnel, supplies, and equipment.

Evacuation

An effective disaster plan also specifies evacuation procedures. The plan should indicate how those to be evacuated will be notified, what they can take with them, and how the evacuation will be accomplished. The plan may need to specify several contingency evacuation procedures, depending on the type of disaster.

The disaster response plan also provides for the logistics of evacuation, including the personnel needed to carry out the evacuation, how they are to be recruited and assigned, and how they will be notified. The plan also specifies the forms of transportation to be used during evacuation, where appropriate vehicles can be obtained, and how they will be refueled.

Rescue

The response plan should specify the process to be used to assess rescue needs and who is responsible for carrying out the assessment. Once the assessment is made, procedures should be in place for obtaining the appropriate personnel and equipment. For example, in the event of an earthquake, heavy construction equipment and operators are needed, whereas fire department personnel are needed in a fire-related disaster.

The rescue operation should focus on removing victims from hazardous conditions and providing first aid as needed. Rescue chains are the logistical component of emergency health services and reflect plans for moving injured persons to appropriate health care facilities. Rescue personnel should refrain from providing other forms of care as much as possible. This care can be provided by others, thus freeing rescue personnel to carry out the rescue operation.

Immediate Care

Provision of immediate care is another consideration detailed in a disaster response plan. Immediate care is care required on the spot to ensure a disaster victim’s survival or a disaster worker’s continued ability to function. Plans for providing immediate care in four areas in the vicinity of the disaster site should be detailed in the disaster response plan (Figure 27-5). Immediate care begins at the actual site of the disaster, with a rapid initial assessment of all victims by the first health care provider on the scene. This phase of immediate care is geared to correcting any life-threatening problems.

The second area of immediate care is the triage area. Triage is the process of sorting casualties on the basis of urgency and their potential for survival to determine priorities for treatment, evacuation, and transportation. Triage decisions are intended to maximize the number of survivors of a disaster event. When victims are easily accessible, triage can take place at the site of the disaster. Victims are then removed to treatment areas based on their triage priority. In a disaster occurring in an enclosed environment (e.g., in a mine or in a building), victims may not be easily accessible and will probably need to be removed to a more distant triage area as they are found.

The triage process usually involves placing color-coded tags on victims. Typically, black tags are attached to victims who are already dead. Red tags indicate top priority and are attached to victims who have life-threatening injuries but who can be stabilized and who have a high probability of survival. Priority is automatically given to injured rescue workers, their family members, hysterical persons, and children. Yellow tags, indicating second priority, are assigned to victims who have injuries with systemic complications that are not yet life threatening and who are able to withstand a wait of 45 to 60 minutes for medical attention. Yellow tags are also assigned to victims with severe injuries who have a poor chance of survival. Green tags indicate victims
with local injuries without immediate systemic complications who can wait several hours for treatment.

The third area of immediate care at the disaster site is the treatment area to which victims are removed after triage. In this area, medical stabilization, temporary care, and emergency surgical stabilization are provided as needed. There may also be a need for psychological first aid at this point. The final area at the site of the disaster is the staging area. It is here that immediate care operations are coordinated and vehicles and personnel are directed to areas of greatest need. The disaster plan should specify the procedures for setting up and operating each of the four areas of immediate care. The plan should also address the supplies, equipment, and personnel needed in each area, how they will be obtained, and how they will be transported to the area.

Another aspect of immediate care that should be addressed in the disaster plan is care of the dead. Plans should be included for procedures to identify bodies and transport them to a morgue of some sort. Records of deaths should be kept, and procedures for rapid disposal of bodies should be specified should contagion be a problem. Plans should also include where and how body bags and identification tags will be obtained.

Plans should be made for casualty distribution and transport of persons with specific types of health problems to specific facilities (Langan & James, 2005). Casualty distribution plans prevent overloading health care facilities closest to the disaster, and may be based on the specific capabilities of certain health care facilities. For example, victims with severe burns may be sent directly to a facility with a burn unit, whereas physical trauma patients are taken to other facilities.

Supportive Care Supportive care is another component of an effective disaster response plan. Supportive care includes providing food, water, and shelter for victims and disaster relief workers. Other considerations in this area are sanitation and waste disposal, providing medications and routine health care, and reuniting families separated by the disaster.

Shelter is required for those who are evacuated from their homes or whose homes are damaged in the disaster. The disaster response plan should specify which community buildings can be used to shelter victims and how victims are to be transported to shelters. There may also be a need to use the homes of private citizens to shelter victims if public shelters are insufficient. When such is the case, the plan should specify how to notify concerned citizens of the need to place victims in their homes and how placement is to be handled. It is helpful to have a list of people willing to provide shelter to others should a disaster occur. In the case of large groups of displaced persons, refugee camps may be set up. Potential camp sites should be carefully selected in relation to possible physical hazards or water runoff.

Within the shelter, there is a need for supplies to sustain daily living. Shelters should have adequate sanitation and sleeping facilities. There should be plans for heating shelters and cooking food if area gas and electrical
power systems are disrupted. Mechanisms should also be specified for governance and security within the shelter, particularly if the shelter will be in use for some time. Shelter leaders can be appointed or elected, and persons within the shelter should have a means of providing input into governance in long-term shelter situations.

Food supplies should be planned and obtained prior to a disaster. There should also be a mechanism for obtaining more food and other supplies from outside the community in the event of damage to stores and stockpiled supplies. A source of clean water is needed, and the disaster plan should identify how and where water will be supplied. Equipment and supplies for water purification should be stored in case of need. Considerations that need to be addressed in planning to feed large groups, in addition to the availability of food supplies, include toilet and handwashing facilities, dishwashing facilities, waste storage and removal (both liquid and solid), cooking and refrigeration facilities, serving dishes and utensils, and food preparation personnel and equipment. Rodent control and food safety information for preparers are other elements of this part of the disaster response plan (Landesman, 2005).

Victims may have other health care needs unrelated to the disaster that need to be met, so plans for providing basic health care in shelters should also be specified. These plans should include stores of medications most likely to be needed by the general public and critical to survival. For example, diabetics will continue to need insulin or oral hypoglycemics, whereas individuals with heart conditions may need a variety of medications. Priority should be given to medications required for serious illnesses rather than for minor conditions. Because communicable diseases spread more rapidly in a debilitated population following a disaster, antibiotics and vaccines should be stored in case of need.

Actions to meet population health needs after a disaster are dependent on recognition of those needs. Such identification can occur through early warning systems or syndromic surveillance. Early warning systems are planned surveillance systems designed to alert health care personnel of potential large-scale health problems resulting from a disaster. For example, an effective early warning system would identify early cases of communicable disease in a refugee camp, permitting immunization or other control measures to prevent an epidemic. Local surveillance for cases of anthrax or smallpox is another example of an early warning system. The success of early warning systems is dependent on timely reporting and investigation of case reports of specific conditions, pattern recognition, and monitoring of new types of data that can suggest disease outbreaks (e.g., work absence patterns) (Buehler, Hopkins, Overhage, Sosin, & Tong, 2004).

Syndromic surveillance is a special form of early warning system in which data are collected regarding specific clusters of symptoms or syndromes from a variety of sources. Syndromic surveillance was employed in New York City following the WTC attacks to monitor potential bioterrorism. Syndromes for which incidence data were collected included gastrointestinal syndromes, respiratory syndromes, sepsis, rash, neurological syndromes, botulism-like weakness, and unexplained death with fever (Scipioni, 2002). In 2003, syndromic surveillance identified an outbreak of diarrheal disease from eating spoiled foods following a major power outage in New York City (Marx et al., 2006). Surveillance activities in the case of chemical releases or nuclear attacks may include environmental sampling (Sutton & Gould, 2003).

Specific screening activities may also be needed in a postdisaster situation. For example, TB screening may be warranted in extended shelter situations such as refugee camps. Similarly, screening for scabies or other infestations might be needed when outbreaks occur in sheltered populations. Screening may also be undertaken to identify people with mental health problems arising from the disaster.

Health care providers may need to be educated to recognize covert releases of biological or chemical agents. Covert releases are often difficult to recognize because initial symptoms of exposure might be mild or nonexistent or might be similar to those of other conditions. In addition, health care providers may not be familiar with symptoms of diseases or chemical exposures that are not often seen in their practice. Finally, cases of diseases may occur over a long period of time in various locations, making it difficult to identify any particular patterns (Patel et al., 2003). Epidemiologic cues that suggest covert chemical releases include an increase in the number of people presenting specific symptoms, unexplained deaths in healthy young people, clients emitting unusual odors, and clusters of illness in people that display common characteristics. Other potential signs of covert release include rapid onset of symptoms following exposure to potentially contaminated media, unexplained wildlife deaths, and symptoms suggestive of syndromes associated with chemical exposures (National Center for Environmental Health, 2003).

Secondary prevention will also include treatment for conditions identified. As noted earlier, antidotes for potential chemical and radiological agents should be readily available and providers should know how to administer them. Treatments for chemical exposures should be based on syndrome categories (e.g., respiratory effects) rather than on specific agents to minimize time spent in identifying specific agents (Patel et al., 2003). Appropriate treatment should also be provided for diseases caused by biological agents as well as for existing illness in the population affected by the disaster (e.g., hypertension, diabetes, HIV/AIDS, TB).

Supportive care also includes psychological counseling for those who are not coping adequately with the
situation. Counseling may be required by both victims and disaster workers, and plans should be made to provide crisis intervention services during the response stage of the disaster. Psychological support can be provided by comforting and consoling those in distress and by protecting them from the ongoing disaster threat. Disaster response plans should include mechanisms for identifying those in need of counseling and providing them with the services required. For example, following the World Trade Center and Pentagon terrorist attacks, an online self-assessment was established for identifying persons with severe depression related to the attacks (National Mental Health Association, 2001). In another study, 75% of people surveyed in New York, Connecticut, and New Jersey reported some emotional problems after the attacks. Unfortunately, only 12% of them reported receiving help (Melnik et al., 2002), in spite of programs like the Green Cross Project initiated in New York City to address psychological reactions to the attacks. The objectives of the project, which are relevant to psychological care in any disaster setting, were to provide immediate crisis-oriented services, create a referral network of providers, and educate care providers regarding “compassion fatigue” and the need to care for themselves as well as their clients (Figley & Figley, 2002).

Generally speaking, people pass through a series of phases in their psychological response to a disaster. The first phase occurs during disaster impact and is characterized by feelings of shock. This is followed by a period of defensive retreat and then by an acceptance of the reality of the event. Eventually, most people will enter a phase characterized by resolution, adaptation, and change (Langan & James, 2005). When people do not progress normally through these stages, they require supportive care.

Individual responses to a disaster occurrence and the need for care are influenced by a number of factors. These factors include one’s perception of the event, one’s physical and emotional status at the time of the event, and one’s general coping abilities. Other factors that may influence people’s response to a disaster include prior experience of similar situations and successful coping in those situations, the aspects of the situation itself, cultural influences, and the availability and response of one’s support network (Langan & James, 2005).

Elements of psychological intervention that should be incorporated into disaster response planning include mental health triage, emergency psychological first aid and crisis intervention, provisions for meeting physical health needs, and establishment of a calm, stable environment that provides a sense of safety and protection. Other considerations include interventions to assist people to develop feelings of belonging, connection, mastery, and empowerment (Langan & James, 2005).

Disaster victims may require goal orientation and guidance, and they can be directed to perform specific tasks that help them achieve a sense of control. Support is needed for those who must identify loved ones among the dead. Expression of feelings should be fostered, and victims should be encouraged to make use of available support networks. Immediate referral to mental health personnel may be required in some instances. Structuring the environment and regularizing schedules, particularly in shelters, can also help to reestablish a sense of security.

Some relief from psychological stress can frequently be obtained if victims can be assured that family members are safe. Disaster plans should therefore include mechanisms for locating people and reuniting families. Names of persons admitted to shelters or health care facilities should be recorded and communicated to a central location where others can check for word of loved ones. Deaths should also be reported if the dead can be identified, and information should be kept on the assignment of disaster workers to specific areas. It is helpful if institutions, such as schools and businesses, compile the names of those who were present prior to a disaster so that they can be accounted for afterward.

Aside from advocacy for and participation in the development of disaster response plans, community health nursing involvement in secondary prevention in disaster response lies primarily in the areas of immediate care and supportive care. Community health nurses may be involved in triage activities and immediate first aid for disaster victims or rescue workers. Community health nurses may also be responsible for shelter supervision and action to meet the supportive care needs of the population after a disaster. They will most likely be involved in assessing health care needs in shelters and addressing those needs directly or making referrals to needed physical and psychological health services. Community health nurses can also advocate for participation in shelter governance by those housed there and help to address areas of conflict among shelter residents.

Community health nurses will also be involved in surveillance activities, and, because of their interactions with disaster victims, may be among the first to recognize signs of disease outbreaks. They may also identify symptoms in the general population suggestive of covert biological or chemical terrorism. If specific screening activities are warranted in shelter situations, community health nurses will probably be involved in developing and implementing screening programs. Finally, community health nurses may be involved in educating the public and other health care providers regarding recognition and treatment of health conditions related to the disaster. Secondary prevention activities by community health nurses in disaster situations are presented in Table 27-8.
Community health nurses have responsibilities in both community recovery and prevention of subsequent disasters. Nurses may be called on to provide sustained care to both victims and disaster workers following the disaster. They may also be involved in identifying health and psychosocial problems that require further assistance. Community health nurses should plan to provide counseling or referral for persons with psychological problems stemming from their experiences during the disaster. There may also be a need to refer disaster victims to continuing sources of medical care. Community health nurses may also need to plan referrals for clients in need of social and financial assistance. For example, disaster victims may require help in finding housing or in getting financial aid to rebuild homes or businesses.

Community health nurses may also provide input into interventions designed to prevent future disasters or to minimize their effects. For example, if the disaster involved rioting by members of oppressed groups, the community health nurse might advocate measures to prevent further rioting; or the nurse might campaign for stronger building codes to prevent the collapse of buildings in subsequent earthquakes. Community health nurses can also help to educate the public on disaster preparedness to minimize the effects of subsequent disasters. A particular challenge following disasters resulting from terrorist activities involves protection of civil liberties while promoting national security (Geiger, 2003). Tertiary prevention foci in disaster settings and related community health nursing activities are summarized in Table 27-9.

### Implementing Disaster Care

Prior to the occurrence of a disaster, the community health nurse may be involved in activities preliminary to implementing a disaster plan, particularly in disseminating the plan to others. Dissemination needs to occur among persons and agencies who will have designated responsibilities during a disaster. Community health nurses participating in disaster planning are responsible for communicating elements of the plan to members of their employing agency. They may also ensure that the plan is disseminated to nursing organizations in the community.
area (e.g., to members of a district nurses’ association). The nurse who assumes this responsibility should be sure that the general plan, as well as the specific part to be played by members of the agency or organization, is understood.

The essential features of the community’s disaster response plan should also be communicated to the general public so residents will be prepared to follow the plan in the event of a disaster. The community health nurse may be involved in helping to communicate the plan to the public by apprising clients with whom he or she works of relevant aspects of the plan. The public should be alerted to mechanisms that will be used to inform them of a disaster and where to go for additional information. Community members should also know the general procedures to be followed in terms of caring for disaster victims and setting up shelters. They should also be informed of the locations of proposed shelters. Finally, community members should be told of specific disaster preparations that should be undertaken by individuals and families.

When a disaster occurs, community health nurses will be actively involved in implementing the disaster plan. Some of the activities involved in implementation were discussed earlier in the section on secondary prevention in the disaster setting.

Advocacy in Action

After Katrina
From September 1 to 5, 2005, 12 senior BSN students, three faculty members, and one graduate nurse had the unique opportunity to practice disaster nursing during one of the worst natural disasters of our time—Hurricane Katrina. The students themselves initiated the trip to Hattiesburg, Mississippi, with the goal of providing immediate care to the victims of Hurricane Katrina. Although Hattiesburg is located 65 miles inland, the winds from the category 4 hurricane caused tremendous damage to the community. Wesley Medical Center (WMC) in Hattiesburg was the only fully functioning hospital within 100 miles of the Gulf Coast, and was inundated by patients requiring medical attention. Upon arrival, we divided into teams, working in the emergency room, labor and delivery, and a medical-surgical unit. The ER was divided into a clinic and an acute side, which treated chainsaw injuries, gunshot wounds, seizures, and other emergent conditions. We took vital signs, acted as escorts, gave medications, assisted physicians and nurses, and consoled distraught patients. One student fed a patient who had waited hours for something to eat; another sat with a suicidal patient; others worked feverishly to save lives.

Not only did Hurricane Katrina bring death and destruction, she induced the arrival of new lives. In labor and delivery, we fed, rocked, changed, and bathed babies and cared for laboring mothers. During deliveries, we assisted the nurses to calm anxious mothers and families. In what would normally be a joyous occasion, fear and worry remained constant emotions. One new mother had her older child staying in the room with her, as there was nowhere else for the child to go. Fourteen babies in the nursery were transported from the neo-natal intensive care unit across town when its generators failed. Those precious babies fighting for survival stole our hearts.

On the medical-surgical unit, many of the adults were evacuees from a hospital in Slidell, Louisiana. Most of the patients had not heard from family members and did not know whether their homes were still standing. We performed assessments, gave medications, started intravenous lines, and admitted and discharged patients. We also spent a great deal of time just listening to the concerns of those under our care. The atmosphere at WMC was not that of a usual hospital setting: the hospital was in lockdown, with the only entrance/exit through the emergency room, and was guarded at all times. People lined up for hours outside waiting to get in out of the heat, or to get food or water. We, as well as health care workers from other facilities, were housed in the hospital’s Wellness Center, sleeping on the gymnasium floor and taking 3-minute showers to conserve water.

Our stay at WMC lasted only 5 days, but in those 5 days we were able to meet needs that would have gone unmet if we had not been there. Troy University students and faculty worked in the hospital around the clock for the duration of the visit, donating approximately 800 hours of labor. Our patients were very grateful for the care they received, and we were grateful for the experience of advocating for individuals, families, and groups of people caught in an unimaginable situation. Many tears were shed as we left the patients, staff, and place we had grown to love during our stay. It was an honor to practice the nursing art of advocacy in its truest form, and under such deserving conditions.

Amy Spurlock, RN, PhD
Troy University School of Nursing
Evaluating Disaster Care

The final responsibility of community health nurses with respect to disaster care is evaluating that care. Nurses and others involved in the disaster participate in evaluative activities outlined in the disaster plan. Evaluation focuses on the adequacy of the plan for curtailing the disaster and meeting the needs of those involved in it. Evaluation of disaster response is sometimes referred to as “after-action analysis” (Scipioni, 2002).

In this effort it may be helpful to examine the disaster response in light of the six dimensions of health. Did the plan adequately provide for the needs of the people affected and the kinds of health problems that resulted? Did physical environmental, psychological, or sociocultural dimension factors impede implementation of the plan or limit its effectiveness? What influence did behavioral factors have on plan implementation, if any? Were health care services adequate to meet the health needs posed by the disaster itself as well as those encountered in the period after the disaster? Data obtained in the evaluative process are used to assess the adequacy of the community disaster plan and to guide revisions of the plan to better deal with future disasters.

The effectiveness of care provided to individual disaster victims should also be assessed. Evaluation in this area focuses on the degree to which individual needs were met and the extent to which problems resulting from the disaster were resolved.

Two specific sets of guidelines that may be used to evaluate the effectiveness of disaster response planning are the United Nations (UN) High Commissioner for Refugees’ Handbook for Emergencies (2000) and the Sphere Project’s Humanitarian Charter and Minimum Standards in Disaster Response (2004). The UN document addresses areas for emergency response related to emergency management, contingency planning, initial assessment and immediate response, operations planning, coordination and organization, and external relations. The guidelines also address provision of food, water, health care, and sanitation services; supplies and transport; voluntary repatriation of displaced persons; and commodity distribution systems for food relief. These guidelines are available from the High Commissioner for Refugees’ Web site at http://www.unhcr.org/cgi-bin/texis/vtx/publ/opendoc/pdf?tbl=PUBLIC&id=3bb26a26b.

The Sphere Project (2004), a group of humanitarian nongovernmental agencies and Red Cross and Red Crescent Societies, has also developed a handbook to address international disaster response. The handbook incorporates eight standards and related key indicators that can be used to evaluate the effectiveness of disaster response. Guidance notes, points to consider in applying the standards, are also included. The Sphere Project standards and related considerations are presented in Table 27-10. The full standards document can be obtained from the project Web site at http://www.sphereproject.org/handbook/hdbkhtm/hdbkhtml. Either set of standards or a combination of both can be used to evaluate the effectiveness of disaster response. Community health nurses would participate in using the standards to engage in action analysis related to a particular disaster. In addition, community health nurses would advocate for the evaluation of disaster services from the perspective of service recipients (Rutta et al., 2005). One further consideration in disaster evaluation is the cost of the disaster response and mechanisms to decrease the cost of future responses (Landesman, 2005).

Although disasters occur infrequently in community health practice, community health nurses should be prepared to respond effectively when they do occur. They should also be instrumental in assuring that individual clients and families, as well as communities, are prepared to respond effectively in the event of a disaster.

### Table 27-10 The Sphere Project Standards and Related Considerations

<table>
<thead>
<tr>
<th>Standard</th>
<th>Related Considerations</th>
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<tbody>
<tr>
<td>Participation</td>
<td>Beneficiary populations should participate in the assessment, design, implementation, monitoring, and evaluation of assistance programs.</td>
</tr>
<tr>
<td>Assessment</td>
<td>Assessment is required to provide an understanding of the situation and resulting threats to life and health; assessment helps determine whether or not outside aid is needed; assessment addresses all areas of need (e.g., water, food, sanitation, security, etc.); assessment data should be disaggregated by subgroup if possible.</td>
</tr>
<tr>
<td>Response</td>
<td>Outside response is required when local authorities are unable or unwilling to respond to the needs of the population.</td>
</tr>
<tr>
<td>Targeting</td>
<td>Aid should be targeted to all those in need and delivered equitably and impartially.</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Program effectiveness and changes in situation are monitored to facilitate program changes or discontinuation as needed.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>There is a need for systematic and impartial evaluation of aid programs.</td>
</tr>
<tr>
<td>Aid worker competencies and responsibilities</td>
<td>Relief workers should have the necessary qualifications, attitudes, and experience for working in the situation.</td>
</tr>
<tr>
<td>Personnel supervision, management, and support</td>
<td>Workers are effectively supervised and supported.</td>
</tr>
</tbody>
</table>

Case Study

Nursing in the Disaster Setting

Two commuter trains have collided in a tunnel at rush hour. Both trains derailed and one of them struck the side of the tunnel, causing it to collapse on two of the derailed cars. There were approximately 300 passengers on the two trains, and 50 or more people are trapped in the two buried cars. The accident occurred approximately one-quarter mile from the west end of the tunnel and two miles from the east end. The largest portions of both trains lie on the west side of the collapsed portion of the tunnel.

One of the passengers is a community health nurse. The nurse was not injured in the accident and was able to get out of the wreckage to the west end of the tunnel, where most of the survivors are gathered.

1. What are the biophysical, psychological, physical environmental, sociocultural, behavioral, and health system factors that may be influencing this disaster situation?
2. What role functions might the community health nurse carry out in this situation?
3. What primary, secondary, and tertiary preventive activities might be appropriate in this situation? Why?

Test Your Understanding

1. In what ways do disaster events vary? What are the implications of these variations for disaster preparedness? (pp. 763–764)
2. What are the four elements of a disaster? How does each influence disaster response? (pp. 765–773)
3. What are the purposes of disaster preparedness? (p. 788)
4. How might biophysical, psychological, physical environmental, sociocultural, behavioral, and health system considerations influence a disaster or a community's response to a disaster? (pp. 774–784, 785)
5. What are the principles of community disaster preparedness? (pp. 788–789)
6. What are the elements of an effective disaster plan? (pp. 791–795)
7. What is the role of the community health nurse in primary, secondary, and tertiary prevention related to disaster situations? (pp. 786–796)

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Resources for this chapter can be found on the Companion Website.

Audio Glossary
Exam Review Questions
Case Study: Disaster Care

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Advocacy Interviews

References


