CHAPTER 7.
EPIDEMIOLOGIC SURVEILLANCE AND DISEASE CONTROL

RISK OF OUTBREAKS FOLLOWING DISASTERS

Natural disasters may increase the risk of preventable diseases due to adverse changes in the following areas:

1. **Population density.** Closer human contact in itself increases the potential spread of airborne diseases. This accounts in part for the reported increases in acute respiratory infections following disasters. In addition, available sanitation services are often inadequate to cope with sudden increases in populations.
2. **Population displacement.** The movement of disaster victims may lead to the introduction of communicable diseases to which either the migrant or indigenous populations are susceptible.
3. **Disruption and contamination of water supply and sanitation services.** Existing water supply and sewerage systems and power systems are particularly vulnerable, and may be damaged by natural disasters. In the aftermath of the 1985 earthquake in Mexico City, for example, millions of inhabitants remained without a piped water supply for as long as several weeks. Drinking water is prone to contamination caused by breaks in sewage lines and the presence of animal cadavers in water sources.
4. **Disruption of public health programs.** After a disaster, personnel and funds are usually diverted to relief. If public health programs (e.g., vector control programs or vaccination programs) are not maintained or restored as soon as possible, communicable disease transmission may increase in the unprotected population.
5. **Ecological changes that favor breeding of vectors.** Unusual periods of rain, with or without flooding, are likely to affect the vector population density. This may involve an increase in mosquito breeding sites or the introduction of rodents to flooded areas. This will be discussed in Chapter 8.
6. **Displacement of domestic and wild animals.** As with human populations, animal populations are often displaced as a result of natural disasters, carrying with them zoonoses that can be transmitted to humans as well as to other animals.
7. **Provision of emergency food, water, and shelter in disaster situations.** The basic needs of the population are often provided from new or different sources.

It is important to ensure that these new methods are safe and that they themselves are not the source of infectious disease.

Outbreaks of gastroenteritis, which are the most frequently reported diseases in the post-disaster period, are closely related to the first three factors mentioned above. Increased incidence (or at least increased reporting) of acute respiratory infections is also common in displaced populations. Vector-borne diseases will not appear immediately but may take several months to reach epidemic levels. It should be noted that humanitarian workers are at risk following sudden-impact natural disasters as well as the disaster victims.

The principles of preventing and controlling communicable diseases after a disaster are to:

- Implement as soon as possible all public health measures to reduce the risk of disease transmission;
- Organize a reliable disease reporting system to identify outbreaks and to promptly initiate control measures;
- Investigate all reports of disease outbreaks rapidly. Early clarification of the situation may prevent unnecessary dispersion of scarce resources and disruption of normal programs.

SETTING UP A DISEASE SURVEILLANCE SYSTEM

In emergency conditions, the routine disease surveillance system is either not up to the task, is disrupted as a direct consequence of the disaster, or cannot provide data quickly enough for timely decisions to be taken. It is recommended, therefore, that a local, syndrome-based surveillance system be prepared at the national level and temporarily instituted in the disaster aftermath. It should be a more flexible and faster reporting system than used in normal conditions. The routine surveillance system must be reestablished as soon as possible.

In order to collect and interpret data, it is essential that a national epidemiologist be assigned adequate epidemiologic and clerical staff who have transportation to the field and priority access to public or private laboratory facilities. In addition to the national epidemiologic staff, university departments, research centers, and bilateral or international agencies may provide trained epidemiologists and laboratory support nationally or regionally. The national epidemiologist should be the secretary of a disease surveillance and control subcommittee of the Health Emergency Committee (see Chapter 5). The subcommittee should provide direct feedback to hospitals and other health facilities where surveillance data are being collected.

The epidemiologist closest to the local reporting unit should investigate suspected disease outbreaks detected by the surveillance system as soon as possible. Until epidemiological assistance arrives, initial investigation and control measures are the responsibility of the local health unit.

Background data should be collected on the geographical areas affected, the major disease risks in the affected area (e.g., whether cholera or malaria are endemic), available resources, and the at-risk and affected populations. The national epide-

miologist and Health Disaster Coordinator should designate syndromes or diseases to be included in the surveillance system (for example, fever, fever and diarrhea, fever and cough, trauma, burns, and measles). All health facilities and temporary shelters should institute the system, using a standardized form as shown in Figure 7.1.

In addition to information provided by the health system, information from humanitarian workers, NGOs, community groups and from unconventional sources such as newspaper accounts, including unconfirmed public rumors, are important as early warnings.

FIGURE 7.1. Post-disaster disease surveillance daily report.

Date..... Name of Reporter .....

From: ( ) Hospital .....
( ) Outpatient department .....
( ) Health center.....
( ) Clinic .....
( ) Others (Specify .....)

Locating Address	Telephone No.

Number of new cases with	Under 5 yrs.	Over 5 yrs.	Total
1. Fever (100°F or 38°C)			
2. Fever and cough			
3. Diarrhea with blood			
4. Fever and diarrhea			
5. Vomiting and/or diarrhea			
6. Fever and rash			
7. Dog bite			
8. Snake bite			
9. Burns			
10. Trauma			
11. Jaundice and diarrhea			
12. Deaths			
13. Other Specify:			

Comments: .....
.....

Complete for evacuation centers only

No. of persons accommodated today.....
.....

Report significant changes in water/sanitation/food supply.....
.....

PRESENTATION AND INTERPRETATION OF COLLECTED DATA

Post-disaster surveillance is not designed to provide precise information on the incidence of a disease. However, it is important to have an *early warning* system that identifies when a given symptom complex or disease may be occurring in an affected area. This indication will provide the basis for more intensive investigation and, if necessary, lead to specific control measures. Where the affected population is well defined, as in camps for refugees or displaced persons, it will be both feasible and important for the national epidemiologist to determine rates and their change over time.

If the above-mentioned post-disaster surveillance system is effective, it will invariably result in an increase in the number of reported common and uncommon diseases and syndromes. This results from an increase in the number of reporting units, improved public awareness, and the greater concern and coverage by the mass media. This is not necessarily a reflection of increased disease, but rather the result of enhanced disease reporting compared with the pre-disaster pattern.

Negative reports are as important as positive ones, and each reporting unit should submit reports whether or not it has seen any disease ("zero reporting"). Negative reports will show that the unit is functioning and that health resources can be channeled elsewhere.

The epidemiologist closest to the local reporting unit should investigate suspected disease outbreaks detected by the surveillance system as soon as possible. Until epidemiological assistance arrives, initial investigation and control measures are the responsibility of the local health unit.

Summary reports of the surveillance system's technical findings should be fed back to the National Emergency Committee, hospitals, and health facilities and appropriate action taken to introduce necessary control measures if beyond the immediate competence of the epidemiologists (large sanitation programs, for example). The general public also should be informed of the risk of disease occurrence. The dilemma in some countries is whether an open policy of posting the available information on the Internet or elsewhere is in the best interest of public health. One school of thought is to limit dissemination to "validated data" approved by the health authorities. This approach does not take into consideration the need for rapid access to information and the fact that "invalidated" information will become public knowledge. A liberal policy encouraging NGOs and local authorities to exchange their observations and findings, electronically and otherwise, is to be encouraged. In all instances those reporting the data should state the source of their information.

The Health Disaster Coordinator should advise the national emergency committee on control measures to be taken to prevent the spread of disease.

LABORATORY SERVICES

Access to accurate and discrete rapid laboratory services is essential for public health management. It is important to establish the cause of any disease manifestation so that correct control measures can be taken. However, laboratory diagnosis is not required for subsequent patients who present the same symptoms. Laboratories must be able to diagnose diseases occurring locally, and be able to absorb an

increase in samples when necessary. If access to a local laboratory cannot be guaranteed, reference laboratory assistance may be required.

Some diagnostic tests (ova and parasites in the stool, blood smear) can be made with a minimum of technology by field reporting units, but certain bacteriologic and virologic tests necessary for surveillance must be performed by referral laboratories. It is important to establish coordination with local, regional, national, or international laboratories to provide necessary diagnostic tests for disease surveillance and control. Because of difficulties in access to certain areas, it may be necessary to make special arrangements to transport specimens.

VACCINATION AND VACCINATION PROGRAMS

Special Programs

Health authorities are often under considerable public and political pressure to begin mass vaccination programs, usually against typhoid, cholera, and tetanus. This pressure may be increased by exaggerated reports of the risk of such diseases in the local or international press, and by the "offer" of vaccines from abroad.

Typhoid and Cholera

Rapidly improvised mass vaccination campaigns against typhoid and cholera should be avoided in Latin America and the Caribbean for several reasons:

1. The World Health Organization does not recommend typhoid and cholera vaccines for routine use in endemic areas. The newer typhoid and cholera vaccines have increased efficacy, but because they are multi-dose vaccines, compliance is likely to be poor. They have not yet been proven effective as a large-scale public health measure. In a disaster situation, vaccination might, however, be recommended for health workers. Good medical control must rely on effective case identification and treatment and effective environmental sanitation measures.
2. Vaccination programs require large numbers of workers who could be better employed elsewhere.
3. Supervision of sterilization and injection techniques may be impossible, resulting in more harm than good being done.
4. Mass vaccination programs may lead to a false sense of security about the risk of diseases and to the neglect of effective control measures.

Supplying safe drinking water and the proper disposal of excreta continue to be the most practical and effective strategy to prevent cholera and typhoid fever and should be given the highest priority after a disaster.

Tetanus

Significant increases in tetanus have not occurred after natural disasters. The mass vaccination of populations against tetanus is usually unnecessary. The best protection against tetanus is maintenance of a high level of immunity in the gen-

eral population by routine vaccination before a disaster occurs, and adequate and early wound cleansing and treatment.

If tetanus immunization was received more than 5 years ago in a patient who has sustained an open wound, a tetanus toxoid booster is an effective preventive measure. In previously unimmunized injured patients, tetanus antitoxin should be administered only at the discretion of a physician.

Regular Programs

If routine vaccination programs are being conducted in camps or other densely populated areas with large numbers of children, it is prudent to include vaccination against tetanus, as indicated by public health guidelines, along with the other components of the vaccination program.

Measles, Polio, and Other Diseases Targeted for Eradication

Natural disasters may negatively affect the maintenance of ongoing national or regional eradication programs against measles and polio. Disruption of those programs should be closely monitored and prevented. Prevention and control programs for urban yellow fever, bubonic plague, or other vector-borne diseases should also be maintained to prevent the possible emergence or reemergence of diseases.

Vaccine Importation and Storage

Most vaccines—particularly measles vaccine—require refrigeration and careful handling if they are to remain effective. If cold-chain facilities are inadequate, they should be requested at the same time as the vaccines. Vaccine donors should ensure that adequate refrigeration facilities exist in the country before dispatching vaccines. During the emergency period it may be advisable for all imported vaccines, including those going to voluntary agencies, to be consigned to government stocks if cold-chain facilities are adequate.

The vaccination policy to be adopted should be decided at the national level only. Individual voluntary agencies should not decide to vaccinate on their own. Ideally, a national policy should be included in the disaster plan.

TRANSMISSION OF ZOONOSES

Displacement of domesticated and wild animals increases the risk of transmission of zoonoses, and veterinary and animal health services may be needed to evaluate such health risks. Epidemiologic identification/characterization of zoonoses is critical in evaluating the risks of occurrence of these diseases in areas affected by natural disasters. It is also essential to establish surveillance mechanisms to prevent human cases or outbreaks.

Dogs, cats, and other domestic animals frequently are taken by their owners to or near temporary shelters. Some of these animals are reservoirs of infections such as leptospirosis, rickettsioses, and bubonic plague, which can be transmitted through their excrement and urine or through ectoparasites, contaminating water and food.

Wild animals are reservoirs of infections that can be fatal to man. In searching for food and safety in the aftermath of a natural disaster, wild animals will come closer to affected communities, increasing the chance of transmission of illnesses such as hemorrhagic fever syndrome from the Hantavirus, hemmorhagic arboviruses, equine encephalitis, rabies, and infections still unknown in humans.