Assessing Needs in the Health Sector after Floods and Hurricanes

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Assessing Needs in the Health Sector after Floods and Hurricanes

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1. Introduction

Over the last decade, hardly a year has gone by in which one or more Latin American countries have not been subject to extensive flooding. Floods disrupt economies, play havoc with public services, and often create the need for assistance from abroad. Economic losses, especially in agriculture, may be crippling for years.

The severity of these floods is often exacerbated when natural causes are compounded by deforestation, faulty dam construction, and other human alterations of the environment. Flash floods may result from these and other phenomena, such as hurricane sea surges and earthquake–related tsunamis. When flash floods do occur, the toll on human life can be heavy.

As a rule, however, the floods that have ravaged large areas of country after country have been slow in onset and prolonged in duration. As a result, it has been possible to warn endangered communities and to evacuate them if necessary.

Because of this characteristic of floods in Latin America, however, confusion and inefficiency have arisen in relief management. Accustomed to thinking of disasters as acute phenomena with a sudden rise in deaths and injuries, the international community often responds with costly medical equipment, teams of specialists, emergency medicines, and mobile hospitals. Yet even a superficial survey may show that there is no dry ground on which to erect the hospitals and there are no acute trauma cases that cannot be handled by local personnel. Press reports of "epidemics" in the early stages of the floods may prove to be equally unfounded, yet health authorities are pressed by public opinion to carry out emergency vaccination campaigns, aerial insecticide spraying, emergency food relief, and similar measures.

Paradoxically, because floods can last several months, the real hazards to health emerge as concern about addressing them is waning and international relief assistance is considered complete.

The inappropriateness of the timing and nature of relief assistance is in no small part due to the lack of a sound method for assessing needs. Needs vary according to whether the disaster is an earthquake, volcano, or flood, and according to the phase of the disaster.

Spirgi (1979) describes the following phases:

1. The impact phase: when the disaster strikes.

2. The emergency phase: when lifesaving measures are taken. This phase has been subdivided into:

   – the isolation period:

   when contact with the "outside world" has been broken and the community must rely on its own resources

   – the "convergency" period:

   when there is an outburst of assistance from outside–assistance that is often unsolicited and frequently useless, however well intentioned

3. The rehabilitation phase: when essential services are provided on a temporary basis. Here, emphasis is on environmental measures, sanitation, and provision of emergency shelter.

4. The reconstruction phase: which has been defined as the "time–phase of permanent return to normalcy."

In natural disasters of sudden onset, these phases are clearly marked; in slow floods, however, the boundaries are blurred. It may take months for the disaster to be recognized as such and for authorities to realize that an emergency exists. The isolation period may last for months, and rehabilitation and reconstruction may overlap with the next flood.

Dramatic, well–defined disease outbreaks are generally not found in the immediate aftermath of a flood. Instead a slower, widespread deterioration of general health conditions takes place, which all too often becomes part of a chronic lowering of the affected community's health status. The longer the flood lasts, the more likely risk factors will converge that can lead to epidemics. Unless the health sector is alert to this process, it may find an explosive problem on its hands long after the "emergency" has been declared over and external assistance has ceased.

What, then, is the best way to safeguard the health of the affected population and make good use of relief supplies? When are what measures called for?

Strategic information gathering is critical to making these decisions. Although data are routinely collected by national and foreign personnel involved in relief and rehabilitation efforts, the selection process is rather subjective, and as accurate as the individual in charge is experienced. Over the years, the number of people with that experience has grown. Yet their approaches to selecting reliable indicators of health needs have not been systematized in writing.

There is, therefore, a marked need for a standard methodology for the rapid assessment of needs. If applied, such a method should make it possible to take sound short–term measures and–more important in the event of floods–to set up a longer term monitoring system for alerting health authorities to delayed risks.

From experience we know that a flood's major effects on health are in four main areas: certain communicable diseases, environmental sanitation, food and nutrition, and vectors. Ideally, therefore, the assessment team sent from a central level should comprise an epidemiologist, a sanitary engineer, a nutritionist, and an expert on vector control. If the stricken country relies heavily on an international or bilateral agency for assistance, then a technical officer of that agency should be part of the team. However, the goal should be for the countries to develop their own expertise in this field–a goal that can be achieved by developing the right method for damage and needs assessment and by training others in that method.

This publication, which was authored by Dr. Miguel Gueri, is a step toward that end. It presents a methodology for selecting the appropriate data from the proper sources. The method is based on the premise that, although each flood has its own peculiarities, there are common key decisions that must be made.

Given the political nature of emergencies, these decisions will be made, right or wrong. The adoption of a standard rapid assessment methodology should provide the basis for improving the record by moving the decisionmaking process into a sound technical realm.

In practice, the assessment team referred to throughout is often only a single individual. Although the world "team" is used here, the method described can be applied effectively by one person if he or she enlists the aid of others who can help supply the required information.

This first contribution toward a standard method for assessing health needs after floods should be treated as a working document; gradual refinements can only move national and international relief and rehabilitation efforts more quickly into an age of informed effectiveness.

Although slow−onset floods are the main subject here, the same approach can be applied generally to hurricanes when, as is often the case, the winds usher in torrential rainfall. The major differences are that in hurricanes the isolation period is shorter, the geographical extent of the affected area smaller, and, in the case of some islands, the need for food relief more immediate and acute.

2. Critical decisions

In emergencies, national health officials and representatives of donor agencies decide what the type of medical and health intervention is required. When a sense of urgency prevails, when political pressure is high, and when information is lacking, these decisions will often be made on the basis of faulty assumptions or expediency. As a result, resources can be wasted and measures needed to safeguard the health of the affected population may not be taken.

The purpose of the assessment team should be to give decision makers the data they require to make sound interventions.

The following list includes some of the most typical decisions that authorities face in floods. Across from the decisions are listed the key indicators on which the decisions should be based.

MEDICAL PERSONNEL/SUPPLIES	
Decision	Indicator
1. Send medical/paramedical personnel	1. Increase in demand, etc.
2. Send drugs/medicines	2. Selective increase in frequency of certain illnesses
WATER SUPPLY	
1. Establish temporary or emergency alternative water source	1. Total interruption of the normal system or interruption great enough to Jeopardize public health
Type of Source	Factor
1.1 Portable plant(s)	1.1a Size of the population(s) to be served
	1.1b Source of the water/turbidity
	1.1c Distance from the source
	1.1d Cost of plant and transport
	1.1e Weight and size of plant
	1.1f Means and feasibility of transport
	1.1g Expected duration of normal system interruption
	1.1h Availability of trained operators and maintenance men
	1.1i Power source
1.2 Distribution tank trucks	1.2a Distance of population from water source
	1.2b Availability of sufficient fuel and appropriate

	vehicles
	1.2c Feasibility of transportation
1.3 Water bags/containers at key points	1.3a Distance from source
	1.3b Number of people to be served and their location
	1.3c Means of transportation
2. Initiate small–scale chlorination	2. Poor quality of water at source
3. Recommend chlorination or boiling	3. Poor quality of drinking water at family level (bleach)
	Factor
	3.a Educational campaign
	3.b Availability of bleach and/or fuel
4. Distribute chlorine tablets	Factor
	4.a Availability of continual supplies
	4.b Cost
	4.c System of distribution
	4.d Educational campaign and monitoring
5. Provide parts and equipment for system rehabilitation	5. Faulty parts/equipment (determined after detailed survey of the system)
SEWAGE DISPOSAL	
Decision	Indicator
1. Provide parts and equipment for system rehabilitation	1. Faulty parts/equipment (determined after detailed survey of the system)
2. Provide alternative methods of sewage disposal	Factor
	2.a Estimated rehabilitation time
	2.b Severity of problem
SOLID WASTE DISPOSAL	
Decision	Indicator
1. Obtain equipment for:	1. Inadequate collection/removal and dumping site
1.1 Debris removal	
1.2 Reconditioning of dump	
1.3 Garbage collection	
HUMAN SETTLEMENTS	
Decision	Indicator
1. Provide basic sanitation in settlement	1. Unsanitary living conditions
	Factor
	1.a Distance to established water source; its hygiene and accessibility
	1.b Population density
2. Improve water supply system	2. Unsatisfactory condition of general water supply system
Method	Factor
2.a Connection to main	2.a Proximity to water source
2.b Trucks	2.b Safety of the water
Decision	Indicator
3. Provide sewage disposal system	3. Poor sewage disposal
Method	Factor
3.a Connection to main system	3.a Proximity to main sewerage and state of same
3.b Trench latrines	3.b Level of ground
	3.c Depth of water table
	3.d Population density

FOOD HYGIENE	
Decision	Indicator
1. Provide additional personnel for food hygiene inspections	1. Infrequent inspections (determined after quick surveys)
	Factor
	1.a Availability of personnel
CORPSES	
Decision	Indicator
1. Initiate mass burials	1. Large number of corpses
	Factor
	1.a Health hazard
	1.b Local laws
	1.c Local customs
MOSQUITOES	
Decision	Indicator
1. Initiate spraying (and larval control)	1. Increase in vector population and breeding sites, and interruption of routine program
	Factor
	1.a Endemicity of disease
	1.b Exposure of human groups to the mosquito
2. Pick best spraying time (and larvicide application)	2. Determination of biological life cycle
	Factor
3. Select appropriate insecticide (larvacide)	3.a Sensitivity of the mosquito
	3.b Availability
	3.c Cost
	3.d Familiarity to personnel
	Factor
4. Order insecticide	4.a Amounts likely to be used in 6 months
	4.b Availability in markets
	4.c Cost
	4.d Transport facilities
	Factor
5. Request equipment	5.a Survey of existing resources
	5.b Availability of fuel for vehicle−mounted equipment
OTHER PESTS	
Decision	Indicator
1. Start dog−catching campaign	1. Increase in stray dogs reported to be biting
2. Import/bring rabies vaccine	2. Increase in number of dog bites in rabies−endemic areas
3. Import/bring snake venom serum	3. Increase in number of poisonous snakes and/or in proven cases of poisonous snake bites
FOOD AND NUTRITION	
Decision	Indicator
1. Establish food aid program	1. Destruction of local crops and stocks; disruption of transport and marketing system and of community's earning capacity
	Factor
	1.a Previous prevalence of under nutrition
	1.b Degree and expected duration of isolation
	Factor

2. Select appropriate type of food (dry versus cooked, perishable versus stable, variety)	
	2.a Food habits
	2.b Availability
	2.c Cost
	2.d Transport facilities
	2.e Distribution facilities
	2.f Fuel and cooking facilities
	2.g Refrigeration
HEALTH CENTERS	
Decision	Indicator
1. Provide relief supplies to center	1. Depleted supplies
	Factor
	1.a Available stock
	1.b Present and expected demand
2. Provide laboratory back−up	2. Increased number of suspected disease cases of epidemic potential and no, or inadequate, local laboratory
3. Send additional health manpower	3. Manpower shortage, increased demand, remote referral centers
EVACUATION CAMPS	
Decision	Indicator
1. Set up camp	1. Life−threatening conditions in area, destruction of housing and impossibility of providing other shelter on original terrain, and/ or spontaneous migration
2. Dismantle camp	2. Danger of epidemic within camp, danger to life passed, or camp found not Justified
3. Provide health and sanitation services	3. Camp set up and not possible to dismantle quickly, disease out breaks detected or predicted, unsanitary conditions, and/or no access to routine health care

3. Magnitude of the impact

The health sector is not an isolated entity. While many conditions created by floods appear to have nothing to do with health, they may in fact have a considerable direct or indirect effect on the health status of the community. It is therefore necessary that the assessment team have an overview of the total situation before it reviews the health component. If the team is multisectoral, some of its members will have much of the basic data needed. However, if it is composed strictly of health personnel, the data will have to be obtained elsewhere. If the team comprises foreign advisers, it should work with local staff who have a thorough knowledge of the country and its people.

General background information should be sought from high−level officials in the capital of the country, province, state, or department. It will be necessary to interview representatives from the civil defense system or a similar organization that is responsible for coordinating relief activities; from the meteorological services; from ministries such as social security, public works, and agriculture; from the better−established voluntary agencies; and from the international and bilateral relief or development agencies and embassies of donor countries.

An aerial survey of the flooded area may be useful, but is not indispensable. It provides a panoramic view of the situation, yet one that is very crude and lacking information on specific needs.

BASIC QUESTIONS

Among the basic questions that need to be answered during this first approach to assessing the overall magnitude of the disaster's impact are the extent of the geographical area affected; the impact on housing, roads, communications, agriculture, and livestock; and the characteristics of the population of the affected area. These characteristics should include not only distribution by age, sex, and physiological status if possible, but also social and ethnological aspects, taboos, and mores. The assessment team should also determine the current status of relief supplies and stocks.

GEOGRAPHIC AREA AFFECTED

It is important to become familiar with the area on a map and to get to know the "mechanics" of the flood, that is, whether it is the result of torrential rains, distant thawing snow, the overflow of a local river, or the rupture of a dam, and whether it is a slow or a flash flood. These have different implications for the health of the community. While flash floods permit little time for evacuation and result in many deaths, slow floods give ample warning that allows for evacuation from dangerous areas and usually result in a low death toll. However, slow floods may cause long–term public health problems.

Depending on whether the community is in the Andean mountains or in a seaside village, the pathology likely to be found after flooding will be different. For example, it is not uncommon for torrential rains in coastal areas to be accompanied by high winds and strong waves which may destroy seaside houses, adding a new dimension to the disaster.

The team will need to know the state of the roads, alternative means of transport, isolated communities, measures that have been or may be taken to protect the population, and the location of actual or potential evacuation areas and their proximity to health care facilities.

Sources of Information

Some countries have a hydrology department that is responsible for monitoring rivers and expected water levels. The department of meteorology frequently can predict the severity of the rainy season and its duration.

There is usually some government department or unit (a national geographic institute, for instance) responsible for drawing and updating maps of the country. In some countries this is the responsibility of the army. As a last resort, road maps may be obtained from a local automobile association or tourist organization.

AFFECTED POPULATION

The assessment team should acquaint itself with the characteristics of the affected population, the history of repeated disaster episodes, and the possible "disaster culture" (tares, 1977) that may govern the community's response to the situation.

The socioeconomic characteristics of the affected population are important. It has been said that only poor people are victims of disasters. In fact, this means that the lower economic strata of the population comprise those who live in old and vulnerable houses (such as those built of adobe) that may not resist an earthquake, or in marginal areas close to ravines that are subject to landslides. These groups cannot afford to keep food and other basic supplies in stock for possible shortages. The disaster may produce secondary effects that weaken the purchasing power of the community and indirectly result in nutritional problems, for example, when floods destroy crops, whether they are for food or for cash. Isolation of a population group may prevent the breadwinner from traveling to work; in other cases, the workplaces themselves may be destroyed.

Sources of Information

Red Cross volunteers or civil defense personnel usually conduct a population census in the flooded area to plan distribution of relief supplies or accommodations at evacuation centers.

Often more than one institution carries out a separate and independent census. Sometimes the degree of thoroughness with which each operates may result in varying and conflicting figures.

COMMUNICATIONS AND TRANSPORT

Communications and transport are essential in assessing the damage caused by a disaster and in planning relief operations. The team should know, or learn as soon as possible, what were the pre–disaster, normal means of transport–road, railway, sea, or air–and determine which have been damaged and are making

access to, and transport within, the region difficult. Isolation is a relative term; sometimes it means using unusual modes of transport to reach communities: donkeys, boats, rafts, 4–wheel–drive vehicles, or helicopters.

Finally, it is necessary to know what type of communication is available: telephone, radio, or other means.

Sources of Information

The ministry of transport, the police, and the army know the condition of the roads.

In most countries a permit is necessary for two–way radios; this is generally issued by the ministry of communications. The same ministry can provide names, locations, and frequencies of amateur radio operators who are invaluable for keeping in touch with isolated areas. "Ham" clubs can also supply data on radio operators. Sometimes even in the remotest areas one finds religious and volunteer organizations that have their own radio communications system.

One or all of these sources can provide the team with information on the needs of isolated communities. However, due to the technical nature of some of the information required, errors in communication are common. Furthermore, information on damages relayed by inhabitants of the devastated area may be highly subjective and colored by emotion.

HOUSING

Lack of housing per se is not a health sector problem. Indirectly, however, it exposes individuals to rain, cold, and possibly overcrowding in temporary shelters which may eventually affect their health. It may also result in psychological and socioeconomic problems for those who have lost their homes.

It is important to know the type of buildings and construction materials commonly used in the flooded area, as this makes it possible to estimate the damage to housing.

As part of the "disaster culture," people living in flood–prone areas often build their houses on stilts. Although the floods are of varying intensity, the inhabitants of this region of Bolivia in the basin of the Mamoré River not only built their homes on stilts, but have adapted to the frequency of the disasters by raising their floors with wooden boards as the flood waters rise.

In another scenario, adobe houses in the northern part of Peru, where no rain had fallen for years, could not withstand the over six months of continuous rainfall brought by the "El Niño" phenomenon of 1982–83.

Sources of Information

People in government departments familiar with the area will know the type of housing in the affected area. The Red Cross and civil defense will have some figures of the number of houses damaged, the need for housing, and the population inhabiting evacuation centers.

AGRICULTURE AND LIVESTOCK

As in the case of housing, the disaster may affect health indirectly through its impact on agriculture. Small landowners with little cash or food reserves will suffer severely from damage to their food and cash crops. The long–term result can be an increase in the incidence of undernutrition. Even if the crops themselves are not lost, damage to the roads can make transporting the produce to market impossible. Thus farmers not producing food face a shortage, while food growers lose income to purchase other foods they do not produce.

When cattle drown, human health may be affected in two indirect ways: less food and less income. Moreover, disposing of hundreds or thousands of drowned animals is a difficult environmental and sanitary problem when flooded terrain inhibits burial of the carcasses.

Sources of Information

The agriculture ministry will obviously have data on the type of agriculture and husbandry practiced in the district and the estimated damage. Civil defense may have similar data, as well as information on the number of families affected.

Closer to the site of the disaster, farmers' organizations and cooperatives frequently have quite accurate information.

RELIEF SUPPLIES RECEIVED AND REQUESTED

Anecdotes abound of donors who send heavy winter clothing to tropical areas and pork sausages to Muslim countries. There are at least as many examples of affected countries issuing long "official lists" in which the "emergency" items requested have nothing to do with the needs created by the disaster.

The problem of unsolicited and inappropriate relief supplies is longstanding and reappears with each disaster. The assessment team must determine if there is a clear, well–defined policy regarding unsolicited supplies, and whether the stated policy is being implemented.

It is also important to know how the supplies are being channeled and who is responsible for coordinating requests and donations, in theory and in practice. Frequently, relief organizations will only send supplies to their own affiliates in the affected country or area.

Within the health sector, the team must find out what donations have been received, what firm commitments for help have been made, and what requests, if any, have been issued.

Sources of Information

In theory, civil defense or similar organizations are responsible in most countries for coordinating aid requested and received. Nonetheless the assessment team should also contact local representatives of donor agencies, particularly the Red Cross and religious organizations.

Often one foreign agency becomes the formal or informal coordinator of information concerning international relief. The representative of the United Nations Development Programme (UNDP) often provides a neutral forum in which agencies and embassy representatives can meet to exchange information about donations and requests.

HEALTH SECTOR

The assessment team must be familiar with the characteristics of the health sector, its structure, operating routine, the surviving facilities and bed capacity in the disaster area, the status of communicable disease control programs, and the number and type of personnel manning them. This information should be gathered not only from the ministry of health but also from all those services that normally comprise the health sector in the region, such as social security, armed forces medical cervices, private centers, and voluntary organizations.

Sources of Information

Data on the number of centers, their location, capacity, and the population they cover are frequently available at the ministry of health, but the team may have to query other health agencies not attached to the ministry.

Central– or regional–level agencies may have some information on flood damage to the infrastructure of the sector, and should at least know whether or not the main health facilities are operative.

If the centers can be contacted through either their own communications system or the alternatives outlined above, the team should request an estimate as soon as possible, specifying damage sustained by physical structures, equipment, materials, supplies, and drugs, and including the number of personnel, their type, and status.

Community spokesmen frequently use any available means of transport to reach the provincial, district, and sometimes even the nation's capital to present the community's complaints and felt needs to their political representative. The assessment team may take advantage of these trips to request written reports from local health authorities.

CHECKLIST

In carrying out an initial survey, the assessment team or individual will probably be able to answer the following basic questions only roughly –detailed quantification will take time. However, even rough

percentages and other approximate calculations, when derived from sound sources, provide invaluable estimates on which to base a preliminary assessment of needs.

Basic Questions

- What is the geographical area affected?
- What are the characteristics of the population affected?
- What was the effect on communications and transport?
- What was the effect on housing?
- What was the effect on agriculture and livestock?
- What is the situation regarding relief supplies and requests?
- What was the impact on the health sector?

Geographic Area Affected

Sources of information

- Civil defense (or similar coordinating agency)
- National geographic institute/geographic department of the army
- Department of meteorology
- Civil aviation
- Department of hydrology

Check

- Detail maps

- Scope of floods (sq. km.)

- Type of flooding:

    – slow
    – flash

- Estimated duration

- Water level

- Danger of river overflow

- Protective measures taken in a coastal area against:

    – high waves
    – high winds

- Protective measures taken in a tropical area

- Protective measures taken in a mountainous area

Population Affected

Sources of information

- Civil defense
- Red Cross

Check

- History of frequent floods
- Last flood (date)
- Population distribution (rural isolated, communities, towns)
- Number of communities affected
- Number of people/families affected

• Estimated number of homeless families
• Estimated number of people/families evacuated

– Where to?

• Type of economy (e.g., agrarian, trading, industrial)
• Estimated loss of work (high, moderate, little)

Communications and transport

Sources of information

• Police/army
• Ministry of transport and communications
• "Ham" operator associations
• Religious/voluntary organizations
• Civil defense
• Red Cross

Check

• Transport

– To the region

* only air:

plane
helicopter

* water

* road:

normal vehicle
4–wheel–drive
horse or mule

* railroad

– Within the region

* bridges destroyed
* number and location of airports
* number and location of landing strips

– Communities that can only be reached by:

* air
* water
* 4–wheel–drive vehicles
* horse, mule, or other beast of burden

• Communications

– Communities with no functioning telephone system
– Radio communications

	Location	Frequency
* armed forces		

* police		
* ministry of health		
* Red Cross		
* 'ham" associations		
* religious/voluntary orgs.		
* other		

Housing

Sources of information

• Ministry of housing
• Civil defense
• Red Cross

Check

• Type of housing common in the area
• Number of homeless families
• Building material/temporary shelter required

– Tents
– Prefabricated housing material
– Building material, type

Agriculture and Livestock

Sources of information

• Ministry of agriculture
• Civil Defense
• Farmer cooperatives

Check

• Type of agriculture (cash, subsistence)
• Type of ownership (large holdings, small farms)
• Main crops
• Hectares destroyed
• Estimated percentage of anticipated harvest destroyed
• Livestock

– Estimated number destroyed and percentage of estimated total

Relief Supplies

Sources of information

• Civil defense
• Red Cross
• U.N. representative and agencies
• Heads of regional organizations
• Main bilateral agencies working in country
• Main voluntary organizations

Check

• Agency responsible for coordinating relief efforts

• Existing mechanism to handle requests

• Transport system to region

• Cooperation of airlines, armed forces

• Coordinating meetings

– responsible agency:

formal
informal

• Main types of aid requested

• Firm offers

• Health sector

– Requests already formulated

– Aid received:

mainly classified
mainly unclassified

– Storage:

adequate
inadequate

– Transport to disaster area: adequate inadequate

• Cold chain

– Airport
– Central store
– In transport
– In disaster area
– In communities

Health Sector
Sources of information

• Ministry of health
• Social security
• Armed forces medical services
• Professional associations

4. Morbidity and mortality

Disasters may have an indirect negative influence on health because of the way they alter the environment. The frequency of diseases will not always increase, but flood disasters do present the potential for outbreaks of communicable diseases. According to Western (1982), the risk factors involved in communicable disease outbreaks after disasters are:

1. Alterations in pre–existing morbidity: It is highly unlikely that the disaster will spark outbreaks of diseases that are not endemic to the region, unless such diseases are introduced by emergency relief personnel. The problem lies in the fact that reliable figures on disease frequencies in a given region are generally nonexistent.

2. Ecological changes resulting from the disaster: Droughts, floods, and hurricanes, in particular, will have a noticeable effect on the region's ecology by exerting an impact on the habitats of vectors and on water sources, thereby increasing the risk of vector–transmitted diseases.

3. Population displacements: If affected populations move far, they may come upon diseases against which they are not immunized or may carry a disease or its vector to an area previously free of it. Furthermore, if they move to populated areas, they may overburden the services and facilities of the community sheltering them.

4. Changes in population density: Overcrowding, especially in evacuation camps or centers, will contribute to the possibility of disease outbreak created either by direct or airborne contact.

5. Disorganized public services.

6. Interruption of basic public health services: Water treatment plants may be destroyed or severely damaged and programs, such as malaria control and follow–up of tuberculosis cases, may be interrupted.

Although they tend to produce few injuries among survivors, heavy floods, and particularly slow ones over a long period of time, may easily bring about a combination of all of the risk factors cited by Western.

Changes in the frequency of certain diseases must be detected so that the necessary steps may be taken to forestall or lessen the impact of epidemic outbreaks. The assessment of the morbidity and mortality situation should not become a lengthy research project, but should focus on eight key questions, the answers to which provide the basis for a sound public health response:

1. How has the flooding affected disease frequency in general?

2. What risk factors have appeared as a result of the floods (even though no increase in disease has yet been reported)?

3. What measures are needed to control these risks?

4. What specific diseases have been reported on the increase?

5. What should be done to cope with that increase?

6. What pharmaceuticals, supplies, equipment, and manpower are needed? What is available locally?

7. What are the projected cost, timing, and duration of need?

8. How will the imported items identified in 6 be transported and distributed?

MORBIDITY

The assessment teams should consult the epidemiologist, area health director, and other local health workers to determine what diseases are common in the area, particularly the communicable diseases whose frequency may be affected by the risk factors cited above.

If there is no information available on endemicity or if the data available are questionable, certain reasonable hypotheses must be formulated. The team should draw up a tentative list of diseases to be investigated based on experience with past floods:

• Acute gastrointestinal diseases ("dehydration" is frequently recorded as a separate entity, especially when a program of oral rehydration exists)

• Acute respiratory diseases

• Tuberculosis (recorded as a separate entity from "respiratory diseases"; a special register usually exists for such cases)

• Malaria

• Dengue

• Yellow fever

• Equine encephalitis

• "Childhood" diseases, usually preventable by immunization

  – Whooping cough
  – Measles
  – Poliomyelitis
  – Chickenpox

(Tetanus, which is included in immunization programs, is not a disease whose frequency increases during floods)

• Typhoid fever

• Skin lesions

• Certain conditions typical of the region or country (e.g., Bolivian hemorrhagic fever)

Diseases that have never been reported in the region, or that have been completely eradicated, should be eliminated from the list.

Ideally, any changes in morbidity and mortality found by the team should be given as incidence rates, expressed as the number of new disease cases per 1,000 or 10,000 persons at risk. In most instances, however, these rates cannot be computed reliably because baseline data are lacking and population figures that should serve as the denominator are outdated, unreliable, or unknown for the geographic area surveyed.

It is equally difficult to estimate the number of people covered by the health center or post, except in small, isolated communities. Moreover, when two or more health units are closely clustered, it is not uncommon for the same patient to attend several in search of free care and drugs.

We will therefore refer to "change in frequency of diseases," a loose indication of a trend that can be obtained from the proportion of observed or attended symptoms or symptom complexes among the total observed or attended population (see Chapter 10, Surveillance Systems). The same rough measurement applies in the rapid assessment of changes in mortality.

Changes in Frequency

The effect of time must be kept in mind. If the evaluation is made during the early stages of the flood, it is unlikely that any significant changes will be noted in disease frequency. The flood's influence will vary according to the disease and how long the flood lasts. Increases in malaria, for example, are not detected until several months after the waters have begun to recede, leaving an ideal habitat for vector proliferation.

When a highly organized system of epidemiologic surveillance exists in the affected area, changes in frequency or even incidence rates may be easily observed. Comparisons can be made with patterns of previous years to verify that changes detected are not seasonal. In addition, any disease not initially considered that has significant increases can be added to the list.

Unfortunately, a responsive system of epidemiologic surveillance will be rare. Whatever exists will probably be inadequate, and very often with an information lag of several months or years, depending on how far away one is from the source of such data.

Sources of Information

The team will often have to seek needed information at the very site of the disaster, probably before any statistical process has been initiated.

A. Health centers and posts:

Whether the health facilities are manned by doctors, nurses, or auxiliaries, there is always a "daily report" or attendance log in which some data about the patients seen during the day (such as name, age, diagnosis, and treatment) are entered. In moat countries this daily report is the basis for a center's monthly report and includes the number of cases treated by diagnosis and often by age groups. These monthly reports then go to a higher administrative level, where they are processed together with those of other centers. From there they continue to another level, and eventually provide the basic data for the health ministry's reports on the country's health status. Usually a monthly report is also prepared on the trends of certain communicable diseases; it, too, is based on daily case records.

The monthly reports can be used to calculate the number of disease cases on the list to be investigated among the total number of patients bested and/or the number of inhabitants covered by the center, if known. It should be kept in mind that the catchment area figure may include those people covered by a smaller unit.

The morbidity rates, or the percentage of cases treated (when rates cannot be obtained) at the flood's onset, should be compared with the previous year's figures for the same period. If the health care conditions are very dissimilar (e.g., when a doctor is now available where there was none before), the team will have to compare the new figures with those for the months prior to the flood.

B. Hospitals

1) Department of statistics:

In moat cases, statistics departments are behind in preparation of their reports sad the data available are not current enough to be useful in an emergency. The assessment team will probably have to get information from the outpatient and emergency departments and from inpatient wards.

2) Outpatient and emergency departments:

The procedure will be the same as for a health center.

3) Hospital wards:

Depending on the hospital's level of sophistication, there may be an infectious diseases ward, a "diarrhea" and "rehydration" ward, a malnutrition ward, and so forth, from which one can secure information. Generally, there will be at least a medical and a pediatric ward where data can be collected (the gynecology–obstetrics and surgery wards' information would probably not be pertinent).

In most hospitals, each ward keeps its own statistical record apart from that required by the department of statistics. There will probably be an "admissions book" or a "patients' register," in which each person admitted to the ward is recorded, usually by name, age, and initial diagnosis. If such a book exists, it would be the fastest way to compare the number of cases of selected diseases with those for the preflood periods. When calculating the proportion of diseases, the team should realize that the total number of patients seen by the facility may have increased or decreased due to the flood.

4) Laboratories:

The laboratory will have records of presumed diagnoses and test results.

5) Malaria eradication program:

The surveillance system for malaria is usually better than that for other communicable diseases. Nonetheless, there may be a delay of a year or more before the figures from outlying areas reach the central level (e.g., provinces, departments) and are processed. Once again, data should come from as close to the community in question as possible. At the level of health area/hospital area, province, or department, there may well be a malaria eradication service that collects field data and processes them to a higher level. Even so, considerable time may elapse from the moment the information originates at the most primary health level to that moment when the service collects it. The health centers, however, usually have a separate malaria report that registers presumptive or suspected cases for which blood samples have been taken. The center usually keeps the stub of the entry or form that accompanies the sample, on which the patient's basic data are noted.

6) If there are no records available:

It is possible that no information system will exist in the flooded area or that, as a result of the flood, all records are destroyed. As a last resort, the team can use the patients awaiting treatment at the health center or at the hospital's outpatient department as a source of information. They should be asked to identify their main symptoms, which allows for a tentative (although rough) diagnosis and also helps determine whether one of the diseases to be investigated is involved. The team can also get a general idea from the health center staff about the number of cases handled compared with the normal situation. Frequently the nursing auxiliary, the health promoter–in short, the primary health worker who has close day–to–day contact with the community–is quite sensitive to the changes taking place in his or her community.

Print and other communications media will often report outbreaks. Although these reports are often unfounded rumors, they should also be checked. If the reports are valid, decision makers can take appropriate action; if no outbreak exists, authorities may decide to publicly dispel the rumors.

C. Evacuation centers:

A detailed review of evacuation centers appears in Chapter 8. When there is a disease registration system and a fixed, nondynamic population, any changes in incidence can be identified during the life–span of the camp. Since a more realistic scenario would include a dynamic population, the best that can be obtained may be the proportion of attendances for specific symptom complexes or readily diagnosed diseases.

Possible Causes of Error

There are several factors that could effect an apparent change in the frequency of the diseases under investigation and lead to error:

A. Different diagnostic criteria, or a different type of health care source; for example, comparing the data reported by a doctor with those reported by a sanitarian.

B. An increase in health care coverage, caused, for instance, by an increase in the availability of health care or a greater number of persons seeking care.

C. A decrease in available health care delivery, such as from the isolation caused by the flood; this could make certain health care centers inaccessible to the population and result in a drop in the number of cases reported by those centers.

D. Improved capacity for diagnosis, for example, unusual access to laboratory facilities. It is not uncommon for a request for external emergency aid to result in the provision of laboratory equipment– sometimes relatively simple, like microscopes or slides–that would make possible, for instance, a greater number of blood smear tests for malaria parasites. This in turn would give a false impression that the incidence of malaria had risen.

E. A greater "alertness" toward certain diseases, particularly when the diagnosis is only clinical: the health worker is "seeking" given diseases. During floods a large number of cases of typhoid fever are often diagnosed clinically without laboratory confirmation. Most are not actually typhoid cases but, faced with that suspicion, the examiner feels more secure in diagnosing a disease to which the population (and, at times, health officials) is sensitive.

F. Seasonal variations; certain diseases endemic to the region regularly show a "peak" in frequency during given months. The flood could coincide with one of those "peaks" and, unless a comparison can be made with previous years, the increase in cases could be attributed erroneously to the flood.

G. In the case of malaria there are two special problems. The frequency of this disease has persistently risen over the last decade throughout most of Latin America. Several factors are responsible for this, above all the economic problems that have led to a reduction in national eradication programs. After a flood it is very difficult to determine whether the increase in frequency stems directly from the disaster or is part of the generally observed rise (research addressing this problem is currently under way in Ecuador). Moreover, variations in the availability of slides, transportation, techniques, and so forth, may bring about marked variations in the number of samples taken and processed.

Number of Centers

The number of centers to be investigated actually depends upon the number of officers making the assessment and the amount of time they have to do so.

If the area in question is very homogeneous, a "representative" center provides a quick idea of the situation, although the information could be biased as a result of numerous factors (e.g., accessibility, dedication of the personnel). In most cases, information would be more accurate if it came from three health centers in geographically distinct areas, although if differences in frequency were found, they might not be statistically significant. These tests would have to be carefully designed according to each circumstance (i.e., random selection, taking into account characteristics of the population, its size, etc.)–often an impractical luxury. Ideally, data should be from both the affected area and one that is not involved. In practice – particularly, when the geographic area is large–it is almost impossible to find a "control" center and a "case" center similar enough to provide reliable information.

MORTALITY

Changes in causes of mortality over time will confirm the flood's effects on morbidity, its severity, and the urgency and extent of steps that should be taken or strengthened to safeguard the population's health.

Different kinds of disasters affect mortality in varying ways. In general, hurricanes and slow floods, such as those brought about by the "El Niño" phenomenon in South America in 1983, cause few direct deaths. However, some of their indirect results, for example, landslides, can be deadly.

The effects on mortality (if any) secondary to increased morbidity will take some time to be felt and will be more marked in the cases of the community's most vulnerable groups, particularly young children. Therefore, the assessment team should concentrate on children under 5 years of age.

Sources of Information

A. Birth and death registration office:

There is usually an office that registers births and deaths at the city or district level. The registration sheets (death certificates) often have a detachable stub that is kept in the local office when the original certificate is sent to a higher administrative level. The minimum information needed is age and cause of death. As with the morbidity figures, the team should compare the number of deaths by cause and age for similar time periods in different years. If this is not possible, the data should be compared with a time period before the flooding started.

The registration office is the first and most important place in which information should be sought; if for some reason it cannot be obtained there, the following places can be tried:

B. Health centers/sanitary posts:

In some countries the local registry offices send a monthly death report to the pertinent health center.

C. Hospitals:

By referring to the "admissions book," "daily report," or "patients' log" in the various wards, one can secure information on the deaths in those wards and their causes.

D. If no records are available:

A general estimate of increased mortality might come from contacts with the local clergy, the sanitarian or nurse, and the doctor (if there is one). In some cases, especially in the more remote rural areas, there may be "clandestine cemeteries" where very young children are buried; their deaths are not registered because of the community's isolation, bureaucratic procedures, or expense.

Possible Causes of Error

A. Insufficient time elapsed for recording.

As was mentioned earlier, if the information is collected shortly after the flood's onset, changes in mortality may not yet be evident.

B. Delayed registration.

There may be a significant delay between the time of death and the date on which the family registers it.

C. Inhibited travel.

The disaster itself may hinder family members from reaching the place of registration.

D. Underregistration.

Most Latin American countries and the Caribbean underregister their deaths–especially those of children. It is quite possible the disaster will augment the proportion of unreported cases in already isolated communities.

CHECKLIST

Basic Questions

• How has the flood modified the frequency of illnesses?

• What specific illnesses have shown an increase in frequency?

• What is the best way to combat the increase?

• What pharmaceuticals, material, equipment, and manpower are needed?

• What is the estimated timing, duration, and cost?

• How will the people and supplies be transported and the material distributed?

Morbidity

• Illnesses common in the area

• Tentative list of illnesses to be investigated

• Changes in frequency: time period to investigate

  – From the flood's onset, compared with the same period in the previous year
  – Weeks (or months) immediately before and immediately after onset of the flooding

Sources of information

• Epidemiological surveillance system

• Health centers and dispensaries (outposts)

– Monthly attendance record (number of cases classified by diagnosis)
– Monthly record of communicable diseases
– Attendance book

• Hospitals

  – Department of statistics
  – Outpatient department (casualty department)

  * monthly attendance record (number of cases classified by diagnosis)
  * monthly record of communicable diseases
  * attendance book

  – Hospital wards

  * registry of patients ("admissions" book)
  * nurses' report book
  * wards to investigate: medicine, pediatrics, malnutrition, gastroenteritis, rehydration

– Laboratories
– Malaria Eradication Program
– Surveillance/report system
– Record of samples (health centers)

• Evacuation centers

• If no records

– Survey in clinic/hospital waiting room
– Survey in hospital wards
– Health staff views

• Sources of error

– Different diagnostic criteria
– Increase in the available services
– Decrease in attendance
– Better diagnostic facilities
– Increased "sensitivity" among health staff
– Seasonal variations
– Malaria

* global trend of increase in incidence
* lack of diagnostic equipment, personnel, and transportation

Mortality

Sources of information

• Registration office

– Copy or stub of death certificate
– Registration book

• Health centers/outposts

– Monthly death record

• Hospitals

– Admissions book

• If no records

– Church books
– Interview with clergy
– Interview with doctor/health worker
– "Clandestine cemeteries"

5. Environmental sanitation

Major disasters often damage basic sanitation services, including the provision of potable water and the disposal of excrete and solid wastes. This may cause an increase in waterborne diseases as well as a proliferation of flies, mosquitoes, and rats. Problems may also arise from overcrowding in evacuation settlements, poor food hygiene, and human and animal corpses.

WATER SUPPLY

Water distribution to the population can be hampered either by the physical destruction of water treatment plants, systems, or wells that occurs during earthquakes, or by the comparatively slight damage to the network inflicted by floods. Floods tend to leave large volumes of solid matter in suspension in the plant's water source, making its purification impossible. Therefore the assessment team must check both the water intake duct and the filters themselves for blockage. In addition, because water treatment plants are frequently located near rivers, the plant's foundations should be inspected for erosion. Even if the water service has not been interrupted, there may be cross–contamination from the sewerage systems due to breaks in the network.

When the community water supply comes from a well, physical damages and the possibility of contamination must also be considered. The latter is less likely in deep wells where the soil itself acts as a filter, but the possibility should be verified nonetheless. Sometimes well water is connected to the general system, so that it mixes with water from other sources that may be contaminated. When wells are linked to the general system, power failures and physical damage may also cause contamination of the well through siphonage.

It is extremely difficult to establish a minimum depth for a well that would preclude concern about the possibility of seepage. Numerous factors are involved, such as distance from a possible source of contamination located on higher ground than the well, the kind of soil, and the possible stagnation of sewage in the vicinity of the well.

In many communities, particularly in rural areas, the purity of the drinking water is questionable; the water is often given no treatment whatsoever. For example, in rural areas it is not unusual for the water supply to be pumped directly from a lake into the water system. Flooding such as that caused by the "El Niño" phenomenon would probably not worsen the quality of this water; in fact, floods might bring about dilution, resulting in a decrease in the dose of microorganisms (Levis, 1984). In any case, it must be verified that no new focal points of contamination have been created.

Sources of Information

Frequently more than one ministry is involved in water supply, and different institutions may be responsible at different stages of the supply. The team must determine which institutions are responsible for the water source (e.g., wells, rivers), the treatment plants, maintenance of the distribution network, quality control, and so forth.

Usually the team can get information from the ministries of health, housing, and public works; the municipality; and sometimes private housing development firms.

A. At the community level:

If there is a sanitary engineer or health inspector working in the community, he or she will know the location of the water source and potential contamination sites in the network. The engineer or inspector will probably have records on the water quality over a period of time, as well as drawings and maps of the network.

B. Municipality

If there is no engineer or health inspector, the official in charge of public works may have the information indicated in A.

C. Water quality control

Many places have a regular system to monitor residual chlorine and the bacteriological content of the water. This system may or may not be under the Jurisdiction of the health department. In any case, if the system exists, the assessment team should check water samples for changes that may be related to the disaster. If there is no monitoring system, it should be established as soon as possible.

D. In the absence of any information:

In this event the team must make a quick survey of the affected area to find out:

1) Where is the source of water?

2) How is the water distributed to the community?

– piped to the house?
– public standpipe?
– water distribution trucks?

(In the last two cases it is important to know how the water is stored in the homes, as it may become contaminated there. The inhabitants should be asked if they have seen any broken mains and, if so, where. This information could also come from the health worker at the health center.)

Once the data is obtained, the team should check some of the reported damages or points where there may be cross–contamination from either the sewerage system or some other source and assess the probability of contamination.

In flood areas that normally have access to treated water, the assessment team will have to take water samples at different sites to test for residual chlorine and the presence of coliforms.

E. Water treatment plant:

If the community's water supply comes from a plant, it should be checked for structural and component damage or any interruption of its function from other causes. There is usually a plant operations book or register in which details about the plant's functioning are entered every day or several times a day (e.g., liters/second, interruptions, chlorine content). From this the team can detect any changes that are attributable to the disaster. The interruptions may be due to electric power failures; the plant may have a generator that was damaged or lacks fuel. If the plant operator has not already done it, he should be asked to prepare a detailed damage report.

F. Wells:

If wells are the source of water, they should be inspected for damage to elements such as the structure, components, generator, and tanks. There will probably also be a corresponding operations book; the well operator should be asked to prepare a detailed report. To determine the possibility of contamination, the assessment team must gauge the depth of the well, type of soil, proximity to possible sources of contamination, ruptures of the sewerage system, and so forth.

G. Other sources:

Other water sources, such as rivers and ravines, should also be checked. Even if the water purification system is not highly sophisticated, the team must look for new sources of contamination such as the flooding of septic pits and sewerage overflow. Water truck distribution also deserves special attention. The water in the tank may not only get contaminated en route or at an inadequate source (Fig. 5.2), but the tank itself may be contaminated after being used to transport toxic substances.

SEWAGE DISPOSAL

In addition to the water supply, the disaster may also affect the sewerage system, either by structural damage, breaks in the network, electric power failures, main blockage from debris, or flooding of the mains and septic pits with consequent sewage overflow.

It is important to determine where the effluent goes, as plant malfunction may result in the discharge of untreated sewage into rivers or canals and eventually contaminate sources of drinking water.

Sources of Information

A. Municipal officers, for example, a public works official (he may have maps of the sewerage system and may already have damage reports).

B. Visits to the plants and quick surveys of the most affected communities to observe possible damage.

SOLID WASTE DISPOSAL

Proper solid waste disposal systems are nonexistent in most Latin American countries. In urban centers, garbage is usually collected and transported to a dumping ground for burning; however, absolute combustion is never achieved, partly because the garbage is not sorted. Sometimes local authorities have the rubbish

buried, but, on the whole, very few Latin American countries have proper sanitary landfills for adequate solid waste disposal.

Under these circumstances it is easy to imagine how a disaster may affect an already unsatisfactory system. Floods may unearth buried rubbish and carry it to the rivers or other possible sources of drinking water. Rain or floodwater may accumulate in discarded tins and old tires. The normal system of rubbish collection will probably be interrupted by the disaster–be it a flood, hurricane, or earthquake–and the disaster itself may add more rubbish and debris. The problem may be similar to that of some settlements after the Popayán earthquake in 1983; garbage containers and collection trucks had been provided, but the trucks could not get to the containers during the rainy season because the improvised settlement roads were not paved.

Accumulated solid waste creates a public health problem: it is an excellent breeding site for flies, mosquitoes, and rats and attracts dogs and other animals, increasing the risk factors for disease transmission.

Sources of Information

A. A visit to the dump or sanitary landfill. This will reveal both its capacity as a breeding ground and its distance to human habitation; the community's exposure to the vectors can then be deduced.

B. Local authorities. Municipalities are usually responsible for waste collection and disposal; the official in charge should have an assessment of conditions.

C. Observation of community conditions (such as accumulated garbage in the streets and the presence of flies, dogs, and rats).

HUMAN SETTLEMENTS

Some disasters may cause migration of population groups, either because their lives are in danger or because their homes have been destroyed. Other scenarios result in migration because people have lost the normal means of earning a livelihood and are looking for work or food. In most disasters a number of new human settlements emerge, most of which are unauthorized. They tend to be located in inappropriate and insecure areas, where there is danger of landslides or sudden floods. They usually have no treated water supply, and rely on rivers, ravines, and sometimes even on the sewage system. Nor do they have a system of waste disposal or sewerage. The building materials and lighting system used frequently pose fire hazards.

These places require epidemiological and environmental surveillance, as they are a potential source of health problems.

Sources of Information

The municipal authorities, civil defense, Red Cross, and frequently the environmental sanitation section of the local health department have information on the number of settlements, their location, the number of residents, and the sanitary conditions.

FOOD HYGIENE

When the disaster causes frequent interruptions in the supply of electric power, frozen foods repeatedly thaw and freeze, eventually spoiling. The assessment team should investigate, and recommend that a monitoring system be set up.

Kitchens in evacuation camps and at emergency meal distribution points require special surveillance for a refrigeration system, pest–proof storage, facilities for washing utensils, and garbage disposal.

When foods are cooked in a central kitchen for distribution to the evacuation camps, the possibility of spoilage during transport should be considered.

Food contamination can occur in public markets when they are flooded with sewage water. In addition, lapses in garbage collection, the presence of pests, and lack of water for personal and utensil cleaning increase the possibility of contamination.

Pollution with pesticides or other chemicals while food is in transit or stored should not be overlooked.

Sources of Information

In order of priority, the assessment team should make quick survey visits to some evacuation camps, kitchens, meal distribution sites, emergency' kitchens, markets, and storage places. The health inspector will be the person to provide information on these areas, but health center personnel may also have noticed any outbreaks of food poisoning.

CORPSES

The presence of dead bodies, human or animal, always causes anxiety among the population, and newspaper headlines about epidemics created by corpses are common. In fact, the psychological problem is greater than that of health. If people who died in disasters had not been suffering from communicable diseases, as is generally the case, they do not represent an urgent public health problem. In theory, the proximity of the bodies to water sources may cause contamination by coliforms, and eventually also the proliferation of synanthropic flies, but it is highly doubtful that corpses represent a greater risk than do other side effects of a disaster. The disposal of bodies should take second priority to the needs of the living.

An earthquake may disinter bodies, as happened in Popayán in March 1983, or a cemetery may be flooded, as occurred in Ecuador in 1983, but this does not represent a serious health problem. However, health authorities may be forced to take some measures in order to calm the population. Burning is never a satisfactory system of disposal. It takes a vast amount of fuel and may even be dangerous. The most satisfactory disposal method is burial, although this may be difficult in terrain that has been flooded for months, for example, in Bolivia in 1982 when thousands of cattle died. Special flame–throwers can be used for a large number of animal carcasses. Throwing lime on corpses has no effect other than psychological among the population (it was done for this reason in the cemetery of Popayán

Sources of Information

The mood of the population can be often be gauged from the newspapers. In addition, local health authorities will have received complaints from community leaders.

A quick survey of the community will reveal the extent of the problem and whether the bodies represent a serious health problem, particularly if they are close to or in the water supply.

Public works officers will know whether adequate machinery is available for large excavation and mass burial. It is also important to know whether there are disaster provisions in the law for the disposal of bodies without previous identification and postmortem.

CHECKLIST

Water Supply

Basic questions

• Has the disaster affected the water supply?

  – Is there structural damage?
  – Is there functional damage?

• Has the disaster affected the water quality?

• What are alternative means of supply?

• What equipment is needed for restoration of the supply?

Sources of information

• Organizations responsible for the supply

  – Ministry of health
  – Ministry of housing
  – Public works

– Municipality
– Housing development

• At community level

– Sanitary engineer
– Public health inspector
– Official in charge of public works

• In the absence of information

– Quick community survey

* where does the water come from?
* how is the water distributed to the community?
* how is the water stored in the homes?
* are there rumors of breaks in the system? (If yes, visit)
* samples of water: residual chlorine coliforms

Water treatment plant

• Physical damage to the structure
• Plant operations book
• Interruption of service
• Interruption of electric power

Wells

• Damages to physical structure
• Operations book
• Depth of well
• Proximity to potential sources of contamination
• Type of soil
• Breaks in sewerage system

Other water sources

• Sources of contamination
• Overflowing of pits
• Contamination of water carriers

Sewage Disposal
Basic questions

• How has the disaster affected sewage disposal?

– Structural/physical damage
– Functional damage

* blockage of the network
* overflowing of septic pits

• Is it creating a public health hazard?

• What equipment is needed for restoration?

Sources of information

• Public works official at the municipality
• Visit to the plant
• Survey of the area

Solid Waste Disposal

Basic questions

• How has the disaster affected the normal waste disposal system?
• How is the sanitary landfill or dump being affected?
• What is the potential health hazard?
• What new waste has been originated by the disaster?
• What equipment is required to solve the problem?

Sources of information

• Municipality
• Visit to the dump
• Observation of the community

  – Accumulation of rubbish
  – Stray animals
  – Flies

Human Settlements

Basic questions

• Is the disaster creating migration/evacuation of large human groups?
• Are new settlements being created?
• What are the sanitary/health conditions in these settlements?
• What are the potential health problems in the settlements?

Sources of information

• Municipal authorities
• Civil defense
• Red Cross
• Environmental officer at local health department

Food Hygiene

Basic questions

• Is the disaster creating food hygiene problems?
• Is the central kitchen hygienic?
• Is the food being contaminated "en route"?
• Is environmental sanitation in the markets satisfactory?
• Is the donated/received food inspected?

Sources of information

• Local health authorities
• Inspection
• Central kitchen
• Emergency kitchens
• Markets
• Food storage depots
• Occurrence of food–borne disease outbreaks

Corpses

Basic questions.

• Are there a large number of unburied bodies?
• Are they close to/in sources of water?
• What are the legal regulations for disposal of bodies?

• What are the local customs for disposal of bodies?

Sources of information

• Local health authorities
• Registries of births and deaths
• Hospital/police/municipal morgues
• Inspection/quick survey

6. Vectors

Floods are more likely to cause vector problems than any other type of disaster because of their effect on vector habitats.

Vector and breeding sites such as puddles and water collected in discarded containers and old tires may increase as a direct result of the floods or they may be altered indirectly when uncollected garbage increases. The flood may also destroy the normal habitat of animals such as dogs and cats that are likely to be parasitized by ticks, fleas, lice, and mites. In seeking safer ground, these animals may come closer to human population groups and transmit their ectoparasites. Population migration is yet another risk factor, as it may cause overcrowding that enhances the transfer of vectors. Finally, the disaster may interrupt ongoing vector control programs (PAHO Sci Pub No. 419).

The increase in the vector population will happen gradually. In fact, some mosquito population indices tend to rise as flood waters recede and leave pools of stagnant water. It also takes some time for other vectors and rodents to multiply to nuisance or hazardous levels.

Public health problems hence will not appear at the peak of the flood, which is precisely when health authorities are under the greatest pressure from the population for action. Table 6.1 has been adapted from PAHO Scientific Publication No. 420; it lists the illnesses produced by the vectors most likely to be encountered during or after a disaster.

MOSQUITOES

When flooding occurs, health authorities are pressed by public opinion, the mass media, and ill–advised politicians to initiate emergency spraying campaigns. These are often badly designed, ill–timed, and use inappropriate insecticides. It is important to consider that (a) it generally takes about two months for the flood's effects to be evident in mosquito populations; (b) certain types of mosquitoes are essentially "domestic" while others are sylvatic; (c) the effect of the insecticide or larvacide depends on the mosquito's life cycle; (d) certain varieties of mosquitoes have become resistant to some insecticides; (e) poorly planned campaigns may actually cause insecticide resistance; and (f) if it is still raining, residual sprays will be washed away.

There are laws regarding the sale, transport, and use of certain insecticides. For example, it is almost impossible to buy DDT in the United States, and passenger airlines are permitted to transport only very small amounts of some insecticides, like malathion.

TABLE 6.1. Vector– and rodent–related diseases.

Vector/rodent	**Diseases**
Mosquitoes	Encephalitis
	Malaria
	Yellow fever (urban)
	Dengue
	Filariasis
Filth flies	Diarrhea
	Dysentery
	Conjunctivitis
	Typhoid fever

	Cholera
Lice	Epidemic typhus
	Louse−borne relapsing fever
	Trench fever
Fleas (dogs, cats, rats)	Plague
	Endemic typhus
Mites (dogs)	Scabies
	Rickettsial pox
Ticks (dogs)	Tularemia
	Tick−borne relapsing fever
	Rocky Mountain spotted fever
Triatomas	Chagas' disease

The assessment team should compare the size of the vector population to its preflood size, and project what it will be in two or three months if no corrective measures are taken. An apparent increase in breeding sites or vector density may be nothing more than seasonal variation.

To get an overview of the situation and devise the best control strategy, the team should plot the following on a map: mosquito population size and breeding sites; their geographic distribution, migration pattern, and accessibility; number and availability of trained vector control personnel; and location of insecticide and equipment stocks. This data should be correlated with epidemiologic findings (e.g., case distribution, location of the outbreaks) and with meteorological observations about expected rainfall patterns.

Sources of Information

There is probably an already−existing malaria or Aedes aegypti eradication program in the country that can provide a picture of the normal situation, the frequency and regularity of spraying cycles, and the mosquitoes' resistance to the insecticides. If there is no such program, the local epidemiologist will probably have some information on the density of the mosquito population by type. In either case, the team should visit disaster areas to check the location, quantity, type, and condition of stocks of existing equipment and insecticides.

A visit to the ovitrap (mosquito traps) sites (if any) and breeding places may be useful. Health centers will know if there is an active case finding for malaria. In endemic areas, blood is sometimes taken in all febrile cases of unknown or doubtful etiology. It is important to know whether each center has facilities for reading the blood samples or if they are sent to a central laboratory. If the latter is the case, the team should find out how long the results take and whether the system has been interrupted by the disaster.

The data collected in this first assessment will give a broad view of the general status. However, a detailed report should then be made on the amounts and types of insecticides needed for at least the next six months, as well as a list of required equipment and personnel.

The assessment team may have to test the sensitivity of the mosquitoes to the insecticide and the best time of the biological cycle in which to apply it. In disaster situations, adult control is preferable, although larvicides may also be indicated, especially if larval control was practiced before the flood.

Data on such factors as population, migrations, rainfall patterns, and destruction of houses should be checked by field observation to see whether displaced populations are more exposed to the mosquitoes. This can happen when migration is toward breeding areas, when houses have been destroyed and their inhabitants are less protected, or when intense rainfall is washing away residual insecticide.

CHECKLIST

Mosquitoes

Sources of information

• Vector control programs

• Aedes aegypti eradication program

    * national
    * regional

• Malaria eradication program

    * national
    * regional

• Epidemiologist
• Regional
• Malariologist
• Program warehouses
• Institutes of entomology
• Ovitraps/breeding sites
• Health centers

Entomologic data

• Type of mosquito
• Distribution
• Population density
• Seasonal variations in density
• Effect of floods on habitats
• New flood–created breeding sites or reservoirs

    – Habits
    – Resistance to insecticides

Control program data

• Has it been interrupted?
• Is there any entomological surveillance program?
• Personnel: type, number, location
• Insecticides

    – Types in stock
    – Amount
    – Location

• Equipment

    – Types: slides, microscopes, reagents
    – Amount
    – Working condition

• Surveillance of cases

    – Passive
    – Active case finding
    – Spraying cycles
    – General data

    *geographical area affected
    *geographic distribution of population
    *migration
    *exposure to the vector
    *destruction of housing
    *settlements and evacuation camps
    *distance to breeding sites
    *road destruction
    *diversion of water and sewerage systems (creation of new breeding sites)
    *amount of rain

*sq. kms. or number of houses to be treated
*estimated amount of insecticide to be used

cost
transport regulations
means of transport
local agents

*equipment needed to carry out the estimated spraying

cost
personnel to be trained

OTHER VECTORS

The survey of morbidity and mortality (see Chapter 4) will show whether vectors other than mosquitoes should be a public health concern. Furthermore, from observation of ecological changes and field investigations, the team will get some clues as to the likelihood of future problems.

Comparative data for before and after the disaster may be available. Whether or not this is so, the observer should note prevalent conditions and check rumors while carrying out the survey.

Sometimes merely noting such things as the presence of stray dogs, dead rats, and uncollected garbage in the streets; the state of dumps; the cleanliness of street markets; the abundance of flies; the hygiene condition of the evacuation camps; and complaints about mosquitoes, fleas, and lice will suffice for a rough Judgment of the situation.

RODENTS, DOGS, AND SNAKES

During floods, reports and rumors are common about problems created by such animals as dogs, rats, mice, and, in rural areas, snakes. Sightings of these animals may increase as they compete with man for dry space and food after their habitats are disturbed by the flood. Moreover, the disaster may cause a breakdown in the garbage collection system, and the accumulation of rubbish will attract rodents and dogs. There have been rumors of packs of dogs attacking humans after a disaster, although these rumors are more frequent after earthquakes than floods. While few actual rabies cases have been confirmed, it is a problem in most Latin American countries, and closer contact between dogs and men may increase the number of dog bites. Dogs and rodents may also carry ectoparasites such as fleas and ticks which can be vectors of disease. In addition to destroying food, rodents may cause certain diseases such as leptospirosis and rat–bite fever.

During the Bolivian floods of 1982, many families reported seeing snakes in their homes but could not say whether they were poisonous. Among the more than 100 families interviewed bimonthly over one year (during which time more floods occurred), there was only one "heard–of" case of a snake bite. Similarly, during the 1983 floods in Ecuador, there was an increase in the sighting of snakes: the report of one herpetologist indicated that 18 snakes had been captured in only one house during the two–week period. Most of them were not poisonous and even the poisonous ones posed very little risk to man because of their habits or the anatomic position of their teeth (Touzet, 1983). Nonetheless, there were numerous rumors of poisonous snake bites (which exhaustive investigation failed to confirm in most cases).

In assessing the situation, the team must determine whether there has been an increase in the number of pests and, if so, whether a public health hazard exists, either directly (e.g., bites, food contamination) or indirectly (plague, scabies, etc.).

Sources of Information

Emergency departments and health centers should know of increases in the number of animal bites (and corresponding fatalities). The checking procedure is the same as for any other process described in Chapter 4.

If one exists, a national institute of hygiene or health and/or the epidemiology division at the health ministry or at the local level will have data on the number of rabies cases and whether an anti–rabies campaign exists. The veterinary division of the ministry of health or agriculture may have more detailed information.

There may also be a national serpentarium or a division or department of herpetology in the museum of national history that will have data on the poisonous snakes in the region. If there is reason for serious concern, the team should enlist the assistance of a herpetologist to carry out a special assessment.

Where plague is endemic, it may increase, but this will probably happen months after the floods have passed.

CHECKLIST

Rodents, Dogs, Snakes

Sources of information

- Emergency department
- Health centers
- National institute of health/hygiene
- Epidemiology division
- Veterinary division
- National serpentarium
- Division/department of herpetology; natural history museum

Check

- Increase in number of animals seen
- Increase in number of bites treated
- Dead rata
- Stray dogs
- Poisonous snakes in the disaster area
- Availability of serum (rabies, snake venom)
    - Production
    - Distribution
    - Control
- Existing control programs
- Surveillance system for diseases indirectly due to rodents and dogs

7. Food and nutritional status

FOOD

Not all disasters cause food shortages and nutritional problems. Floods can destroy crops, but the population of the area may not be significantly affected–there are few communities today that depend exclusively on their own crops for food.

Serious nutrition problems are caused mainly by isolation, distance to markets, and socioeconomic problems created by the floods, such as loss of income. The latter may be attributable to the inaccessibility of workplaces, to the fact that they themselves have been destroyed or damaged by flood, or to crop destruction that has reduced family purchasing power. Floods may also damage food stored in warehouses, shops, and family larders or barns.

When large areas are flooded, when the floods are expected to be prolonged, and when communities are isolated, it can be assumed that food assistance is needed. The assessment team should determine the percentage (or absolute amount) of the expected food crop damaged by the flood and estimate the effect on energy intake. It should also do a rapid inventory of damaged stocks in stores, shops, and warehouses and compute the implications in terms of weeks or days of supplies lost for the community. To plan assistance, the team should have a rough idea of the number of families affected, the socioeconomic problems created by the flood, the extent of isolation, and the food habits of the population. The latter are often overlooked, with the result that foreign food assistance goes unconsumed because it is unfamiliar.

Sources of Information

The evaluator(s) should work in close contact with local agencies. Civil defense or its local equivalent usually has information about the size of the flooded area, crops destroyed, and population affected. This information may be completed with figures from the ministry of agriculture or its local representative (which may be the local agricultural extension officer). These officials will know how the flood has affected the present crop and whether it is likely to damage the next one. Agricultural cooperatives are common and are sometimes very well organized, with up–to–date and reliable data that may be quite useful.

The Red Cross and other voluntary organizations usually make quick surveys to determine the number of affected families, their location, and their needs.

Information on the population's food habits and nutrient intake may be available at the nutrition division or department of the ministry of health.

Most Latin American countries have at one time conducted a nutrition survey but the information may be outdated. The local (regional or provincial) nutritionist or nutrition officer (if there is one) may have recent information. They usually carry out small–scale nutrition surveys that may shed some light on the nutritional status and food habits of the community. The representativeness and scientific validity of these surveys should be interpreted cautiously, however.

Other sources of data about the size of the affected population and the socioeconomic impact of the flood may be the local officers of the ministry of social security or its equivalent, and social workers.

To determine sources of food supplies, their cost, means of transportation to or within the country and to the flooded area, and the distribution system among the people, the assessment team will have to meet and coordinate with civil defense, the armed forces, the World Food Program, Red Cross, and other voluntary organizations and international or government agencies. In many countries a food aid agency already exists and may be the most logical coordinating body.

EVALUATION OF NUTRITIONAL STATUS

A sudden–onset disaster does not cause an immediate deterioration of the nutritional status of the stricken community. It takes some time for the results of the food shortage to be reflected in the physical status and in the anthropometric parameters by which undernutrition can be objectively measured. However, if the disaster has long–lasting effects on food supplies or on the socioeconomic statue of the community, the incidence of undernutrition may increase. Physical evidence of undernutrition is noted first among vulnerable groups such as pregnant and lactating women and small children. The team needs to investigate how the flood has affected or is likely to affect the nutritional status of the community, and ascertain whether changes in nutritional status can be detected early.

Sources of Information

Although most health centers weigh and sometimes measure pregnant women, the practice of assessing nutritional status by using weight–for–height tables per week of pregnancy is not widespread (Gueri et al., 1982a). As result, it is unlikely that measurable and objective data will be found on the nutritional status of pregnant and lactating women.

Therefore it is better to concentrate on data about the nutritional status of children under 5 years of age. Even within this group, the clinical diagnosis of "malnutrition" or "undernutrition" has very little value because diagnostic criteria vary widely from one doctor to another. In addition, when undernutrition compounds other pathological processes, it is frequently omitted in both the clinical history and the death certificates. Nevertheless, health professionals might be more inclined to diagnose undernutrition in the abnormal climate of a disaster, which encompasses the emotional issue of food shortages and the phantom of widespread starvation. For all these reasons, assessing the frequency of undernutrition from clinical diagnoses in the clinical histories, "admissions books," "daily registry of patients," or death certificates frequently leads to error. The nutritional status of the community affected by the flood can be evaluated accurately only by using objective and measurable evidence such as weight, height, arm circumference, and similar anthropometric parameters.

A. Health centers:

Most health centers in Latin America and the Caribbean hold regular "well–baby" sessions, in which the child's growth is monitored. Usually weight–for–height or –for–age is registered on a standard growth chart

according to certain reference values. These registers make it easy to obtain data on the nutritional status of the child population. However, attendance at sessions may decrease markedly in emergency situations.

In many centers all children's weight (and sometimes height) is measured and noted in the clinical record (comparison of these measurements with the standard of reference and nutritional status recorded is not as regular). It is also likely that the health ministry will have established a nutrition surveillance system.

If the only reasonably reliable data are those on the clinical record, the team may have to survey the records. It should calculate the possibility of nutritional deterioration by matching the measurements against records from the previous year or months. This is a tedious and time–consuming exercise but may reveal changes in the frequency of undernutrition that may be attributed to the floods. A more important result would be the establishment of the baseline data for a surveillance system.

Common sources of error are incorrect measuring techniques, defective scales, and mistakes in calculating the children's ages (when using weight– or height–for–age as the parameter). Moreover, an unfortunate and well–known fact is that the worst cases of malnutrition never go to the clinics.

B. Hospitals:

Frequently the weight and height of the child are entered in the admissions book of pediatric wards. Data obtained from this source will give very biased results, as the sample is hardly representative of all the children of the community. Nonetheless, the team can tell from this whether more cases of malnutrition have been admitted since the flood.

C. In the absence of information:

If no recorded information can be found, the evaluators should conduct a survey that is as detailed and statistically significant as time and resources allow. The easiest and quickest way is to measure the arm circumference of the children seen at the clinics. Within certain limits, arm circumference is relatively independent of age; it can be compared with the reference values suggested in Table 7.1. This method has been used to assess nutritional status of the community in emergency situations in the Americas (Gueri et al., 1982b) and on other continents (Guerney, 1969).

TABLE 7.1. Reference values of arm circumference.[a]

Age group	Value below which a child would be considered malnourished
Under 3 months	9 cms
3 to 5 months	11 cms
6 to 23 months	12 cms
24 to 59 months	13 cms

[a] For more details as to measurement techniques and reference values, see D.B. Jelliffe, "The Assessment of the Nutritional Status of the Community (Monograph No. 53), Geneva, World Health Organization, 1966.

CHECKLIST

Food

Basic questions

• What percentage (or absolute numbers in tons or hectares) of the expected food crops (and cash crops) have been destroyed by the flood?

• What is its significance for energy intake?

• What is the loss of stored foods, and what does it imply in terms of weeks or days of supply for the community?

• How many families are affected?

• What is the extent of isolation? Its expected duration?

• What are the socioeconomic problems created by the flood?

• What are the food habits of the community?

Check

• Destroyed crops

  – Types of crops destroyed
  – Amount destroyed as percentage of the expected crop

• Percentage of caloric intake from local sources
• Effect of flood on next crop
• Amount of stocks destroyed

  – As percentage of total stock
  – Energy equivalent

• Number of isolated families
• Degree of isolation
• Socioeconomic problems created by flood

  – Loss of employment
  – Isolation from workplace
  – Destruction of workplaces
  – Loss of earnings due to destruction of crops

• Food habits of the population

Nutrition
Sources of information

• Civil defense or equivalent
• Ministry of agriculture and local officers
• Agricultural cooperatives
• Red Cross
• Voluntary and social organizations
• Social workers
• Nutritionist
• Hospital

  – Admissions book, pediatric ward (anthropometric measurements)

• Health centers

  – Well–baby clinics (growth charts)
  – Clinic records

  * weight–for–age
  * weight–for–height

• In the absence of any data: arm circumference of those children present at centers

8. Evacuation camps

The establishment of temporary camps should be avoided whenever possible, unless necessary to save lives. Uprooting families from their homes and normal environment and grouping them with other unknown families in a confined space with little privacy often leads to psychosocial problems. Furthermore, because their food and basic needs are generally provided for, camp inhabitants have little to do, and it will not be long before suspicions, disagreements, and quarrels begin between families or groups. Complaints against the camp

administration are common, and violence sometimes erupts. Moreover, the postdisaster "dependence syndrome" can result in difficulty moving people back to their homes.

From a public health standpoint, most of the risk factors for epidemics (discussed in Chapter 4) are present. Overcrowding and insufficient sanitary facilities are the rule, facilitating the transmission of communicable diseases. The evacuees should be sent back to their homes as soon as possible.

These considerations notwithstanding, camps are often set up unnecessarily, either because of ignorance or because, from an administrative standpoint, it is easier to manage relief operations.

Because they are a source of potential health problems, the camps are "special cases" and the assessment team must pay particular attention to them.

It is not the purpose of this publication to discuss either the recommended physical characteristics of evacuation camps or their administration. The manual prepared by UNHCR in collaboration with WHO (UNHCR, 1982) covers these area. It is worth mentioning, however, that many of the official camps set up in the event of natural disasters are in fact indoor stadiums or schools. The camps that mushroom spontaneously in some cases, such as after the Popayán earthquake of 1983, pose less of a health problem in principle (overcrowding is not severe), but soon become permanent shantytowns.

The team's main objective is to find out what actual or potential health problems exist in the camps and thus what the needs are for shelter, food, medical services, potable water, and sewage and solid waste disposal. This process also involves determining the population size, geographic location of the camps, and the possibility of overcrowding and psychological problems.

When visiting the camp, the team should note its aspect and physical appearance, as well as its location and proximity to any vector breeding sites, the demographic characteristics of the evacuees, the social aspects, medical care, environmental sanitation, and likelihood of outbreaks.

Sources of Information

The assessment team can get data on the total population of the camps and their geographic location from civil defense and sometimes from the Red Cross and health services. From discussions with area authorities, the team can select a sampling of evacuation camps, those that are most representative and in which health problems are likely to develop.

The team should encourage the camp director to fill out the checklist or a similar one and send it to the responsible institution. Certainly the health data should be sent to the public health officer responsible for the region.

CHECKLIST

Basic Questions

- What is the total population of the evacuation camps?
- What is the number and geographic location of the camps?
- Are the camps overcrowded?
- What are the needs for food?
- What are the needs for medical care and supplies?
- What are the sanitary conditions?
- What are the potential psychosocial problems?
- Where did the occupants come from?
- How badly were their home areas affected?

Sources of Information

- Civil defense
- Red Cross
- Health officers in the region

General

• Total number of camps
• Total population of camps
• Agency responsible for camps

Check

• Physical aspect

– Type of camp:

school, church, etc.
temporary shelter: type

– Area:

total
covered

– Partition between families, means of privacy
– Area per person
– Paving
– Water supply
– Proximity to vector–breeding sites Proximity to garbage dumps

• Administrative, social, and demographic aspects

– Agency responsible for the camp
– Camp director's normal occupation/profession

* his/her previous experience in evacuation camps
* formal training in camp administration

– Aides (specify number, normal occupation, and responsibility area within camp)
– Total number of evacuees and demographic distribution
– Percentage of evacuees engaged in camp activities and work
– Percentage of evacuees working outside the camp
– Schooling

* classroom hours/week
* educational talks
* number of hours/week

– Other social activities (specify)

• Medical attention

– Physician	No. hrs/day	
– Nurse	No. hrs/day	
– Nurse's aide	No. hrs/day	
– "First–aider"	No. hrs/day	
– Other (specify)	No. hrs/day	
– None		

• Distance to nearest health facility
• Clinic, first–aid center
• Equipment for first–aid

• Drugs[a]	Amounts (or for "x" weeks)
– Analgesics	
– Antianemics	

– Antimalarials	
– Antihelminthics	
– Antacids	
– Antiseptic solutions	
– Bactericides	
– Dermatologic ointments	
– Ophthalmic ointments	
– Oral rehydration salts	
– I.V. fluids	
– Water ampules for injection	
– Vitamins	

• Security for drugs
• Epidemiological surveillance system

– None
– Detailed
– Simplified
– Frequency of data collection
– Responsibility of?
– Data sent to?
– How?
– With what frequency?
– Daily registry of attendances

* type of illness registered
* most common illnesses

rate per 100 camp inhabitants

* any outbreaks at present
* describe:
* verified

yes
no

[a]The list of drugs described in the UNHCR/WHO Manual can be modified according to the prevalence of diseases and demographic characteristics of the camp (UNHCR, 1982).

• Environmental sanitation

– Water: piped

* no. of persons/faucet
* no. of persons/shower

– Laundry sink(s)

* average size
* no. of persons/sink

– Tank

* capacity

– Alternative

* water truck (frequency)
* other (specify)

– Storage

* capacity
* covered?

• Sewage disposal

– Flush toilets: not/total or per every 10 people
– Septic pit: not/total or per every 10 people
– Trench

* length
* no. of holes

– Other (specify)
– Aspect

• Solid waste disposal

– No. of containers
– Capacity
– System of disposal

* collected (frequency)
* buried
* burned
* dumped (distance from the camp)
* other

• Food

– Agency responsible
– Types of foods
– No. of meals provided
– Calories/inhabitant/day
– Protein mgs/inhabitant/day
– Supplementary feeding program

* beneficiaries

type
number

* types of foods
* copy of weekly menu
* central kitchen

condition
washing facilities

– Individual/family cooking

* fire hazards

– Storage

* pest–proof
* refrigerated

• Nutritional status

– Surveillance system

* describe

* weighing scale No. Type

* length of board
* tape measure

– Prevalence of undernourished in the vulnerable population

9. The health center

Throughout this manual the health center is referred to as one of the most important sources of information for assessing the impact that floods have on the health sector. In many cases, the health center is also the first contact point between the community and the health system–it certainly gets the largest share of demand on the system. Therefore 8 detailed damage check on the centers is important.

Obviously, the assessment team will not be able to visit every health center in the flooded area; the most critical centers should be selected ("critical" means those with the highest demand or the most severe flood damage). The items that the team should look for are in the following checklist. This checklist, or a similar one, should be on hand in all centers in disaster–prone areas so that center health workers can make their own rapid assessment after the disaster and, as soon as it is feasible, relay this information to the health authorities in the region, by any means of communications available. The data gathered will also be invaluable for programming the center's local disease control measures.

Many of the questions will be unnecessary if there was a disaster plan prior to the disaster. All such plans should include an appraisal of the physical state of the health facilities and an inventory of its resources.

CHECKLIST

Basic Questions

• What physical damage has the center sustained?

• What is the degree of its isolation? (transport, communications)

• Has the flood affected its staff? If so, how?

• What illnesses are on the rise?

• What is the increase in the demand for care? What kind?

• Can the demand be met by staff other than doctors? If so, type (i.e., nurses, paramedics, health aides, health promoters)

• What are the existing supplies (for "x" number of months) of:

– Drugs
– Curative material X–ray material
– Laboratory material
– Basics (such as soap, etc.)

• What are the expected needs for supplies?

Infrastructure

• Physical damage

– Damage to the building
– Describe

* where
* type of damage

• Electricity

– No
– Yes

• Irregular (hrs/day = _____)

• Generator

– No
– Yes

* adequate
* defective fuel sufficient insufficient why?

• Telephone

– No
– Yes

* irregular
* nonfunctioning

• Transceiver

– No
– Yes
– Nonoperative

• Water

– Enough?

* no
* yes

– Responsible company
– Piped inside the clinic
– Piped into the yard
– Water tank

* no
* yes capacity

– Source

* treatment plant
* well (depth= _____)
* other: specify
* chlorinated no yes unknown

– Alternative source

* cistern
* water truck

frequency
storage

type
capacity
covered?

river/gorge
other: specify
treatment system: specify

• Sewage disposal

– Sewerage system

* functioning?
* obvious breaks near the clinic?
* pools of sewage water?

– Latrine

* flooded?
* overflow?

• Solid waste disposal

– Collected?

* responsible agency
* nonoperative
* irregular

– Disposed:

* buried
* burned
* communal container

Health Services

• Population covered by the center

– Directly
– Indirectly (referrals)

• Communications with dependent/referral centers

– Roads

* adequate
* difficult
* impossible

• Ambulance

– None
– Damaged?
– Fuel

* adequate
* insufficient
* none

• Laboratory

– None
– Nonoperative (reason)
– Partially operative

* possibility of performing tests

– Lab material

* Sufficient for_____(period)

• X–ray

– No
– Nonoperative (reason)
– Possibility of performing examinations
– Materials sufficient for_____(period)

• Curative material

– Sufficient for_____(period)

• Basic supplies

– Sufficient for_____(period)

Personnel

• Type	Resident No.	Nonresident No.
– Doctors		
– Nurses		
– Nurse's aides/auxiliaries		
– Technicians		
– Statisticians		

Statistics

• Daily attendance of children/adults

• Most common conditions

• Percentage of undernutrition

• Percentage of endemic conditions

Immunizations

• Coverage by type

• Attendance since floods

– Same
– Increased
– Decreased

• Any campaign since the beginning of floods?

– Type
– Doses completed (No.)
– Only 1st doses (No.)
– Only 1st and 2nd doses (No.)

• Cold chain

– Refrigerator

* no
* yes

operative
temperature
adequate?

* nonoperative

why?

* if not electric, sufficient fuel?
* vaccine supplies

type no. of doses

* containers (cold boxes or thermoses)

adequate
insufficient

* ice

no
yes

Pharmacy

• Qualified pharmacist? No Yes
• Damage to the supplies? No Yes
• Approximate duration of drugs stocked

– Analgesics
– Antihelminthics
– Bactericides
– Antimalarials
– Antianemics
– Dermatologic ointments
– Steroids
– Cardiovascular drugs
– Antiseptic solutions
– Antacids
– Ophthalmic ointments
– Oral rehydration salts
– Water ampules for injection
– I.V. fluids
– Vitamins

General Information About the Center and the Community

• Isolation:

– Transport system to nearest community where supplies can be obtained

* road

little difficulty
difficulty

only 4–wheel–drive
crossing river or flooded gorge

by foot
by boat

mule or similar

* boat only
* helicopter only

• Communications

– Ham operators in community
– Police/army radio

• Food supplies

– Adequate
– Shortage

* type of food

• Fuel

	Gasoline	Kerosene	Other (specify)
– Adequate			
– Rationed			
– Severe shortage			
– None			

• Insects/stray animals

		Increase	
	No	Yes	Severe

– Mosquitoes

* type (if known)

– Flies
– Rats
– Mice
– Dogs
– Snakes

* poisonous

– Other (specify)

• Observation

– Pools of rainwater
– Pools of sewage water
– Rubbish
– Stray dogs
– Flies
– Mosquitoes Houses destroyed/semidestroyed

• Estimated number of homeless families

10. Surveillance systems

The preceding chapters have been concerned with the assessment team's retrospective survey of a flood's impact on health. It is quite likely, however, that the overall effect may take some time to become completely evident. Therefore a quick and simple monitoring mechanism should be in place which gives health officials an early warning of negative changes in the health status of the community. The changes detected should then be investigated and verified to design corresponding control measures.

By keeping a close watch on the community, the monitoring or surveillance system simultaneously allows health officers to deploy personnel and supplies according to objective need and to formulate logical relief requests.

Epidemiologic surveillance systems for communicable diseases are the most widely known and used in normal times to monitor the health status of a community. Yet in disaster conditions, noncommunicable diseases may also have to be monitored. If the initial survey indicates that risk factors have changed for the worse or are about to, the usually protracted duration of floods calls for setting up additional monitoring systems as a special precaution. These systems follow.

Nutritional surveillance In floods perhaps more than in any other disaster with the exception of droughts, crops are likely to be damaged and long–term nutritional deficiencies may result.

Water–quality monitoring: Experience has shown that gastrointestinal disorders are a concern related to contaminated water supplies.

Entomologic surveillance: Floods tend to alter ecological habitats in a way that may be favorable to vector breeding and increased human exposure.

One of the responsibilities of the assessment team is to determine whether a surveillance system exists and, if so, whether it adequately monitors the flood–created conditions. If not, the team should identify those areas in need of surveillance and recommend guidelines for establishing simple and rapid monitoring and reporting systems.

These systems should target the population at greatest risk, as defined in Chapter 1. They will be most effective if the team tries to integrate rather than bypass existing reporting systems, no matter how rudimentary these may be.

The basic guidelines for each of these monitoring systems are outlined below.

EPIDEMIOLOGIC SURVEILLANCE

Although no serious outbreaks have occurred after recent disasters, the potential (as mentioned in Chapter 3) is there. To avoid an out–of–control situation, the usual monthly reporting system discussed in Chapter 3 is not adequate–the reporting is too infrequent and takes too long to reach the decision–making levels; precious time is then lost in instituting control measures.

A simple reporting system should be established which is transmitted on a daily or, at most, on a weekly basis. It should not depend on physician diagnoses but symptoms or signs that can be detected by health staff with the most basic training (or even by nonhealth personnel).

A questionnaire for this purpose should be designed or adopted (Figure 10.1) (Western, 1982) based on symptoms of the minimum number of conditions likely to occur. The assessment team should make copies available at health centers in high risk areas so that the reporting system is enhanced and the staff is alerted if an outbreak is probable.

The conditions to consider are those endemic to the region, those seen by the assessment team to be on the rise, and those that experience has shown to be common during and after floods.

This system will unquestionably overestimate the prevalence of certain conditions (this was demonstrated in Bolivia during the 1982–83 floods, when a simplified, symptom–based system was compared with the "institutionalized" diagnosis–based reporting system. However, it should be kept in mind that such a

mechanism is for early warning, and the information is to be confirmed before control measures are taken. In a disaster situation, it is better to be overly cautious than unprepared.

The team may want to include noncommunicable conditions that are not normally reported in routine epidemiologic surveillance programs. During the "El Niño" floods of 1982–83, for example, Bolivia and Ecuador decided to include animal bites and skin lesions in their system.

Sources of Information

Obviously, the health centers should report data for the simplified surveillance system. The main value of the system, however, is to collect information from sources closer to the community, such as the health promoters or community health workers, and in certain circumstances school teachers and staff at the evacuation camps.

Frequently the Red Cross and other voluntary, religious, and social agencies organize health dispensaries that may be manned by paramedics and "first–aiders" but are often not supervised by medical personnel. These may be the only places for miles around in which some sort of health care is provided and thus become an important source of information.

FIGURE 10.1. Daily report of disease surveillance.

Easy–to–recognize symptoms or diseases

Health installation or aid group:...	Date:...

	Cases		**Deaths**	
	Younger than 15 years	**Older than 15 years**	**Younger than 15 years**	**Older than 15 years**
Fever (without diarrhea/cough)[a]				
Fever with diarrhea[b]				
Fever with cough[c]				
Measles				
Meningitis				
Dogbite				
Snakebite				
Burns				
Trauma				
Energy–protein malnutrition				
Other				
Daily total				

Comments:_____

a Indicative of malaria, dengue.
b This can be subdivided according to blood, mucus, vomiting.
c Indicative of respiratory infection.

Source: PAHO, Emergency Health Management after Natural Disaster, Sci Pub No. 407, Pan American Health Organization, Washington, D.C., 1981, p. 26.

Data Processing and Reporting

Each reporting unit processes its own data; by calculating simple percentages of cases over attendances, it compares the proportion of certain conditions on different days. This information should be passed on to the nearest health unit on a daily basis, if possible, or at least weekly.

The health unit–be it a dispensary, health center, or hospital–should compile the data from the different reporting sources within its geographic area of influence. It then processes, analyzes, and interprets the

information and relays the results to the next level health unit. The "primary" or "basic" health unit normally will be the first to investigate an increase in the number of cases of a given symptom or symptom complex and, once they are verified, will attempt to diagnose the clinical entity causing the symptom or symptoms. If the outbreak is confirmed, this unit will take the first steps to control it, and will inform the next administrative level of the outcome. The primary unit may request assistance in the diagnosis or control phase.

The interpretation of the processed data and the control measures taken at each level are the core of the simplified epidemiologic surveillance system in disasters. Without this process of investigation, verification, diagnosis, and control, the system is worthless.

Each health unit should be prepared in advance to carry out the process for two reasons: (a) the unit may be isolated and unable to request assistance, and (b) it may be critical to take control measures as soon as possible. Transmitting the information may be difficult: normal means of communications may be broken down as a result of the disaster and not all communities have a police post with a radio or "ham" operator. At times it may only be possible to send data with a returning rescue or relief party.

Sources of Error

As has been mentioned earlier, a system based on symptoms tends to overestimate the potential for outbreaks of certain diseases. The symptoms may be vague and ill–defined for a given condition. In general, this system is sensitive but not very specific.

A common source of error is a reporting system that mixes diagnoses and symptoms' or that has nonmedical personnel making diagnoses. All too often numerous cases of "malaria" or "typhoid fever" are reported by first–aiders with tremendous good will but very little training.

NUTRITIONAL SURVEILLANCE

Monitoring the nutritional status of the community allows the authorities to decide whether to establish, continue, or discontinue a food aid or supplementary feeding program for vulnerable groups. It also pinpoints those communities most in need of nutritional assistance.

Young children are particularly sensitive to the effects of food shortages and are the first to show signs of malnutrition. For that reason, the surveillance system should concentrate on them.

Sources of Information

A. Health centers and dispensaries:

The weight and sometimes the height of children attending health centers are usually measured and recorded. Unfortunately, in too many instances, the data are never analyzed or compared with a standard of reference or used for an intervention program. Such information is key to establishing a simplified system of nutritional surveillance.

Most countries have adopted a standard of reference for weight–for–age or weight–for–height and established criteria for degrees of nutritional status. These are based on the Gomez classification that is common throughout Latin America, on the WHO classification, or on some other local standard. Whatever standard and classification is used in the area should be the bands for the surveillance system. A simple form of recording data is shown in Figure 10.2.

FIGURE 10.2 Nutritional Surveillance.

Health center_____

Date_____

Parameter (weight–for–height, weight–for–age, etc.)

Classification (Gomez, WHO, national, etc.)

Age group	Normal	Deficient	Total

Under 1 yr.	/ / / / / / / / / /	/ / / / / / (6=37.5%)	16
1 to 4 yrs.	/ / / / / / / / / / / / / / /	/ / / / / (5–25X)	20
Total	25	11= 30.5%	36

The form illustrated in Figure 10.2 can be filled out every day, every clinic session, or every month, depending on the circumstances.

B. Evacuation centers, schools, other shelters:

Evacuation centers and other shelters can use a system similar to that suggested for health centers. In schools or evacuation centers, for instance, children can be weighed every week or every month and the community's status can be monitored according to the percentage of cases below the normal level ("deficients"). It may be more practical, however, to use arm circumference measurements, as will be seen below.

Information can also come from those attending food distribution centers or emergency kitchens.

Indicator To Be Utilized

Whenever possible, the surveillance system should be based on a functioning infrastructure. If health centers measure weight, the system should be based on weight–for–age; if both weight and height are measured, the parameter should be weight–for–height.

A weight–for–height figure is better than one of weight–for–age because the former differentiates acute undernutrition, which may be due to the flood's impact, from chronic undernutrition, which has nothing to do with the disaster (although aggravated by it). Furthermore, weight–for–height is independent of age. However, measuring height properly requires calibrated boards, and these are not as widely available as balance scales.

When properly done, measuring arm circumference has an advantage in that only a tape measure is needed; it is cheap and can be carried in a pocket. For a quick survey or when the system is based on data–collecting posts other than health units, this is the simplest of the three methods to use but it also is the least sensitive. The measurement obtained can be compared with the reference values suggested in Table 7.1.

Reporting the Information

The assessment team should proceed in the same manner as for epidemiologic surveillance. However, daily or weekly reporting is not necessary since no "epidemics" of undernutrition occur over short intervals, as may happen with communicable diseases; monthly reports are adequate.

Unless the increase in undernutrition is from an outbreak of gastroenteritis (which is usually accompanied by loss of weight), there are not many corrective measures that the primary health worker can take. Undernutrition is frequently a socioeconomic problem; in disasters it often stems from the logistics of food supplies and distribution, in which many different agencies may be involved and over which the health worker has no control. The main responsibility of the health worker is to inform responsible authorities (forcefully, if necessary) of any deleterious changes in the nutritional status of his or her community.

Sources of Error

The most common source of error is that of technique. Frequently the scale is bad or the measuring technique is poor. Length/height may be particularly difficult to measure. When there is no length board, length is often measured from crown–to–heel and, if not stated as such, will be a source of gross mistakes in the interpretation of the results.

WATER–QUALITY MONITORING SYSTEM

After a disaster, one of the most critical needs is for an adequate supply of water (PAHO, 1982b). A system to monitor and control water quality should be established as soon as possible.

In floods, critical aspects in water safety are the amounts of residual chlorine and the detection of Escherichia coli in water samples sent to the laboratory. In a disaster situation, it may be more practical to analyze samples locally than to rely on laboratories. This can be done by using simple diagnostic kits based on

colorimetry (in the case of chlorine) and membrane filters for bacteria (Assar, 1971; Vargas de Mayo, 1984) (Fig. 10.3).

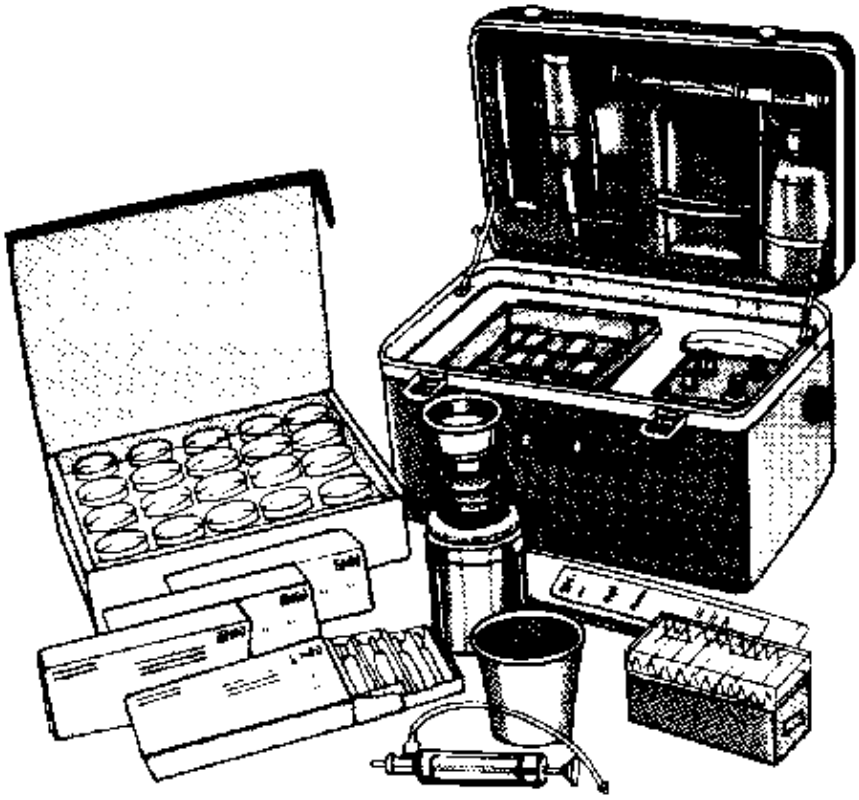

FIGURE 10.3 Field kit for bacteriological analysis of water supply.

Sources of Information

It is essential to establish the points from which samples are to be taken and the frequency with which this should be done. Usually the samples are taken from the water source and at different points along the supply network. If water is distributed in water trucks or similar container vehicles, samples should be taken at the point where the truck gets its supply and toward the end of the run.

It may be difficult to set up a system based on sampling different points if transport and communications are difficult or impossible to arrange. The team may have to limit itself to the area that can be covered on foot, which may or may not include the source of water supply.

Reporting the Information

The local health authorities should identify the source of contamination, and in the event that residual chlorine is absent or below recommended standards (Assar, 1971), they should investigate whether the amount used is insufficient or absent. The findings should be reported to the health authorities in charge of emergency rehabilitation measures.

Although the corrective measures are usually beyond the health sector's responsibility, it should nonetheless report its findings to the agencies in charge of the water supply and pressure them to repair and treat the system accordingly.

ENTOMOLOGICAL SURVEILLANCE

Chapter 6 reviews at some length the assessment of the flood's impact on vector populations, particularly mosquitoes, and mentions the need for an entomological surveillance system. The full effect of the floods on vector–borne disease transmission will not become evident until some months after the flood's onset or in fact months after the waters begin to subside. Waiting for an alert from epidemiologic surveillance may take too long – monitoring breeding sites and mosquito density is essential.

Sources of Information

There must be permanent points for adult mosquito captures and monitoring of larva breeding sites. There should also be surveillance of meteorological activity in the area, particularly rainfall, to determine its influence on the vector population. Migration of people and animals should also be checked and mapped.

The role of the assessment team is to verify whether an entomologic surveillance system exists and how is it functioning, the type of reporting, its frequency, and the response by the relevant agencies. In the absence of a system, the team should set up the methodology for one.

CHECKLIST

Basic Questions

• What diseases may become epidemic as a result of the disaster?

• To whom and where should food aid be directed?

• When should food aid be started or discontinued?

• Is there a vicious cycle of "gastroenteritis–malnutrition"?

• Is drinking water contaminated?

  – Where and why?

• Is there an increase in the vector population?

  – Which ones?
  – Where?

Epidemiological Surveillance

• List of signs and symptoms

  – Criteria for selection

  * endemicity
  * result of initial evaluation
  * previous experience

• Source of information

  – Health centers and posts
  – Health promoters/community health workers Schools
  – Evacuation camps
  – Health posts of voluntary agencies

• Data processing

  – Simple percentages
  – Processing at each level
  – Analysis and comparison of the results, daily or weekly

• Flow of the information

  – Sources of the data
  – Flow to nearest health unit

  * collection and compilation
  * analysis
  * interpretation
  * investigation/verification/diagnosis
  * corrective measures

– Flow to health unit or higher level for:

* information
* request for assistance

• Communication system

– Regular

* telephone
* radio
* road, railroad, etc.

– Irregular

* rescue groups
* boat, mules, etc.

• Frequency

– Daily
– Weekly

Nutritional Surveillance

• Sources of data

– Health centers and posts
– Health promoters/community health workers
– Schools
– Evacuation camps
– Health posts of voluntary organizations
– Food distribution centers
– Emergency kitchens

• Questionnaire to utilize

• Parameter

– Weight
– Height

* length boards

– Arm circumference
– Sources of error

* inadequate equipment
* inadequate technique

• Frequency of reporting

– Monthly

Water–Quality Monitoring

• Test for residual chlorine
• Amount of Escherichia coli
• Laboratory
• Portable kits
• Specify

  - Sampling points
  - Frequency of sampling
  - Responsible person
  - Flow of information

• Investigation of contamination source

Entomological Surveillance

• Permanent capture points: frequency of observations
• Permanent larval breeding sites: frequency of observations
• Meteorological data
• Migration of people and/or animals
• Frequency of observations
• Data flow

  - System
  - Frequency

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