

IV. THE HEALTH SECTOR

A. INTRODUCTION

1. General Comments

All disasters have an impact on the health sector, whether due to the need to protect the population's health during emergency situations and disasters, evacuate and rescue victims and modify health-care models or programmes in the medium and long term, or because of damages caused to the infrastructure of the health-care services network. This impact translates not only into immediate needs, but also into long-term effects.

Understanding and assessing these effects requires the availability of information that allows one to determine, in the time available for the assessment, the scope of damage to the sector's different components and functions. In the absence of such information, the assessment must proceed via spot studies or projections to measure the time and requirements for recovery. The collection and analysis of information and, more generally, the implementation of health information systems, is an essential component of disaster preparation. The availability and quality of the health information are very important, because they form the basis for understanding the fundamentals of health policy and thus provide the opportunity to undertake a review of the health-care services network, with an eye to rationalizing resources and modernizing the sector.

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Disasters can be considered a problem for public health for several reasons:

- They can cause an unexpected number of deaths, injuries or illnesses in the affected community, thereby exceeding the therapeutic capacity of the local health-care services and forcing authorities to reorganize the sector or to solicit outside help;
- They can destroy local health infrastructure such as hospitals, health-care centers, laboratories and the like, which will thus be unable to respond to the emergency. Disasters can also alter the provision of routine health-care services and preventative activities, with subsequent long-term consequences in terms of increased morbidity and mortality;
- Some disasters can have adverse effects on the environment and the population by increasing the potential risk of transmissible diseases and environmental dangers that increase morbidity and premature deaths and could lower the quality of life in the future;
- They can affect the mental health and the psychological and social behavior of the affected communities. Generalized panic, paralyzing trauma and antisocial behavior rarely occur after big disasters, and the survivors quickly recover from the initial shock. However, anxiety, neurosis and depression can arise following both sudden and slowly forming emergencies;
- Some disasters can cause food shortages, with severe nutritional consequences such as a specific deficit of micronutrients (vitamin deficiencies); and

- They can cause broad movements of the population –whether spontaneous or organized– often to areas where the health-care services cannot meet the new situation, with a consequent increase in morbidity and mortality. The displacement of large population groups can also increase the risk of outbreaks of transmissible diseases in the displaced and host communities, where the large groups of displaced persons may be housed in and share unhealthy conditions or contaminated water.

After the disaster, the sector must take on three essential tasks: the rescue, treatment and subsequent care of primary trauma victims who have suffered the direct effects of the disaster; the prevention of the appearance or propagation of effects that are harmful from the perspective of public health; and the speedy recovery of the affected health-care facilities. Any expense that corresponds to the rescue, treatment and subsequent care of primary trauma victims that has not been taken into account in the emergency stage or in the corresponding section of the affected population must be accounted for within the assessment of the corresponding effects on the health sector, as discussed in the present chapter.

Given that the health sector’s mission is to prevent the propagation of disaster-related effects that could endanger the public health, unfounded rumors and the speed with which massive international efforts in medical aid are mobilized to the most distant areas have contributed, in part, to the erroneous idea that disasters are almost inevitably accompanied by the outbreak of epidemics transmitted by contaminated water, vectors or direct contact. In fact, experience confirms that there is usually no immediate risk of epidemic outbreaks due to causes attributable to a disaster. After a period of time has passed, the implementation of normal surveillance methods for detecting epidemics or the application of a situation-specific protocol of surveillance makes it possible to identify and control the risk of transmissible diseases and prevent any potential epidemic outbreak. Experience gained with all kinds of disasters over the last ten years confirms that it is not necessary to undertake massive vaccination campaigns.

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Recent experience thus shows that the swift mobilization of communities, national resources and international aid facilitates the treatment of the wounded –including the most serious cases– within a short time, thereby reducing the disaster’s impact in terms of the length of the “crisis” in the health sector. Consequently, reconstruction issues will be addressed much more quickly and effectively.

2. Assessment procedure

Like the other specialists participating on the assessment mission, the one in charge of the health sector should be notified of his or her participation on the mission two or three weeks in advance. The field mission should last one to two weeks. It is therefore recommended that in the period leading up to the visit, the health specialist should collect all the available information on the sector, both at the national level and at the level of the affected region. Likewise, it is advisable for the specialist to prepare in advance a list of people and institutions with whom contact must be established in the field.

At the end of the assessment mission, the specialist will be expected to present a table summarizing the effects on the health sector. The information should be broken down not only by geographical area, in particular at the level of the country's administrative units (the same units used for all the sectors), but also by public and private sector and by the amount of direct and indirect damage (see Table 1, which presents a model of the kind of information to obtain).

The health specialist should also provide the macroeconomics specialist with any pieces of information that facilitate an estimation of the health sector's effects on the main macroeconomic variables, especially public finances. It is also important to work in close coordination with the specialists in the other sectors to assess the repercussions of the disaster, particularly on the employment sector. With regard to the issue of gender, the health specialist must take into account that the sector employs mostly women and that disasters have a greater impact on women's health.

Table 1

THE IMPACT OF A DISASTER ON THE HEALTH SECTOR
(Thousands of dollars)

Component	Damage			Sector		Effect on the balance of payments*
	Total	Direct	Indirect	Public	Private	
Infrastructure¹ Health ministry Social security Private						
Equipment and furniture² Health ministry Social security Private						
Medications Health ministry Social security Private						
Unforeseen expenses and income Emergency treatment Income not received Treatment not given Increased costs Increased expenditures in medications Epidemiological surveillance Vector control Community education Psycho-social rehabilitation						
TOTAL						

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1 Specify the name of the affected infrastructure, if relevant, and the severity of the damage.

2 Identify any equipment and furniture that require specific quantification due to their value.

Table 2
 THE IMPACT OF A DISASTER ON THE HEALTH SECTOR, BY AFFECTED REGION
 (Thousands of dollars)

Component	Region			TOTAL
	1	2	3	
Health ministry³ Infrastructure Equipment and furniture Medications				
Social security Infrastructure Equipment and furniture Medications				
Subtotal, public sector Private Infrastructure Equipment and furniture Medications				
Subtotal, private sector Unforeseen expenses and income Emergency treatment Income not received Treatment not given Increased costs Increased expenditures in medications Epidemiological surveillance Vector control Community education Psycho-social rehabilitation				
TOTAL				

The assessment process might develop through the following stages:

- Determination of the geographical area affected by the disaster, as well as the disaster’s main immediate effects;
- Analysis of the sector’s operation and policy before the disaster, based on existing documents;

³ Specify the name of the affected infrastructure, if relevant, and the severity of the damage, as well as any lost equipment and inputs, so as to facilitate a specific quantification.

- Analysis of the political and socio-economic implications of the disaster's effects on the sector;
- Field assessment of direct damage and effects to validate or modify the information provided by the sector's authorities;
- Quantification of the direct effects;
- Estimation and valuation of the indirect effects;
- Assessment of the macroeconomic effects;
- Estimation of the effects induced on other sectors, in particular on employment and women;
- Gathering of any available information concerning the strategy, plans and projects that may be under consideration, as well as the support and reconstruction resources that are, or may be, made available to the sector; and
- Cooperation in formulating the strategies, plans and projects for the reconstruction and revitalizing of the sector.

3. Information requirements

To assess the disaster's impact and effects on the sector, it is important to analyze the available administrative, economic, social and epidemiological information for the period before the disaster in the affected region and/or country.

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This report should, at the very least, contain the following information:

- The socio-demographic situation and the status of the main epidemiological indicators, including the morbidity rate and incidence of different diseases that are relevant to the type of disaster in question;
- A description of the characteristics and location of existing health-care facilities;
- The existing human resources, equipment and medical supplies in the health sector and its facilities;
- The sector's management, the way in which it is financed and its financial resources;
- The health service coverage provided by each of the different institutions; and
- The cost of the services supplied, including the cost of a doctor's visit, daily hospital room charges and average wages, among others.

4. Sources of information

Sources of information vary widely in type and origin. No source should be ruled out when it comes to obtaining information that might help measure the impacts and assess the direct and indirect effects on the sector.

It is important to make use of existing information, including available publications, pertinent historical material and data on the situation prior to the emergency. It is also advantageous to talk with appropriate, well-informed individuals, including donors, personnel in humanitarian organizations and in national public administration, local specialists, community leaders of both sexes, the elderly, health-care workers, teachers, businesspeople and so forth. Group discussions with members of the affected population can provide useful information on practices and beliefs. Other sources of information include early warning systems and vulnerability assessments, as well as national and regional plans for preparing in case of disaster.

One of the main sources of information will necessarily be the government agencies in charge –in this case, the ministry of health and social security– as they can provide statistical and budgetary information on the sector’s resources and activities. Especially useful are annual or periodic budget documents, the inventories of relevant institutions (which contain details on their personnel and materials), periodic statistical publications, reports on health structures and bulletins on the epidemiological situation.

The different services of the health and social security ministry can similarly provide information on current programmes, international aid and any reform plans and projects being developed. Apart from the health ministry, the ministry in charge of coordinating foreign aid and cooperation in the country can supply useful information on the aid resources being channeled into the sector.

The pharmaceuticals industry and the government agency in charge of its regulation generally make available useful information on the medicinal drugs market.

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Information on the population and its main socio-demographic characteristics can be requested from the national institutes or agencies in charge of producing official statistics. More detailed or specific information can be obtained from decentralized agencies, municipalities and professional associations.

Private institutions are another important source of information, as they can supply a detailed inventory of the private sector’s infrastructure and human and financial resources, information on the costs of different services rendered, frequency rates for medical visits to private hospitals, private sector development forecasts and so on. Similarly, training bodies and professional medical and paramedical associations are important sources for verifying medical demographic information.

Information published by international agencies that provide specific support to the sector should generally be taken into consideration. Examples include the (regular) statistical publications of the PAHO/WHO, the report on “Health Conditions in America”, the UNICEF publications on children’s health and publications by the United Nations Population Fund (UNFPA). The International Red Cross and international NGOs that are involved in emergency assistance are equally important sources to consider. Multilateral and/or bilateral assistance agencies that finance specific reform-support programmes usually generate information that can help clarify current policies.

B. QUANTIFICATION OF DAMAGE

1. Definitions

a) Direct damages

Direct damages are those caused to the health system infrastructure, as well as to the stock of medical equipment and inputs. The following components are usually the most affected:

- Hospitals, health centers, clinics, dispensaries and rural and urban health-care stations belonging to the national health or social security system;
- Health sector offices;
- Laboratories and blood banks;
- Rural and urban private sector hospitals and clinics;
- Medical and auxiliary equipment and medical and surgical instruments;
- Non-medical equipment and supplies used in the health sector;
- Furniture and basic material; and
- Stocks of medications and vaccines.

- 98** The magnitude of the damage to the health infrastructure and medical inputs/equipment will depend not only on the type of construction, but also on its location and the type and origin of the disaster.

b) Indirect losses

Indirect losses occur after the event that caused the disaster; they refer to the consequences for the economic flows of the sector. Indirect effects thus include the reduction in the level of normally available services, the additional cost of caring for victims, including the cost of relocating services and personnel into emergency services, the cost of maintaining idle human resources as a result of the impact on infrastructure, the reinforcement of epidemiological surveillance, the increased cost of medical treatment, lost income, activities associated with emergency care, delivery of medications and other inputs, vector control, vaccination, psychological care and so on.

The nature of indirect losses varies greatly. The following are some of the main types:

- The costs of monitoring and controlling the spread of infectious and contagious diseases and the harmful effects on health;
- The public and private cost of hospital and outpatient care;
- The cost of reinforcing primary care in rural areas and for vulnerable groups;
- The decline in the victim's well-being and living standards due to the general erosion of the standards of public hygiene;

- The general decline in activity in the formal and informal productive sectors resulting from the psychological trauma suffered by the affected population (this is usually measured in the estimates for the corresponding productive sector);
- The additional cost of treatment and health care for the affected population; and
- The additional cost incurred to reduce the vulnerability of the sector's buildings

C. ASSESSMENT METHODOLOGY

1. Direct damages

Public and private health-sector authorities are the main sources of the information required for assessing direct damage. Information may also be requested from the decentralized government services that normally operate in the affected area.

Information on current prices in the construction sector can be obtained from authorized professional entities (engineers' or architects' associations, construction chambers).

Given that the disaster's consequences can also be analyzed as part of an operational review of the health-care services network and model of care –on the regional or country level, depending on the magnitude of damages– the health and social security ministry can provide indicators of activity that make it possible to judge the functionality of a given structure and decide whether it should be repaired or replaced. The disaster can thus provide an opportunity to lower the operating costs of structures that no longer ensure that the population will receive effective service.

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a) Damages to infrastructure

To assess direct damage to health sector infrastructure, the same general procedure described in the chapter on housing and human settlements should be followed. That discussion defines three broad types of damage to infrastructure:

i) **Structural damage:** beams, joists, structural flooring, load-bearing walls, foundations and so forth;

ii) **Non-structural damage:** partition walls, interior installations, doors, windows, non-structural roofing, floors and so on; and

iii) **Deformations to the land:** settling, shifting and so forth.

Starting with a list of health infrastructure in the area affected by the disaster, with the facilities organized by type of establishment, the specialist will proceed to diagnose the damage. As in the case of housing, it is advisable to classify the facilities into the following groups: buildings that were totally destroyed or that are beyond the possibility of repair; buildings that were partially destroyed or that can be repaired; and buildings that were not affected or that suffered minor damage.

In other words, after collecting reliable data on the number of damaged or destroyed hospitals, health-care centers and other infrastructure in the sector, the specialist should seek up-to-date information on the value per square meter of new construction or repair, as is relevant in each case.

Next, each facility must be specifically identified, with details on its location, category, the main materials used in its construction and the unit prices for its reconstruction, full replacement or repair, as required in each case. The cost estimate for repairs should be expressed as a percentage of the cost of full replacement, as estimated by the assessor responsible for determining whether the facility should be repaired or partially rebuilt (see Table 3).

To assess the effects on the service network, the specialist should also categorize the affected health sector facilities by i) geographical area, ii) level of care, iii) number of beds and iv) public versus private. The analysis should include a description of the post-disaster situation in each of these categories. As part of this analysis of the impact on the services network, the specialist should also assess the affected infrastructure as a percentage of the total (see Table 4).

b) Furniture and equipment

100 The assessment of the damage to furniture and equipment can be based on the same three categories used for infrastructure: i) no possibility of repair (necessary replacement); ii) possibility of repair; iii) and minor damage.

To estimate the cost of repairing or replacing medical equipment and furnishings, depending on the level of the facility, either a coefficient can be allocated to each hospital bed to represent the value of the equipment and furnishings associated with it or an estimate can be made on the basis of existing price lists or price lists prepared for this purpose.

In the case of specialized equipment, however, it will be necessary to determine the current cost of replacement and whether the item must be imported.

The assessment must also take into account possible damages to non-medical equipment. This encompasses all non-medical equipment necessary for maintaining the sector's operations, from the air and water quality control system to personnel administration. Examples include air conditioning units, heaters, refrigerators for storing vaccines, office equipment, air purifiers, water filters and the like.

A table can be drawn up to summarize the estimated damage to infrastructure and equipment, with a breakdown by degree of damage and a detail of the associated costs, as follows

Table 3

DIRECT DAMAGE TO INFRASTRUCTURE AND EQUIPMENT

	Replacement		Repair		Minor damage	
	Units	Ave. cost (per sq. m)	Units	Ave. cost (per sq. m)	Units	Ave. cost (per sq. m)
Hospitals						
Clinics						
Health-care stations						
Pharmacies						
Laboratories						
Medical equipment						
Non-medical equipment						
Furniture						
Other						
Total						

Table 4

AFFECTED INFRASTRUCTURE AS A PERCENTAGE OF THE TOTAL

	Replacement		Repair		Minor damage	
	Units	% of the total	Units	% of the total	Units	% of the total
Hospitals						
Clinics						
Health-care stations						
Pharmacies						
Laboratories						
Total						

2. Indirect losses

a) Demolition and clean-up costs

The costs of demolition, removal of debris and land improvement are considered indirect losses. This assessment should be carried out in close cooperation with the government officials responsible for the sector. Demolition costs vary widely in relation to the type of building materials involved. The specialist should thus consult with an engineer or architect on this point. The costs of removing debris are usually estimated based on the volume to be removed and the unit cost of removal and transport to the waste disposal location.

b) Cost of disaster mitigation works

It is often necessary to adopt mitigation and prevention measures to avoid or reduce the impact of future disasters on the sector's infrastructure. The costs of such works or measures, as well as the costs of relocating facilities to less vulnerable sites, are considered an indirect effect of the disaster.

102 The mitigation of disaster-induced losses via the adoption of preventative measures is a highly profitable endeavor in areas that experience recurrent events. Each dollar spent on adequate mitigation before a disaster hits represents enormous savings in losses that could have been avoided. Different mitigation measures have different implementation modes and costs. The simplest and most economical are those associated with non-structural and organizational-administrative aspects, whereas structural measures are more complex and expensive.

Phasing in an integrated hospital damage mitigation plan will facilitate a slower, more feasible application of resources. The practical experience gained in hospital damage mitigation works over the last ten years, together with current information on the building code, can serve as the basis for estimating these costs.

c) Cost of treating victims

From a medical standpoint, the classification of the wounded and injured according to the severity of their wounds and their chances of rehabilitation is especially relevant. When a disaster causes a relatively large number of victims, it is not possible to attend to all of them at once. In such cases, medical or paramedical personnel should sort the victims by triage at the time of search and rescue operations. Triage is essential for optimizing existing curative resources, since it describes and sorts the victims while making it possible to estimate the cost of treating and rehabilitating both the seriously and slightly injured.

Health specialists may face two alternative situations. Under the first scenario, primary victims are few and relatively concentrated, and the normal relief and treatment services in isolated or remote regions are capable of dealing with all the cases without too great a delay. In this case, information will generally be centralized, and the health specialist should therefore have no difficulty in estimating the additional costs related to additional medical examinations, hospitalization costs, long-term treatments, the increased demand for medications and sedatives, overtime work by medical and paramedical personnel, transportation expenses for victims or for long-time patients who are deemed healthy enough to return home and so forth. The second scenario occurs when the number of primary victims exceeds the capacity of primary and hospital health-care services both inside and outside the devastated area. In view of the difficulty of estimating the cost of medical attention, the following standard is customarily accepted: no conjectural estimates are made to account for the wounded who are not registered in the national system or in the private health-care system, and the total cost incurred by the hospital system is estimated on the basis of the care given to the primary victims. In other words, the increase is determined as the total cost incurred by the system for search and rescue and the treatment and subsequent care of the trauma victims from isolated or remote areas. The accuracy of the estimate will depend essentially on the validity and reliability of the classification procedure and access to information.

If the number of existing entries in the registry is reliable, the health specialist should not have much difficulty estimating the costs. Otherwise, they may be able to estimate them based on the increased costs of the following interventions: i) the enlargement of the reception and treatment areas; ii) the length of stay of patients in the reception, treatment and hospitalization areas; iii) the treatment and recovery of hospitalized patients; iv) the treatment and recovery of outpatients, if justified by the availability of personnel; v) medical, paramedical and auxiliary personnel; vi) the evacuation of new and pre-existing patients; vii) transportation costs; viii) the treatment of patients sent home prematurely; ix) mobile units; and x) health inspections carried out in homes.

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These cost components can be rearranged to suit the public or private hospital system unit responsible for receiving the primary victims of the disaster. If some facilities charge for medical services, the value of the benefits thus given are replaced by the procedure described above. Finally, monitoring and registration of the victims' records will probably be centralized by the health ministry or other governmental body.

d) Costs of public health and epidemiological interventions

This section analyzes public health interventions necessary for preventing or controlling the spread of harmful effects from the disaster on public health.

Health measures following a disaster are generally palliative in nature. Their primary objectives are to control water quality, prevent epidemic outbreaks and ensure that the disaster's impact does not trigger the spread of latent diseases. With regard to epidemic outbreaks, the health specialist must identify those that are caused exclusively by the disaster event before registering the costs.

The following kinds of interventions are rapid and are generally coordinated by the health ministry. It is important to request that the health ministry provide all the available information on these interventions (resources, operation, financing commitments, nature and amount of outside aid, etc.). The associated costs must be identified for each intervention, if it is implemented.

- Water. This category includes the cost of supplying the population with simple materials outlining instructions on i) the need to check water quality before using the water; ii) uses for sterilized water; iii) the danger of storing water in broken, dirty or uncovered containers; and iv) the importance of keeping wells, springs or other sources of raw or potable water free of contact with human and animal excrement, trash and industrial or domestic waste water.

Water quality must also be monitored (this is defined and estimated under the heading water and sanitation in the chapter on infrastructure). The process might include carrying out an analysis of water quality (residual chlorine or bacteriological quality), overseeing sterilization, monitoring the quality of water distributed via water tanks and so forth. Public health authorities will have the responsibility of ensuring that all shelters and affected population without access to water sources have appropriate, undamaged water storage containers, whose capacity is sufficient for the number of people in the shelter.

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If the shelters do not have water storage containers, some type of storage facility will have to be provided (PVC, fiberglass or asbestos-cement tanks). Water sterilization tablets may also be distributed to the affected population or shelters.

Another cost to take into account is the removal of the corpses and remains of buried or partially buried animals.

- Sanitation control. This item includes public health educational activities concerned with food handling and domestic hygiene, as well as health inspection of living quarters and temporary shelters for the victims or the primary affected population. Measures that might be carried out include mass public awareness campaigns, talks with affected groups, visits to shelters and so on. The wide-scale or selective distribution of protective products might also be undertaken, as in the case of masks for filtering ash in an effort to prevent respiratory problems following a volcanic eruption.

- Fight against vectors. This includes the cost of destroying and monitoring new foci of vector reproduction, as well as the fight against the vectors themselves. It includes the localized application of rodent controls and insecticides, the protection of domestic water supplies, the destruction of unnatural water collection areas, the detection and treatment of cases and prophylaxis, if necessary. This item should also include health education and the distribution of repellents or barriers to reduce contact between people and the vector.

- Vaccination campaigns. It may be necessary to carry out mass vaccinations (typhoid fever, cholera) or selective campaigns (for example, children and measles); such costs should be considered an indirect effect of the disaster. At the same time, efforts should be made to avoid interrupting the regular national vaccination programmes, which may require the following actions: i) immediately reinstate the vaccinations routinely given in national immunization programmes; ii) propose the temporary use of cold boxes (RCW42) to ensure the preservation of vaccines in affected areas and consider the possibility of mobilizing immunobiologics, provided ice is available; iii) resort to the use of photovoltaic refrigerators for storing vaccines and producing ice, given the availability of sufficient batteries; and iv) initiate the recovery of the cold chain (purchase of refrigerators, thermoses, thermometers and so on).

- Epidemiological surveillance Epidemiological surveillance after a disaster involves four fundamental steps: i) investigate rumors and reports of cases in the field; ii) approach laboratories to obtain definitive diagnoses and support for epidemiological investigations; iii) present epidemiological information to decision makers; and iv) ensure surveillance during and after the rehabilitation phase. It is necessary to determine the cost of the following items: epidemiological surveillance in health-care facilities and in the community (including field research, data processing and laboratory analysis); the quarantine, isolation and treatment of the first cases; and finally, the epidemiological surveillance of people housed in shelters.

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- Food safety. The health sector may contribute to the formulation of intersectoral post-disaster policies on food safety by providing information and orientation as needed. The health sector is also responsible for preserving the sanitary condition of food donated by humanitarian aid. It must also monitor the nutritional status of the affected population (for example, via surveys), given that the decreased availability of food could lead to malnutrition from a lack of protein or micronutrients, such as vitamin A, vitamin C or iron. All of these actions should be included in the cost assessment.

The main source of information will be the national emergency committee and the health ministry. In principle, all relevant epidemiological information should be included.

The health specialist will probably find that the relevant information has already been classified in some form. In any case, it is useful to verify the validity and reliability of the available information or to make one's own cost estimates.

Health specialists should give particular attention to the following items:

Cost of personnel. This item should include the cost of the additional personnel and regular staff overtime needed to tackle the post-disaster situation. Special attention should be given to the additional personnel recruited by the health system and assigned to disaster-related public health interventions, water quality control, epidemiological surveillance, vaccination campaigns, laboratories, environmental health and the fight against vectors. The cost of special brigades for health-related actions or epidemiological surveillance must also be accounted for. Other costs include the training or orientation of personnel for the implementation of disaster-related public health measures.

Cost of material and equipment. Here, the costs to be considered include the purchase, storage and distribution of equipment, medications, vaccines and pharmaceuticals used for preventative purposes (and curative, in the case of transmissible diseases) to counter the effects of the disaster. The logistical costs of vaccination campaigns are also included, as are the costs of equipment that had to be purchased for vector control and for sanitary control measures that form part of the disaster response. The cost of imported medications should be accounted for separately.

Cost of diffusing public information. The cost of diffusing public health information must be measured, whether it involves mass social awareness campaigns, educational programmes targeting the affected population or talks with vulnerable groups.

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To avoid double accounting, it is important to distinguish between the cost of personnel, material and equipment involved in the treatment of victims and those channeled into the aforementioned public health measures. The former should be taken into account under the first heading of indirect effects (the cost of treating the victims), whereas the latter should be analyzed and incorporated here.

The health specialist's first task is the identification of the costs associated with sanitation and epidemiological surveillance operations. The second, and more difficult, task is to determine which disaster-related effects can be considered aftereffects. This distinction should be taken into account especially for epidemiological surveillance activities such as the collection and interpretation of data to determine the risk (or presence) of outbreaks or foci of transmissible diseases. It is generally said that a disaster does not "produce" transmissible diseases, but merely modifies environmental conditions, thereby unleashing latent diseases. When changes in the incidence of disease are detected, the only way of knowing with any degree of certainty whether an increase can be ascribed to the disaster is to refer to the epidemiological records and the health organizations' reports.

Additional sources include sectoral programmes run by international organizations, which often maintain their own information systems. Health specialists can also draw on the following sources of information:

- Project presentation documents;
- Press reports; and
- Interviews with health personnel.

e) Increased cost of preferential health care for vulnerable groups

While there are many, complex causes of vulnerability, experience shows that the chief cause is poverty, especially in the case of single mothers, children under the age of five and the aged. Likewise, after a disaster, pregnant women and the undernourished are the population groups that are most exposed to risk, especially infectious and contagious diseases. Other highly susceptible groups include adolescents, unaccompanied minors and people with disabilities. Consequently, the protection of these groups after a disaster requires specific health interventions. Special health operations are also often carried out for other groups that have been particularly affected by the disaster, such as rural families and farmers whose land has been severely damaged by flood or prolonged drought. The cost increase resulting from these special interventions on behalf of vulnerable groups should be estimated and recorded as an indirect cost.

f) Additional indirect health service operating costs

The destruction or crippling of the public and private hospital, primary care and other health infrastructure, together with disaster-related deaths and injuries to medical and paramedical personnel, force the national and private health system to incur additional operating expenses. These are described below.

Failure to meet income forecasts. If there is a lack of qualified personnel or if the infrastructure is put out of service, this might lead to a reduction in income from the charged services of the national public health system and of private clinics and hospitals. The health specialist should determine the value of such a reduction in future expected income for outpatient and hospital services by referring to the applicable rates prior to the disaster.

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The calculations can be simplified by using earnings and cost indexes that have been previously established by the hospitals' planning departments. A more precise assessment can be made when there is a hospital information system that keeps records on the volume and relative cost of the assumed illnesses.

Non-provided health-care services. It is also necessary to estimate the cost of the services, whether free or subsidized, not provided by the public health system. Two types of calculations can be used to make a quick assessment. The number of non-performed outpatient examinations, surgical procedures and hospital treatments can be estimated and evaluated on the basis of established prices. When this information is unavailable (or when there has been considerable destruction or impairment of the infrastructure), it is preferable to use the "foregone income" of the medical, paramedical and auxiliary personnel while activities are stopped. The average individual salary of each of these categories should be multiplied by the total number of shifts not worked and by the number of members absent in each of the health officials' categories.

The valuation of this item should consider the possible reduction in costs owing to the total or partial non-operation of certain health-care facilities, with a corresponding decrease in the purchase of inputs and payment of basic services used in the operation of these facilities.

Increased costs of providing services. This item covers all additional costs incurred by the public and private health-care services to ensure that services are available, except i) those services provided to direct victims of the disaster and ii) the public health-care services mentioned above. In general, it encompasses the increase in the cost of services stemming from the disaster, the expense of replacement personnel (estimated in the same way as in the preceding paragraph), the relocation of outpatient services, the strengthening of the infrastructure, transport, public information costs, importation of medications and instruments and so on. It is essential to take into account that the use of resources to prevent the consequences of a disaster has a cost inasmuch as these resources are no longer used for their originally intended purposes. The health specialist thus has the choice of estimating these resources from the point of view of the benefits that they will have ceased to supply because they are being used for disaster-related needs and estimating them in accordance with the replacement value of the service supplied.

When calculating increases in health-care operating expenses, health specialists must include all expected future services, even though they might not yet have been supplied, because they represent a net loss for the beneficiary population.

108 Interruption of aid programmes. In many countries, the national health-care services are in charge of implementing and distributing some social aid programmes (distribution of milk, family assistance programmes, advance payments of health-care expenses, etc.). Such programmes are often interrupted when a disaster occurs. Since a good number of these programmes are only briefly interrupted, often without important consequences for the beneficiaries, the health specialist should use his/her judgment in estimating the corresponding costs. If beneficiaries suffer net losses during the time that such programmes are suspended, the cost of these losses must be calculated for the time that the services are expected to be suspended. The same goes for the additional costs that will probably have to be incurred to speed up the normal supply of these benefits.

g) Increased public and private costs owing to higher sickness rates

The increase in morbidity owing to causes attributable to the disaster, as confirmed by the people in charge of epidemiological surveillance services and by the health specialist, entails increased costs for both the national and private systems, as well as for the victims themselves. Health specialists who make a quick assessment of the damage may find that information is scarce. In these circumstances, the easiest thing to do is to record the additional public and private costs that will have to be incurred, using an estimate of the number of cases to arrive at the costs. When there are many cases spread over a wide area, the first task will be to verify the two categories of cost attributable to the disaster:

- The treatment of primary cases (quarantine, isolation, etc.); and
- The increased costs to the sector for the provision of additional services.

If either or both of these items incur costs, the health specialist should separate the additional costs that are attributable to the higher level of sickness from the additional costs that are attributable to other causes. This will ensure that the same costs are not counted twice and that only the increase stemming from the greater morbidity rate is measured.

Disaster-related morbidity forces individuals to incur expenses, lowers production and gives rise to medical or hospitalization costs. The health specialist should work in cooperation with the macroeconomic specialist to assess these related losses and add them to the costs incurred by organizations. There are two ways of calculating these sickness-related production losses. In the first, the average per capita production figure is calculated for a defined period using a process of prorating and extrapolation, and this is then subtracted from GDP. This method facilitates comparison, but it fails to show that the activities do not fall within a single segment of society and that sickness is not distributed evenly throughout the population. The second method is based as much as possible on the productive activity of the sick. It consists of defining the groups of different income levels that may be affected and then arriving at the amount of lost production by calculating the number of days not worked. Nevertheless, these costs do not include the “intangible effects” on the quality of life of the sick and their surroundings.

The difficulty here is to express the cost of the effects on morale and psychological suffering in monetary terms. In order to estimate the additional costs related to the increased morbidity, an average cost per sick person should be estimated. In the case of medical expenses and the cost of medications, this may be done either by referring to existing tables or by using all of the sickness-related costs of a sample of the sick. These figures (that is, lost production, medical expenses and medications) should be applied to the part of the population recognized as being sick from causes attributable to the disaster. If treatment costs differ appreciably according to the patients’ age, this will have to be taken into account by separating particular age groups.

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D. MACROECONOMIC EFFECTS

The health and macroeconomic specialists should work together to determine the macroeconomic effects originating in the health sector.

a) Diminished contribution to development growth rates

Losses should first be measured in terms of the health sector’s contribution to gross domestic product (GDP). Health is a service sector that creates multiple jobs and has many ramifications, including knowledge investment (scientific research), human capital investment (training and education) and material investments (buildings and materials).

National accounts can be used to measure the reduction in the sector’s output as a percentage of GDP. In the case of the private sector, this reduction may be assessed using the criteria of businesses in the industrial and commercial sector. For the public sector, one should first calculate average production and then apply the figure to the estimated period of suspended or reduced activity.

b) Effects on employment

The damage caused to infrastructure may lead to unemployment among sector personnel. In most cases, these employees will continue to receive their wages. The actual number of jobs lost in the relevant period will, however, have to be estimated.

c) Effects on the external sector

A disaster's effects can have an impact on imports and exports insofar as the raw materials and equipment needed for reconstruction are concerned.

- In some countries, the construction or repair of health infrastructure entails importing materials and equipment that are not produced locally. In this case, it is important for health specialists to work closely with the officials responsible for the sector on a national level to determine the quantities and costs of the products and materials to be bought overseas, and then to estimate the portion of imports that are destined for the reconstruction effort.

- If damaged or destroyed buildings and equipment are insured with a local insurance company that has reinsured that risk with a foreign company, an influx of foreign currency may result. The health specialist should obtain information about this by questioning the insurance companies.

d) Effects on public finances

The health specialist must determine the increase in public budgetary outlays needed to meet emergency, rehabilitation and reconstruction requirements. This estimate can be made by adding the amounts spent during the emergency stage to projections on rehabilitation and reconstruction projects.

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In addition, the government may experience a drop in normal income, since any reduction in the services provided by private health-care establishments translates into a corresponding decrease in the amount of taxes paid. When estimating such losses, the normal tax rate for these cases should be taken into consideration.

e) Effects on prices and inflation

The magnitude of the damages might be so great that the reconstruction needs for all sectors –not just health– leads to a scarcity of construction materials and equipment and causes prices to rise. The health specialist should search all available sources to obtain information about prevailing prices before and immediately after the disaster so as to make allowances for any increase and to project price movements. To do this, the health specialist must collaborate closely with the specialist in housing and human settlements.

f) The differential impact on women

As in other sectors, the disaster affects women differently than men. In the health sector –as in education and culture– women account for a higher percentage of workers than men, such that any loss in employment and income will affect them directly as a group. Furthermore, whenever overtime is required of health sector workers, women's overall work load will be increased beyond the compensation of the additional income they may receive, as they must still discharge their reproductive activities after returning home late.

To determine these differential effects on women, the health specialists must work in close cooperation with both the employment and gender specialists of the assessment team to ensure that these losses are properly estimated and that no double accounting occurs.

As in previous chapters, an example of the application of the methodology described above is provided in the following appendix, using information obtained during a recent disaster.

APPENDIX VI

ESTIMATE OF DAMAGES IN THE HEALTH SECTOR CAUSED BY THE 1999 MUDSLIDES IN VENEZUELA¹

Torrential rains occurred in December 1999 along Venezuela's northern coastline after a low-pressure trough stalled over the Caribbean for nearly 20 days. The resulting mudslides and flooding had catastrophic effects on the population, urban infrastructure, basic services and productive infrastructure, as well as incalculable effects on the environment. The states of Vargas, Miranda and Falcón were the most severely affected.

1. Health sector

The health sector was unable to respond fully to the extraordinary demand arising out of the catastrophe as a result of damage to physical infrastructure, access to facilities and the availability of personnel –areas that were already showing weaknesses and inequalities before the events of December.

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The physical plant of hospitals and outpatient centers sustained varying degrees of damage in the hardest-hit regions –especially in the state of Vargas– with some rendered non-operational as the tragedy unfolded. Even the medical facilities that could continue working were completely cut off, as many roads were washed out. The loss of furniture, equipment, materials and medications –exacerbated in some cases by looting– was another difficulty that had to be faced, as was the effective loss of personnel, a third of whom were themselves victims (in Vargas) while others were unable to reach work owing to difficult conditions on key roads, including the Caracas-La Guaira highway.²

Medical reinforcements were deployed from abroad during the initial relief effort, including more than 400 Cuban doctors, paramedics and nurses who worked in the most devastated areas. International shipments of equipment and medications also helped alleviate much of the immediate shortage.

Once the emergency phase –rescue, emergency medical care, finding the dead³ and moving victims to temporary shelters– had passed, environmental and epidemiological surveillance efforts were stepped up so as to minimize risk factors. In an effort to involve the public at large in Vargas, health brigades were formed and given training in the handling of toxic solid waste, food preparation and conservation, water treatment and vector control.

¹ ECLAC, *Los efectos socioeconómicos de las inundaciones y deslizamientos en Venezuela en 1999*, Mexico City, February 2000.

² Many health-care workers missed paydays because service had been suspended at the banks where their wages are normally deposited.

³ The Attorney General's Office was entrusted with locating the corpses of victims.

Other emergency-phase priorities included repairing damaged health-care facilities. At the beginning of 2000, Venezuela had 182 hospitals, as well as 707 urban and 3 541 rural outpatient clinics.⁴ Most of the damage was concentrated in the states of Vargas, Miranda, Falcón, Yaracuy and the Federal District, in which a total of 31 hospitals and 687 outpatient clinics are located. Of these, 9 hospitals (29%) and 251 outpatient clinics suffered damages, ranging from minor to total loss. The extent of the damage may not seem significant as a national percentage, but it is clearly quite high in the disaster areas, affecting health-care services for 360 000 disaster victims (see Table 1).

Table 1

VENEZUELA: HEALTH-CARE FACILITIES DAMAGED IN THE MOST SEVERE DISASTERS AREAS

Federal Entity	Hospitals			Out-Patient Clinics		
	Total	Damaged	%	Total	Damaged	%
Total	31	9	29.0	687	251	36.5
Vargas	5	5	100.0	36	26	72.2
Federal District	6	1	16.7	76	-	-
Miranda	12	1	8.3	178	107	60.1
Falcon	3	1	33.3	308	97	31.5
Yaracuy	5	1	20.0	89	21	23.6

Source: Ministry of Health and Social Development and PAHO/WHO

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Most of the health-care facilities in Vargas were affected, to varying degrees. Five outpatient clinics and two hospitals were severely damaged.⁵ The Macuto maternity hospital (Hospital Materno Infantil de Macuto) was completely covered by mud, destroying its 120 beds and other equipment, but apparently leaving the building itself in tact.

The state psychiatric hospital was similarly affected. The Venezuelan Social Security Institute's Hospital Vargas, which was not open to the public at the time of the disaster, was quickly cleaned up and pressed into service to cover spillover from other besieged medical facilities. The Pariata and La Sabana hospitals functioned at 70% of their normal capacity, while the Naiguatá hospital operated at 40%. Outpatient clinics proved to be the most vulnerable. The type III clinic, "Dr. Alfredo Machado" at Catia la Mar, a key medical facility in a heavily populated parish, was completely covered by mud, and it struggled to provide some services at a church next door. In Vargas alone, six outpatient clinics were deemed a total loss.

⁴ See Censo de Establecimientos de Salud de las Direcciones Generales Regionales de Salud, 1998.

⁵ The state of Vargas had three specialized hospitals (Hospital de Niños Excepcionales, Hospital Dermatológico "Martín Vegas" and the Hospital Materno Infantil de Macuto), two type III hospitals, 19 urban outpatient clinics (5 type III, 1 type II and 13 type I) and 17 rural outpatient clinics (all type I).

The Federal District's oncology hospital suffered extensive damage to its very costly equipment, but with some well-known exceptions, most facilities were easily restored following clean-up and the restoration of the water and drainage systems and roads.

Direct damage to physical plant at health-care facilities was estimated at 18 million dollars, plus 11 million dollars in lost equipment and furniture. Total direct cost to the sector thus reached 29 million dollars. The cost of fully rebuilding damaged facilities, incorporating modern materials and equipment, was estimated at around 55 million dollars.

Table 2

VENEZUELA: DAMAGE TO THE HEALTH SECTOR a/
(Millions of dollars)

Item	Total	Direct	Indirect a/	Reconstruction Costs	Foreign component
Total	61.0	29.0	32.0	55.5	4.2
Total or partial destruction of healthcare infrastructure	18.0	18.0		32.4	2.3
Loss of equipment and furniture	11.0	11.0		23.1	2.0
Increased allotments for hospital and out-patient care b/	12.0		12.0		
Additional costs for sanitation, vaccinations and epidemiological control b/	8.0		8.0		
Retrieval and treatment of trauma victims	1.0		1.0		
Medical, psychological and food assistance at b/	8.0		8.0		
Cost attributed to the diminished capacity of healthcare services	3.0		3.0		

Source: ECLAC, based on data supplied by the Ministry of health and Social Development and PAHO

a/ Includes estimated costs affecting the public health system, as well as both for-profit and non-profit private health-care facilities.

b/ Includes cash and material aid from other nations.

Of even greater significance for the sector were the extraordinary outlays it made –with assistance from the international community, civil society and the local community itself– which were estimated at 32 million dollars. These emergency funds went primarily to special care for injured and displaced persons and to preventative health and vaccination campaigns. Total direct and indirect costs attributable to the health sector thus reached 61 million dollars.