



EMERGENCY CARE IN NATURAL DISASTERS

Report on a Joint International Hospital Federation/International Union of Architects/Office of the United Nations Disaster Relief Coordinator/World Health Organization Seminar held in Collaboration with the League of Red Cross Societies, the International Civil Defense Organization and the Government of the Philippines, Manila 13-17 March 1978

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## Background

Since 1957 the International Hospital Federation, the International Union of Architects and the World Health Organization have periodically held joint seminars on subjects of common interest.

Health planners, hospital planners, administrators, and architects need to be familiar with the concept of disaster preparedness, especially when working in disaster-prone regions. Consequently it was felt that the seminar planned for 1978 should be devoted to emergency care in natural disasters.

The choice of this subject called for the collaboration of other international and non-governmental organizations wholly or significantly involved in disaster preparedness and disaster relief: the Office of the United Nations Disaster Relief Coordinator (UNDRO), the League of Red Cross Societies and the International Civil Defense Organization. In view of the prominent part to be played by UNDRO in the organization and conduct of the seminar, this became an UNDRO as well as an IHF, IUA and WHO joint seminar.

From the start the organizing and collaborating organizations fully realized that one week was far from sufficient to deal in depth with such a multifaceted and intricate subject; they were aware that the intervention needed for the relief of a population stricken by an earthquake was of a totally different character from that necessary in the case of flood; they did not ignore that the financial and manpower resources of a country were a determining factor in the amount and the form of disaster preparedness that they could afford. They nevertheless were of the opinion that it was necessary to discuss the problem at a global level in order to recognize a number of patterns, rules, and steps that would help each country according to its own circumstances, needs, resources, and the particular type of disasters to which it is prone, to devise a mechanism or rather a series of inter-related mechanisms that will be different from all others while, at the same time, drawing from the experience of others everything which would have been found of relevance.

These background data would not be complete without mention of the Government of the Philippines: the organization of the Seminar would not have been possible without the help of the authorities who put the Philippine International Convention Center at our disposal. The WHO Regional Office for the Western Pacific and the UNDP Resident Representative in the Philippines, were invaluable in the preparation of the Seminar.

## Introduction

Dr S.T. Han, Assistant Director of Health Services, welcomed the participants on behalf of Dr F.J. Dy, WHO Regional Director for the Western Pacific, and on the organizing and collaborating organizations, and pointed out the objectives of the seminar.

H.E. Jose M. Crisol, Undersecretary of the Philippine Department of Defense gave the opening address.

The seminar was structured around position papers given by representatives of the sponsoring organizations, and case examples presented by participants were used for discussion. This report follows the same format, although in the interests of clarity the various papers have been drawn together under each discussion heading; a summary of discussions and conclusions is given at appropriate points.

The past decade has seen a considerable expansion in knowledge about the effects of disasters on health and, therefore, of the optimal strategies for the provision of emergency services. This seminar was held with the object of promoting an exchange of knowledge and experience of the delivery of health services in the wake of natural disasters such as cyclone, tsunami, earthquake, flood and drought.

The seminar was structured around the following five points:

- (i) The efficiency of a medical relief operation will be greatly enhanced if it is prepared in advance to meet likely contingencies. This preparation falls into two categories: organizational preparedness, including that of the material requirements of providing medical care, and those physical measures which can be taken to mitigate against the effect of disaster, e.g. the construction and siting of houses, hospitals, etc.
- (ii) In many respects each disaster is unique; however, the medical problems which will be caused in a specific area by a stated type of disaster will be largely predictable, qualitatively if not quantitatively.
- (iii) Planning and preparation are paramount in international relief.
- (iv) Medical preparedness for disaster can be organized to meet probable needs immediately after a disaster; however, it will be necessary to assess the specific effects of the disaster which has occurred, and the health care needs caused by it.
- (v) Reconstruction after disaster provides an opportunity to introduce measures to mitigate against future disaster.

#### 1. THE EFFECTS OF DISASTERS ON HEALTH: EXPERIENCE FROM DISASTERS

The effects of natural disasters on health can be viewed from two aspects; each with separate relevance to the provision of medical and health services:

- (a) the way in which disasters cause injury and death;
- (b) disasters as an epidemiological determinant: that is, the way in which disasters may induce ill-health by causing secondary changes in the environment.

##### (1) Disasters as a direct cause of death and injury

Here, the crucial determinant is the type of disaster which has occurred. A clear division exists between the effects of earthquake and those of other types of disaster, that is, volcanic eruptions, floods/sea surges and other forms of inundation, cyclones, hurricanes and other high winds. Most earthquakes cause death and injury by the sudden collapse of buildings. This fact is clearly related to the repeated observation that the number of injuries which occur outnumber deaths by a factor of 2/3:1 and that a huge need for rescue, first aid, transport and surgical services will be created in a short space of time. Medical services must therefore be widely and quickly available: the severely injured cannot wait and the lifesaving value of medical services will diminish with each passing hour. The earthquake which shook Guatemala in February 1976 left a total of 24 340 dead and 98 563 wounded (ratio 1:3.4). The duration of this emergency phase is also shorter than is usually thought. In Nicaragua on the fifth day after the earthquake which destroyed the capital, Managua, the attendance of patients at the military field hospital was similar to that observed at hospitals before the earthquake. Similarly, following the devastating earthquakes in Peru (1970) and in Guatemala the acute phase of the medical emergency lasted only 8-10 days. Life-saving medical and surgical care was largely completed during the first three days.

However, it is clear that the rates of injury and death and the specific population affected are far from random, and depend upon several other variables. Chief amongst these are the number of foreshocks which precede the main destructive shock, the type and siting of housing, construction methods employed, the time of day and, in some cases, the

time of year, all of which influence the part of the population affected. For example, a survey by Glass in a Guatemalan village in 1976 showed that 78 people out of a population of 1 500 had been killed and 38 had suffered fractures or other major injuries. Almost all houses in the village had been destroyed and a strong relationship was found between the individuals killed and injured and the type of housing in which they lived. Adobe (sun-dried earth-brick) housing carried most risk, particularly if it had been built more than seven years before; lighter forms of construction were much less associated with injury and death.

Diurnal variation in the pattern of injury has also been noted from Chile and Iran and reflects house occupancy. During the day, when men may be at work, they will be less exposed. In rural areas the risk will be less during the agricultural season, for the same reason. In Chile, a clear relationship has been found between the death toll from earthquake and the number of foreshocks, which gave warning and allowed escape.

In general also, age-specific morbidity - with the possible exception of babies, who, sleeping with a parent will be relatively protected - appears to be greatest in the young and the old, although it shows a general tendency to rise with age.

Relatively little is known of the determinants of types of injuries within populations; records suggest a fairly continuous gradation in numbers with the slight injuries predominating over the serious ones. Perhaps half or more of the fractures seen will be of the limbs. Following the earthquake south of Khorasan, Iran, in 1968, for example, 10 886 patients were treated at a field hospital, of which only 368 were hospitalized. In Guatemala, paraplegia accounted for only 116 out of the 76 000 injured. Little information is available on the incidence of severe soft tissue and visceral injury although there are indications that the significance of these may have been underestimated. Few cases of 'crush syndrome' (renal failure following the release of myoglobin from damaged muscle) were reported after the recent earthquake.

Secondary disasters may be of considerable importance in causing injury and death. Fires, flooding and landslides may all cause a secondary wave of injury, although the areas in which these will occur are relatively predictable. In Tokyo, following the 1923 earthquake, 60 000 were killed in the initial shock and 16 000 injured: a further 50 000 were killed in the subsequent firestorm.

The effects of flashflood, other inundations and high winds present a considerable contrast. Here, deaths outnumber serious injuries and the rates of injury will be small. Victims are either drowned or they survive, and the small number of injuries which occur will result from encounters with floating debris, or from debris blown around by high winds. The recent tidal wave and cyclone disaster in Andhra Pradesh underlines this point well: of 8 504 dead and a further 3 000 missing presumed dead, only 117 orthopaedic cases were treated, including only five cases of paraplegia. It is the young, the old and the weak who die, since these groups are the least able to save themselves; consequently, immediately after a major sea-surge the surviving population may be fitter than the original population.

## (2) Disasters as an epidemiological determinant of health

This category includes a variety of health problems other than injuries, chief amongst which are the risk of communicable disease, psychological problems, direct environmental risk and food shortage.

In 1970, a cyclone and tidal wave killed at least 210 000 people in East Bengal. Among the surviving population, a survey by Sommers and Mosely showed few injuries, that children were in a nutritionally better condition than the unaffected populations further north, and that morbidity, principally from gastroenteritis, was apparently lower. It is important to have baseline data in order to determine the effect on morbidity of a disaster:

after the Andhra Pradesh cyclone 2 150 cases of gastroenteritis and 18 deaths were observed, but it was not possible to state whether or not this represented a change in incidence for the area and season. Only 17 cases of cholera were identified.

Epidemic disease. The belief is widespread that epidemic disease is an inevitable sequel to natural disaster. In practice, however, epidemics have only rarely been observed: the recent literature appears to contain only two examples. A small outbreak of leptospirosis in Lisbon in 1967, following floods, and a sudden increase in malaria in Haiti attributed to floods washing away residual insecticides from houses. But little information is available on the effects of disaster on communicable disease, and it is possible that small outbreaks have gone unnoticed since the methods of observation used are crude; and a sudden influx of medical help after a disaster leads to an increase in the reporting of disease.

The problem is better considered from the standpoint of the presence of communicable disease in the area before the disaster, and an examination of the actual or potential changes in the risk of transmission. In most areas, the list of potential epidemic diseases is very small; the major focus centres on disease spread by faecal contamination of water or food, although there may also be concern about the risk of tetanus. Specifically, interest will centre on the enteric fevers, bacillary dysentery, the other infectious diarrhoeas, including cholera, and, as a subsidiary problem, respiratory diseases.

After most earthquakes, the risk of outbreaks due to one principal source, appears to be low, with the possible exception of piped urban water/sewage systems, where cross contamination of broken pipes might occur. Although this phenomenon seems not to have been observed in the past, this may have been due to the prompt isolation of damaged areas, and the hyperchlorination of water. In Guatemala 75 urban and 242 rural water supply systems, and 66 000 latrines had suffered damage to a varying extent and the risk should not therefore be minimized. However, intensive surveillance of the area revealed no significant increase in incidence of communicable disease.

Equally, floods have not been observed to enhance the transmission of disease to any great extent, although the potential clearly exists where, for example, pit latrines and water tanks are flooded. In practice the relatively low risk of communicable disease may result from massive dilution of infective agents, the sanitary measures instigated by the authorities or, sometimes, the reluctance of the population to drink brackish or saline ground water. For instance, the apparent decrease in diarrhoeal disease observed in East Bengal (now Bangladesh) in 1971 may have resulted from the increased use of water obtained from tube-wells.

Corpses and animal carcasses are often feared as a source of infection; though again there appear to be few observations in support of this, and from a deductive standpoint little evidence to suppose that the risk is large. If persons handling bodies are reasonably protected with gloves and take normal hygienic precautions there is little reason to fear disease.

In some countries there appears to be a regular and predictable risk of dog bite two or three weeks after earthquake, since stray unfed dogs and a homeless population are thrown into close proximity. In theory, this might increase the transmission of rabies, though no case seems to have been recorded. On the other hand, snake bite seems to be a definite problem.

The risk of epidemic disease will be increased where people are brought into close proximity without services, as in a refugee camp. Even here the risks of transmission of most diseases remain unchanged if adequate water and sewage systems are provided. However, in West Irian an epidemic of influenza occurred in a refugee camp population which had not formerly been exposed to the disease.

Psychological disorders. Broadly, these appear clinically to fall into two major syndromes:

(i) A 'post disaster syndrome' characterized by temporary confusion and disorientation and rarely hysteria, which probably affects the majority of the population, at least briefly, after a major unanticipated disaster (e.g. earthquake) but which rapidly disappears with time.

(ii) Various mixes of anxiety/depression which affect an unknown proportion of the population. This problem has been reported mostly from developed countries and may be related to the relative difficulties and the long time involved in reinstating high value property. Little is known of the extent or significance of these problems in developing countries.

According to a study of the Department of National Health and Welfare of Canada, recent studies of disaster have dispelled a number of misconceptions about how people behave in extreme emergencies: panic and irrational behaviour are rare in disasters, looting is a minor problem in most disasters, survivors are not reduced to a helpless and dependent mass, survivors seldom think only of their own welfare, and disasters do not produce mental illness. Although a disaster produces social chaos and much suffering, fear, and anguish, the survivors usually demonstrate a great capacity for endurance, mutual aid and recovery.

Direct environmental risk appears also to have been exaggerated in the past - no death from exposure after disaster on land having apparently ever been recorded; although clearly, in cold environments, it might pose a threat where casualties are trapped under rubble. Little is known of the less extreme effects of exposure, especially on malnourished populations.

Food shortage appears regularly to follow only flood, which may damage stored or standing crops, and salinate fields. This is particularly so since in many areas floods are most likely to occur in the wettest season, before the harvest. Flooding in north Bangladesh in 1972 was reportedly followed by some 20 000 starvation deaths in isolated areas. Earthquake appears only rarely to cause similar problems. Food shortage may result from the destruction of transport systems to urban areas and in areas dependent on the cash market, the loss of jobs may result in difficulties in food purchase, even when food is abundant. There may be a shortage of agricultural labour. Under certain circumstances, the supply of food may well be a priority above that of the provision of medical care.

One may observe that in each type of disaster under consideration, the types of health problems which will be of importance will be relatively predictable on the basis of a knowledge of the terrain and type of event involved. Much less predictable will be the timing of the disaster. Advance prediction of earthquake is at present very crude. For cyclone, we are much better informed, but there is still much to be desired in advance warning. Although the effect of a disaster will be relatively unpredictable, an idea of the risks of occurrence of various levels of severity may be possible by interpolation and extrapolation from past events, making due allowance for changes in population density and other variables. Qualitatively, the problems to be dealt with will be:

Earthquake: a large influx of casualties in the first few days, mainly minor injuries with a possible predominance of the young and old. The risk of secondary disaster, e.g. major fire, and the resulting pattern of injury, e.g. burns, should be allowed for where this is possible.

Flood, tidal wave, cyclone, volcanic eruption: few traumatic injuries will be seen, even when the death toll is high.

Epidemics and communicable diseases: are of low probability although these remain a potential threat. The risk can be eliminated by prompt attention to likely sources of outbreaks, e.g. sewage, water supplies.

## 2. NATIONAL RESPONSE TO DISASTER

### (a) The assessment of needs and priorities

Following a natural disaster, there is usually a lack of specific reliable information on the extent of damage and of medical need. Often the problem lies rather with an excess of contradictory ill-founded or exaggerated information. The rapid acquisition of accurate information or of estimates of known accuracy are prerequisites both for the planning of a national relief programme and for guiding international assistance.

Data collection need not impede initial relief work since this can begin on the basis of the information obtained. When adequate preparedness for disaster exists, this information will become available and will include accurate and up-to-date information relevant to the disaster affected area including an inventory of the medical facilities, available personnel, material, transport and communications, both within the disaster area and in adjacent parts of the country. This knowledge will allow a reasoned first estimate to be made of the extent and nature of the likely need created by a given event, and of the resources available to meet that need.

The assessment of needs and priorities involves several steps. Data must be collected, interpreted, and disseminated to potential users, and finally utilized in defining priorities and making decisions. Only the first two aspects are considered here.

Types of data required. Two broad categories of information are required by health administrators:

- (1) General statements about the extent of damage, the area and population affected, functional damage to public services, telecommunications, highways and roads, power and other utilities. The collection of this information is independent of the health administration.
- (2) Specific medical, epidemiological and administrative information on health problems and available resources.

No universal answers can be given as to the health information which will be needed, nor on the most effective and least costly methods of collection. Here, as in most other areas which are under discussion, the solution most suitable to local conditions must be selected and measures for implementation included in the predisaster plan of operations.

The following types of data have been shown to have practical value following recent disasters:

Number and proportions (or rates) of injuries. Several categories of injuries need to be defined. The most pragmatic classifications are based on the site (e.g. fractures of arms or legs) or the severity of trauma. The latter classification is the basis for effective triage in the field. Gross data on the total number of persons injured are of little value to relief officials unless some indication is provided on the type of treatment required, for instance, ambulatory treatment or major surgery. Epidemiological data on sex and age are also required and can be obtained on a sample basis. Spot surveys in Guatemala following the earthquake of February 1976 suggested that children under five and adults over 50 have a considerably higher rate of trauma. Such information has direct implications for the type of treatment facilities and material required.

Incidence of communicable disease. The risk of outbreaks of communicable diseases is usually of major concern both to the general public and to the administration. A quick survey of the site of impact will provide baseline data and should lead to the setting-up of an epidemiological surveillance system based on reporting of suspect cases of selected diseases (see section 2(b)). This can be made using simple symptom reporting from out-patient and hospital departments. The time necessary for disease transmission and therefore for the building-up of an epidemic, precludes outbreaks in the first few days of the emergency.

Incidence of mental health disorders. Little is known about the actual extent of this problem in different cultural and environmental settings.

In the opinion of several participants, disasters did not have a significant effect on mental health.

Medical and epidemiological data represent only a part of the information required for effective relief operations and rehabilitation. Identified health problems should be quantified and this information matched against the health resources available in the country. The result will indicate areas of need and provide quantified requirements for additional resources and assistance.

Inventory of remaining health facilities. A detailed inventory of functional health facilities will include much information not included in a general survey of damage. For relief purposes, the emphasis is placed on describing the damage to existing facilities. Field surveys by experienced professionals combined with low-flying reconnaissance missions by helicopter have been effective in providing a quick assessment, but a more detailed inventory must be obtained by ground survey.

Inventory of medical supplies. A quick survey of supplies available at the site of the disaster may indicate that urgently needed drugs or material could be easily salvaged and used. In Nicaragua, a survey of the medical warehouses in Managua a few days following the devastating earthquake which destroyed the city in 1972, showed that over one million dollars worth of medical and surgical supplies were immediately salvageable although the warehouses had been reportedly totally destroyed. The assessment of available supplies should not be limited to the site of the disaster but, if necessary, should be carried out at national level.

Inventory of essential services available within or outside the stricken area. The assessment of available resources should not be limited to the area of impact. For instance, a daily monitoring of beds available in all hospitals within and outside the disaster area following the Nicaragua and Guatemala earthquakes dramatically improved the use of resources and reduced the need to evacuate patients to hospitals in other countries.

Water supply and sanitation facilities. Health problems are not limited to the management of mass casualties: the provision and repair of damaged water supplies and sanitation systems are important. A survey of the water supply systems in urban or rural areas should be included in the early assessment of health needs. In the assessment of water supply and sanitation it is important that assessment teams be constituted of experts familiar with the sanitary conditions existing before the disaster. Experience has shown that engineers unfamiliar with poor rural conditions - and especially foreign experts - tend to overestimate the emergency requirements and falsely attribute to the effect of the disaster deficiencies in sanitation and water supplies which actually reflect long-term development problems and which existed before.

Techniques and methods. The techniques and methods for the quicker collection of data vary greatly in accuracy, speed, sophistication and cost. They include:

- reporting by normal administrative channels
- field surveys
- aerial or satellite photography.

Reporting by normal administrative channels. Unless the administrative structure is severely disrupted or has totally collapsed, immediate information is usually transmitted to the central level by local officials in the disaster area. The accuracy of this data may be, and often is, limited. Inevitably, local officials will lack the necessary experience for this task and may be under strong emotional or political pressure: exaggeration is often the rule and may reflect the interest of the administrators in attracting maximum attention for the population for whom they are responsible. Long delays may occur before information is transmitted to the central level unless telephone or radio is available. Reports received during the first twelve hours generally speak only of casualties and damage in the most accessible areas. For example, following the Guatemala earthquake, it was not until forty-eight hours after the impact that any specific information on the extent of the damage outside Guatemala City was available, although there had been earlier rumours of widespread damage in rural areas.

The major advantage of this source of information lies in the fact that it is part of a normal and therefore organized reporting process and can be improved to meet the special requirements of an emergency situation. It is particularly valuable when a continuous flow of quantified data is required to monitor major changes in the situation.

Field surveys. A systematic rapid sample survey of the areas affected by the disaster is necessary to provide an immediate overview of the situation. One cannot over-emphasise that the survey should cover the entire area and not be limited to sectors reported damaged. Failure to comply with this condition may result in isolated localities being left unattended for a considerable period of time. Advantages of a survey being promptly carried out are many; it quickly provides standardized information which would otherwise not be available until normal communications are re-established. Following the earthquakes in the rural parts of Peru (1971) and Guatemala, field surveys provided the national emergency committees with a comprehensive overview of the extent of damage within three to five days.

The participation of a trained statistician is recommended in the planning of a survey. The results of the survey following a disaster will only be of value if it has been properly planned and data adequately processed. If this is not done the data may be invalid. With regard to the large variety of data to be collected, survey teams should be multidisciplinary and call on the best expertise available in the country.

In the health sector, epidemiologists are best qualified to assume this responsibility and provide a diagnosis on the public health situation.

Aerial and satellite photography. Recently, greater use of sophisticated technology such as photography by high-flying aircraft and satellites has been made in quantifying the extent of damage. The accuracy of the data collected may be exceptionally good. The technique is known to be useful for the assessment of macro-damage, but its potential in health remains to be determined. The technology is not readily available to most disaster-affected countries and its cost may limit future application.

Anticipation of requirements for relief and rehabilitation. The objective of the assessment is to determine which human or material resources will be required to cope with the emergency. These resources must be readily and promptly available: if too much time elapses between the identification of a need and the arrival of supplies at the site, they may no longer be useful. For example, after an earthquake first-aid and surgical supplies must be delivered within the first few days to outlying health services. The international community, by-and-large, is not often in a position to respond so quickly. Following the Nicaragua and Guatemala earthquakes, the number of aircraft arriving with

medical supplies was reaching a peak two weeks after the impact, by which time the priority had already shifted to the provision of sanitation and other forms of reconstruction.

First assessment of needs. The responsibility and authority for conducting an assessment of needs lies with the government of the disaster-affected country. Should the national resources be found insufficient for relief, external assistance from bilateral or international sources will have to be sought. However, when a disaster is of such magnitude as to make extensive international aid necessary, it often happens that nationals with the necessary expertise are too scarce to conduct on their own an adequate assessment of the extent of the damage and of the needs. Moreover, potential donors need objective and detailed information on material requirements in order to plan their action and make estimates of the expenditure involved. It must not be forgotten that they have to justify their action to their governing bodies. Consequently, it often happens that teams or individuals are sent to the affected area by each organization to carry out an independent survey and provide first-hand data on the requirements. The participation of the international community in a joint assessment of disaster situations, under the authority of the disaster-affected country would contribute greatly to a better and more efficient response to the challenge of natural disasters.

(b) The surveillance and control of communicable diseases

The methods employed in the control of communicable disease in the wake of a disaster do not differ from those used in normal times: only a more intensive application of these may be needed since the risk of disease transmission may have been enhanced.

(i) The communicable diseases of particular importance to the area should be identified. These will be mainly diseases endemic to the area before the disaster occurred, and under most conditions there is little reason to fear the introduction of new types of disease. The list should be confined to those which have a reasonably short incubation period and are amenable to control.

(ii) By survey and using where possible baseline data gathered before the disaster, an identification should be made of those points where transmission of these diseases might occur, e.g. urban water supply, sewage, contaminated wells, settlements of squatters without adequate water and sanitary arrangements. The first priority should be to rectify these, e.g. by sealing damaged segments of piped systems, hyperchlorinating water where this is possible, the use of bleaching powder in wells, removing bodies, carcasses, etc.

(iii) A simple reporting system should be established in order to identify outbreaks of disease should these occur. This reporting system can be based on a simple and appropriate symptom diagnosis, from health facilities. Where an area is poorly served by health facilities, even in normal times, it may be worthwhile introducing some temporary clinic facilities for this reason alone, even if it is thought that no increase or even a decrease in morbidity has resulted from the disaster.

(iv) A regular system for the collection of these data (every 2-3 days) and their rapid analysis should be established.

(v) Where data indicate that an outbreak has occurred, this should be promptly investigated, a process which may involve detailed clinical investigation of cases and require some laboratory back-up. If an outbreak has occurred this can be controlled by the usual methods of source identification and elimination, the treatment of cases and, where appropriate, the vaccination of contacts.

(vi) A clear system of reporting of findings on a regular basis should be established both with the field and with the National Emergency Committee. This reporting should be brief and cover instances where no disease has been observed as well as positive findings.

Vaccination. Experience shows that in disasters there is a tendency to rely heavily on vaccination. Participants were of the opinion that attempts at mass vaccination under such circumstances appear to be inappropriate for several technical and administrative reasons.

(i) Most vaccines available (and particularly those against typhoid and cholera) are of very limited effectiveness unless given in three properly spaced injections. Even then their effectiveness is short lived.

(ii) Mass vaccination under disaster conditions makes great demands upon personnel, transport and other resources. Only rarely is it possible to obtain an adequate first coverage of the population, and less often is it possible to provide further injections.

(iii) Vaccinating the population can lead to a false sense of confidence, particularly when it is considered that even after a single injection 10-14 days must elapse before any immunity is acquired at all.

#### Discussion

There was general agreement amongst delegates on the principles to be applied in the control of communicable diseases. An excellent example was supplied from Guatemala (MacDonald) where in 1976 a reporting network was established within a few days of the earthquake by staff from PAHO/WHO, Instituto de Nutrición de Central America y Panama (INCAP) and the Ministry of Public Health and Social Welfare, emphasizing water supply and identification of possible sources of disease. A similar system of reporting in Andhra Pradesh was used and public health and medical teams, consisting of 1-2 doctors and 2-3 paramedical personnel were employed in the chlorination of wells, testing of water, and in cholera surveillance. A cholera combat team and the Regional Public Health Laboratory engaged in the testing of stool specimens from patients with diarrhoea.

With regard to mass immunization several points were raised. The public may expect to be vaccinated! After the Darwin cyclone mass typhoid vaccination was conducted for this reason. In India, Pakistan and Bangladesh, mass cholera vaccination is conducted routinely after disaster, and it is believed by the authorities that this alters the progress of the disease. In Guatemala vaccination against diphtheria, pertussis, tetanus (DPT), poliomyelitis and measles were conducted after the earthquake, not because these diseases were feared but as a routine programme brought forward in time, both to allay the fears of the population and to increase the coverage of the routine immunization programme. It was considered by several speakers that mass tetanus vaccination should not be attempted in the wake of disaster: ideally this should precede the disaster in vulnerable areas since postdisaster vaccination will yield little benefit.

In some areas the risk of rabies from dog bites may be dealt with by appropriate programmes to reduce the dog population.

#### (c) The management of mass casualties

Logically this can be divided into four phases:

- (i) The rescue of casualties.
- (ii) First aid.
- (iii) Transport.
- (iv) Definitive treatment (dealt with as a separate topic, see Hospital organizational plans).

It was clear that few global solutions could be found to the provision of services in each of these phases, given the great range of resources, type of disaster and risk in different countries and regions of the world. However, some principles and problems emerged:

(i) In the wake of large-scale disasters, most rescue must of necessity be performed by the people themselves. It would clearly be beyond the ability and resources of any central organization to accomplish this task. Guatemala in February 1976 provides an excellent example: "From the earliest hours ... the number of volunteer groups set up was truly amazing. The first sunlight found citizens cleaning their streets ... and helping their neighbours and friends to carry away the wounded and evacuate the dead. Civilian patrols organised immediately, established car pools to transport the wounded, provided substantial assistance in keeping order ...". Assistance from outside may, however, be necessary. In the Mindanao tsunami/earthquake disaster (August 1976) which destroyed tall buildings, heavy equipment appears to have been necessary for moving debris.

(ii) Several questions were raised about the type, extent and source of first aid which should be administered at the scene of the injury. Certain principles appeared to be clear but again the degree to which these could or should be implemented must depend upon local circumstances.

Little information is available on the relationship between mortality in casualties after major disasters and the time that elapses before treatment. Mortality rates in the wounded have fallen dramatically in recent decades, an evolution which is related to improved first aid at the place of injury. If adequate and rapid attention is paid to the maintenance of an airway, the treatment of shock, and the arrest of haemorrhage before the patient is transported to hospital, this will have profound implications for the subsequent chance of survival. Observations in a Guatemalan village of 1 500 inhabitants, where following a disaster the mortality rate was 5%, indicate that if advanced first aid had been available within three hours it would have reduced mortality by about 7%.

A reduction in mortality in the severely injured can be achieved by early first aid; the better the equipment used (e.g. the use of respirators, blood transfusion at the place of injury) the greater will be the reduction. The use of 'flying squads' of medical personnel based on hospitals is a practical system to provide such services where small numbers of casualties are involved (e.g. road accidents) but after major disasters this system could not meet the need. Greater benefits can be expected from improved knowledge in the community on basic first aid (e.g. the arrest of haemorrhage) and better use of local medical and paramedical personnel.

(iii) Similar considerations apply to transport. Following a major disaster most local transport is usually set apart by local people. The injured tend to converge on the nearest medical facilities even when these may be destroyed. In some areas, more sophisticated means will be required (e.g. helicopters for the evacuation of serious injuries). This should and can be planned for in order to achieve systematic coverage of the area, to ensure that only casualties requiring evacuation are evacuated and to ensure that the required information about the patients accompanies them. In Guatemala some people evacuated from rural areas could not be returned to their villages for lack of information.

(d) Hospital organization and disaster plans<sup>1</sup>

Several questions were raised for discussion about written disaster plans. How, for example, could hospital staff be expected to assimilate and remember detailed plans? How could plans be written for various possible contingencies in which the hospital and

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<sup>1</sup> This topic was studied and discussed by four working groups.

its staff had no direct experience? That is, could a plan devised on a theoretical basis rather than on actual experience be expected to work? Were plans necessary at all, given that past experiences suggest that hospital staff, if they are aware of the basic principles of mass casualty management, are capable of a very high degree of improvisation? The question was also raised as to whether hospital plans ought to be considered not on the basis of the individual hospital but in relation to a number of hospitals in a region or a whole country, in order that maximum utilization of facilities be obtained. This latter possibility appears to be of great importance where e.g. in Guatemala, numbers of hospitals within the disaster area were rendered inoperative by a disaster.

There was a consensus on the following points:

- (i) A written hospital plan, if realistically drawn up, is of considerable advantage.
- (ii) The plan should be devised to meet a variety of probable contingencies which may have to be faced by the hospital. There is little point in attempting detailed planning for events that are unlikely to occur.
- (iii) The plan should be simple, aiming at establishing an optimal distribution and layout of material and personnel to meet an expected need. Staff members should have sufficient information to understand the broad principles of the plan but should be responsible only for a specific area. Since the exact nature and size of the casualty load would be unknown, room should be allowed for improvisation within the system.
- (iv) Only a few people (e.g. senior administrators) need to be familiar with the more complex and detailed aspects of the plan.
- (v) Two categories of plans were considered necessary:
  - a minor plan, to be put into operation for a small caseload, say up to 100 casualties, not requiring extensive surgery - this plan would allow for the extra load to be dealt with while the hospital continued its normal operation;
  - a major plan to be implemented when it was necessary to stop the normal work of the hospital, expand surgical capacity, etc., as below.

Within the major plan the following are essential:

- (i) Reorganization of the admission area of the hospital to allow space for triage - the sorting of patients into categories according to urgency and further care needed.
- (ii) Morgue facilities.
- (iii) The control of relatives, visitors and sightseers in this area.
- (iv) Provision for the clear identification of patients by tagging or other means (see international assistance below).
- (v) Provision for adequate waiting areas and medical support for patients awaiting special investigations, especially at X-ray departments.
- (vi) Provision for the expansion of surgical facilities: it was suggested that a considerable expansion of facilities would be possible if fairly small extra amounts of equipment could be stock-piled within the hospital, e.g. operating tables/instruments, etc.

(vii) The plan should be rehearsed regularly. The point was made that this did not necessarily mean a full-scale rehearsal. Parts of the system (e.g. that of senior administration) could be tested in isolation: if the plan was well drawn up, individual staff members could carry their basic instructions (e.g. on a small plastic card) at all times.

These points should be incorporated not only in the framework of a single hospital organization but also in a wider system of hospitals with interlinked plans. The assumption here is that individual hospitals might sustain damage, and that in fact, since a disaster involves only a part of a country or province, hospitals outside the disaster area should be part of the plan. The plan should be based on hospitals since experiences have shown that staff function better in this environment than in improvised structures. Such a plan should:

- give full details on each hospital
- indicate other facilities that could be mobilized in an emergency
- point to possible bottlenecks within the expanded hospital system and to the means to overcome them
- point the way in which the evacuation of casualties could be controlled and coordinated according to the functions of individual hospitals and their saturation at a given time, in order to ensure that casualties reach the facility at which the category of care needed can be given and to ensure the even distribution of casualties among various hospitals.

It is not possible, of course, to plan hospital facilities taking into account all possible disasters but it is desirable to maximize their utilization in the event of a catastrophe. The planning of such utilization should take into account that hospitalization is a process comprising a series of stages (reception, triage, diagnosis, treatment, housing), at each of which bottlenecks may occur. Therefore the prerequisite to maximum utilization is for the disaster plan to include a study of each of these stages as well as of the passage from one stage to another. Such a study should comprise estimates of the volume of casualties which can be dealt with at each stage in a given unit of time, so as to determine where bottlenecks are most likely to develop.

(e) Drug and medical supplies: standardized drug lists

(1) The Red Cross list of medical supplies.

During the emergency phase of any disaster relief operation, the first requests for international assistance always include medicaments. The experience of the League of Red Cross Societies (LRCS) during recent years has shown that major difficulties often arise due to the lack of coordination and standardization of medicines and simple medical equipment, and that in the early phase of a relief operation, it is here that the greatest waste occurs.

In order to study this problem the LRCS convened a meeting with representation from national Red Cross Societies, International Committee of the Red Cross, WHO, UNICEF and non-governmental organizations involved in disaster relief. With the object of avoiding unnecessary duplication and waste in relief operations, the committee established a list of a limited number of medicaments relevant to the majority of cases encountered by a medical team working under emergency conditions.

The list of drugs includes seventy items, but does not aim to be comprehensive, since the personal choice of doctors, local need and the availability of medicines may dictate some variations.

The list is divided into two codes:

- A: medicaments required throughout the world
- B: medicaments required mainly for the treatment of tropical diseases.

The list has been kept to a minimum and no attempt has been made to include drugs for the therapy of diseases requiring long-term treatment, e.g. tuberculosis. The purpose of the list is to allow national societies to have supplies prepared in advance and to standardize requests for replacement of stocks. Experience has shown that much drug wastage results from the individual preference of doctors: in Viet-Nam for example, eleven teams required eleven different sets of drugs and when the doctor leading a team changed, all the drugs had to be changed as well.

The list is aimed at providing only basic guidance to local societies, and it is hoped that it will be modified according to local needs.

(2) WHO list of essential drugs.

WHO has established a model list of essential drugs with the aim of facilitating the supply of necessary medicaments of known value at a lower cost. The emergency relief operations of WHO encourage the use, as far as possible, of drugs from this list in disaster situations. The WHO list is not particularly aimed at emergency situations and in no way replaces the Red Cross or other list.

Discussion

A number of points relating to standardized drug lists were made by delegates.

It was suggested that paediatric formulations (syrups, etc.) should be included, since 30-40% of patients would be children. This, however, may involve additional cost and transport expenses.

Standard packages of drugs may be prepared for various uses, e.g. Box A for orthopaedic use, B for general surgery, etc. This might entail some waste but would simplify supply and replacement of stocks.

Concerning the coordination of drug supply and distribution within a disaster area, it was pointed out that in some past disasters, some agencies held drug stocks of which the National Emergency Committee had no detailed knowledge. Whilst some other agencies are by charter independent of government, greater effort should be made to coordinate their activities with those of national bodies. A centralized inventory of donated medical supplies is desirable.

The inclusion of chloramphenicol in these packages was discouraged as it causes serious blood dyscrasia in some patients. The use of this drug as an antibiotic should be reserved for cases of typhoid.

The major problem is not so much the delivery of drugs to the affected country as the distribution of the right drugs to the right places within the affected country.

The development of an equivalent list of surgical instruments was suggested. Such kits are used successfully by the military.

It was further pointed out that:

- The quantities of medicines sent to the disaster areas are often too great as compared with the needs.

- Problems of duplication of medical supplies in international aid can be reduced by proper coordination. UNDR0 is the WHO statutory international coordinating body, while, for health problems, WHO can provide information and advice on the usefulness of specific items.

- While there is considerable variation among countries as to the exact drugs required, a reasonably simple list can be devised for a given country and type of disaster.

### 3. INTERNATIONAL RESPONSE TO DISASTER

The provision of international assistance can be viewed from three standpoints: planning, mobilization and coordination.

Planning. The arrival of international aid after a disaster can be anticipated, and plans can be made in advance for this. Aid is of four well-defined types: bilateral aid, arranged directly between the donor and receiving governments; aid from the numerous voluntary and charitable agencies; from various bodies within the United Nations system; and, direct contributions from private individuals, especially where strong links (e.g. ethnic) exist with the stricken country.

National Emergency Committees, civil defence organizations or the government authority responsible can establish links and draw up contingency plans. These can be with:

- United Nations (through UNDR0) via the UNDP resident representative;
- WHO, through the WHO Programme Coordinator, the Regional Office, or WHO Headquarters;
- intergovernmental and non-governmental organizations;
- potential bilateral donors.

Most organizations and donor governments welcome predisaster planning since in practice they are at present often forced to respond only after a disaster has occurred and without the benefits of an established programme.

Mobilization of international assistance. Decisions as to requests for international assistance and the framing of requests are often taken only after disaster has struck. National Emergency Committees could do much to improve the administrative arrangements for the request of aid by planning and by knowledge of the international aid mechanisms. UNDR0 and the individual UN agencies can assist in this. Voluntary agencies could be dealt with via their country representatives.

Coordination. At the international level, coordination of international assistance is the responsibility of UNDR0, which aims at having as complete an inventory as possible of material available from different sources. Donors receive clear guidance as to what to send, and thus duplication is avoided. UNDR0 does not stock-pile material, or engage directly in relief activities: its job is to know of stock-piles held by other organizations and to coordinate the use of these to the best advantage of the recipient.

### Discussion

International aid is of course welcome. However, there remains a number of regularly recurring problems which need to be solved:

- The quantity of material donated. This may sometimes be too great for the capacity of the transportation systems of the country. Donors, whose responsibility ends at the port of delivery, do not always realize that the usefulness of aid, especially in

emergencies, depends on the possibility of distributing small quantities of specific items within the country.

- The quality of material sent: the types of drugs supplied were often useless for emergency care, and all too frequently were approaching or had passed their expiry dates.

- Medical personnel. If not properly coordinated, medical aid may arrive unannounced, foreign doctors may be unable to speak the local language or lack the specific skills needed. This may lead to a burden on local resources in lodging, food, etc. On the other hand, in Guatemala, for example, most of the medical aid which was supplied bilaterally from neighbouring countries was effective because those helping were familiar with the language, customs and problems of the people - helpers had often faced the same problems themselves, and quickly arrived, fully self-sufficient, at the scene of the disaster. This shows how cooperation on a regional basis between countries with similar problems can be of considerable value. The possibility of similar regional bilateral aid in the Indian sub-continent was discussed.

- Another problem discussed was the reluctance of voluntary agencies to merge into a larger coordinated response for fear of losing their identity; it was considered that it should be one of the responsibilities of national emergency committees to assign tasks to voluntary agencies, according to the needs, and the specific expertise of the agency involved.

#### 4. THE ROLE OF CIVIL DEFENCE, GOVERNMENT AND CENTRAL ORGANIZATION IN PROVIDING AND COORDINATING EMERGENCY MEDICAL CARE

After a natural disaster, health facilities' services may have to operate independently, but a central system of control, coordination and supply is essential.

The exact form this central organization will take cannot of course be fixed since the role and the means of various services will vary. In some countries, civil defence organizations will play a key role, often in conjunction with the armed forces, in others it is the national Red Cross, etc., but in general the central organization will be the responsibility of the civil administration, which may, in turn, call upon the services of others, including the ministry of health. In the Philippines, for example, a country which is subject to an unusual frequency and range of disasters and which, spanning some thousands of islands, has special problems of communication, the needs for a specialized permanent operations centre is apparent and this exists. Elsewhere, where disaster is less probable or the costs are prohibitive relative to the risk, it may be more practicable to vest responsibility for emergency health administration with an office in the ministry of health and to define its relationships with other ministries.

At the seminar, a general scheme for a civil defence operations centre was presented and this is summarized below. Participants also had the opportunity of visiting the Emergency Operations Centre of the Philippine Government which is run on similar lines.

##### Emergency Operations Centre

This is intended to facilitate the central control of disasters and the appropriate management of available resources. It has, in general, four components:

(i) Management. Made up of a committee, chaired by an official of sufficient authority to take decisions and to coordinate with all ministries. Such a committee generally includes representatives from the ministries of the Interior, Defence, Health, Social Affairs, Communications, Public Works, Information. A disaster coordinator ensures liaison within the operations centre.

(ii) Communications. This assures regular and accurate exchange of information within the Centre, with higher authority, and with the authorities and population of the disaster area. This presupposes plans for necessary powers to have priority use of radio, telephone and other communications in case of disaster. Alternative means of communication must be foreseen. This sector is also responsible for early warning systems.

(iii) Documentation. This section makes available the necessary background statistics, records and maps, including available medical services and resources, material, water supply, etc. A detailed emergency list of personnel, their functions, and substitutes for key positions should be maintained.

(iv) Equipment. Responsible officers will need appropriate transport, maps, portable communication facilities, etc. This is the responsibility of the equipment section.

#### Civil Defence System

To ensure the efficiency of the relief response, the government should:

- establish permanent machinery for action, relief operations and coordination;
- determine specific tasks before, during and after the disaster, including those of voluntary agencies;
- prepare manuals for field operating units - these should include specific guidelines for action in case of disaster with instructions for these units to bring up the matter of disaster preparedness with their respective focal authorities;
- maintain lists of anticipated disasters with an indication of their likely impact;
- provide disaster mobile units;
- maintain the necessary stock-piles;
- establish and keep up-to-date information on hospitals, field kitchens, food supplies, drugs, etc., which could be mobilized for disaster relief;
- inform and familiarize the population with the country's disaster plan and train citizens in basic first aid and other emergency procedures;
- encourage the formation of volunteer first aid groups such as local Red Cross Societies;
- maintain preparedness through regular rehearsal and mock exercises.

#### 5. HOSPITALS AND DISASTER

Hospitals occupy a special place in the life of any community. They are generally located in areas of high population density; they form a focus in the community to which people gravitate at times of need; they function continuously and even in normal times they can respond to emergencies. Moreover, they generally are sufficient in their internal provision of services. Amongst the measures which can be taken to improve the resistance of a region or city to disaster a first priority should be placed upon appropriate planning of the medical facilities against disaster. These are relatively easy to implement and may be highly effective. Decisions concerning hospitals cannot be taken in isolation and must be part of a wider overall plan.

As in other areas of disaster planning decisions must be made regarding the costs involved and the benefits which accrue. In areas where the risk is low, massive investment in the protection of buildings and utilities is clearly not necessary.

(a) Site selection. Ideally hospitals should be situated away from high risk areas. This will depend on local topography. Lands subject to floods or landslides caused by heavy rain should be avoided. Often practical considerations make this impossible since land cost is generally highest in those areas where a hospital is most needed, e.g. city centres. The site may have to be determined on the basis of the probability of events, e.g. precautions to be taken against the '10-year' or the '50-year' flood?

(b) Physical construction. Old buildings may need reinforcement against earthquake; in high risk zones new buildings may be constructed to earthquake resistant standards. A consideration here is cost, since the higher building standards required may increase costs by 10-15%. It was suggested that hospital buildings in earthquake-prone areas be built no higher than 2-3 storeys, which could be served by ramps rather than lifts or stairs. In earthquake-prone areas, the spacing of the various buildings in the hospital complex is also important. This minimizes the possibility of all the buildings being destroyed at the same time. It also facilitates evacuation.

(c) Internal design. Flexibility should be foreseen in hospital design for the alternative use of various facilities and areas to deal with mass casualties in case of a disaster. Consideration may be given to problems of access and exit.

(d) Utilities. Even if the building survives structurally through the disaster, there is a risk of damage to utilities which would either render the hospital inoperative, or reduce its efficiency. The hospital should therefore have a reserve stock or be able to provide for its needs from another source; the period for which these temporary utilities would have to function would depend upon the area involved. Three days appeared to be a reasonable estimate for the period of self-sufficiency needed after a major earthquake, much more than the one day generally planned for.

(i) Water supply: damage to internal piping might be avoided by the use of flexible materials and joints. The hospitals reserve of water is held in a roof tank and this should be of sufficient size to permit basic services to function for three days. Rationing of water may be needed.

(ii) It might be impossible for the hospital to discharge sewage into the main system: an emergency treatment facility is a possible solution.

(iii) Alternative means of lifting patients from floor to floor and for evacuation must be considered, since elevators may be out of service.

(iv) Emergency power generators and fuel will be needed.

(v) Food supplies and cooking facilities must be planned in consideration of physical damage and mass arrival of casualties.

(vi) Overcrowding and infection may be problems when large numbers of casualties are admitted. It may be possible to distribute patients to nearby public buildings and schools or to erect temporary wards in open spaces. The group felt that there was no case for the building of 'extra' wards which would remain empty until needed: this approach would be prohibitively expensive.

(vii) Some sophisticated hospital facilities are designed in such a way as to become non-functional under disaster conditions, e.g. a complete lack of natural lighting. Consideration should be given to providing alternative lighting and ventilation.

## 6. THE RECONSTRUCTION OF HEALTH SERVICES AFTER A NATURAL DISASTER

The approach to reconstruction will depend on a great number of factors varying with each disaster and each community concerned. Nevertheless some points, practical as well as conceptual, are common to all and were therefore discussed in further detail as follows.

### General considerations

(a) Reconstruction. This entails the provisions of physical facilities: it will be necessary to repair or replace dwellings, roads, sewage and water supply systems, hospitals and health centres, etc. But it also implies organization and administration of recovery.

In the health sector, reconstruction implies the restoration of all health activities interrupted or reduced by the disaster, and refers both to physical reconstruction and to administrative and organizational inputs, both of which are indispensable for the restoration of the health services.

(b) Intersectoral approach. It is now widely recognized that health is not only interlinked with other services but in many ways is dependent on them, i.e. sanitation, agriculture, transport, education, etc., and that consequently intersectoral planning aiming at solving the fundamental problems of the community with community participation is therefore advisable.

Disasters, with the major disruptions that they bring in all sectors, provide an opportunity for using the intersectoral approach to bring about basic changes during the reconstruction phase.

However, the understandable preoccupation with restoring the physical capacity of health services as quickly as possible can lead to a situation where plans and projects for the health services are made in isolation and mainly aim at restoring the situation prevailing before the disaster, the more so that it is relatively easy to attract funds to reconstruct health centres, hospitals, etc.

It is therefore imperative for decision-makers to resist the temptation, backed by popular opinion, and to take the time necessary for consultation and cooperation with other sectors to provide better living conditions, of which health, however important, is but one factor.

(c) National responsibility for reconstruction. A natural catastrophe tends to lead to a sense of solidarity within a community and with national and international agencies and the governments of other countries; but the ultimate responsibility lies with the government of the affected country. International aid is a complement to this national effort and can be of great value. To utilize this to the maximum, plans should take into account this international component. During this period of international aid, credit, donations and loans for specific projects, as well as technical expertise, become available. International funds sometimes have to be used according to the wishes of the donor agency. The authorities responsible for reconstruction should therefore take this into account in planning for reconstruction.

(d) Disaster as an opportunity for change. Experience has shown that despite the desolation and ruin it causes, a disaster can sometimes have positive effects. Reconstruction should be an opportunity to incorporate changes which can provide solutions to previous difficulties in the community. The psychological climate, once the initial period of anguish has passed, offers a chance to introduce new ideas, new attitudes, and new patterns. This is also the time to establish modifications in the organization and distribution of services, to rectify malfunctions and solve problems which had existed

before the disaster but which could not be tackled because of other constraints.

There are no fixed rules for this. Thorough assessment and study of the situation are required; knowledge of the existing health services of the area, their characteristics, limitations and restrictions; as well as the community's needs and expectations in reconstruction, is essential.

(c) Temporary facilities. An emergency requires immediate action. However, thought must be given to the future since the effects of early decisions can persist for a long time, even if this is unintended. Temporary facilities have a tendency to become permanent. It is necessary to avoid creating conditions which will be difficult to modify or eliminate.

This is particularly important when such decisions apply to the rebuilding of facilities and to the planning of basic organizational aspects of services. For example, general rather than specialized hospitals will be needed: community and ambulatory rather than in-patient services should be emphasized. Proper geographical redistribution of services is desirable.

#### Nature and type of reconstruction

Reconstruction in a disaster area fundamentally needs planning. Distinction is usually made between the emergency and rehabilitation phases and reconstruction. In practice, planning is necessary in all these phases and must be introduced as early as possible in order to avoid early mistakes becoming permanent. Compromises will often be needed between speed and the need to study the situation. A balance must be struck between planning and implementation and between the priorities in the short-, medium-, and long-terms.

In the initial stages of reconstruction it is necessary to provide basic services for the survival of the population. The area must be cleared, materials salvaged for reuse, ruins demolished, crops harvested and the flow of necessary supplies re-established. Although the provision of health services is necessary at this time it is not a central preoccupation, with the exception of an epidemiological surveillance system and the control of infectious diseases. Often, normal services are interrupted and the protection of the population is a necessity. Therefore those services should be re-established as soon as possible. Basic services can be provided from temporary facilities with the support of institutions outside the affected area.

A second stage which will serve as a reference point for future development is characterized by the development of a basic set of services and the restoration of the unity of the system.

The health services planning process, whatever methods are utilized, involves four steps: diagnosis, formulation of plans, preparatory action, and execution of plans.

(a) Diagnosis. This entails identification, descriptions and assessment of the damage caused. Diagnosis does not mean a simple inventory: it is necessary to categorize the information obtained and to distinguish between the demands and requirements for information created specifically by the disaster and those which are needed for reconstruction. The diagnosis must include a description of the original conditions of the health services: their organization, limitations, problem areas and resources. This analysis is necessary for a complete understanding of those factors which obstruct or limit the possibilities for change. A third necessity in diagnosis is to develop as wide a knowledge as possible of the plans and programmes for reconstruction in other sectors.

(b) Formulation of a plan. This involves the determination and presentation of those actions which are necessary to modify the observed situation and to bring the services to

the proposed level. It is a clear and, as far as possible, quantified statement of the actions required to produce specific ends. It is a phase when priorities must be clearly defined, in terms of short-, medium- and long-term actions and needs.

The plan provides an opportunity to focus on innovative ideas: besides present requirements, the actions proposed should also foresee, and take into account, future needs. Innovation includes changes in attitudes as well as in the organization of services and physical facilities.

(c) Preparations for the implementation of the plan. The plan for the reconstruction of health services should be combined with other sectors' plans and with the overall plan for reconstruction. During this preparative phase new legislation may be passed, new administrative measures introduced, detailed plans prepared and plans made for the evaluation of programmes to control and modify the process of execution.

(d) Execution of the plan. The enthusiasm for reconstruction and the passage of time since the catastrophe lead to a desire for rapid action. Notwithstanding its importance, the plan may then be overlooked. This phase entails, amongst other things, the training of personnel, the passing of appropriate legislation, and the introduction of administrative reform. Evaluation and control of progress in reconstruction are fundamental.

To ensure administrative order, an appropriate body must be in charge of coordinating the programmes of different sectors and agencies, local, national and international. This body must be invested with sufficient authority to control the activities of the organizations involved and must have the legal and administrative resources to do so. This committee must be made up of representatives of all the organizations involved in reconstruction, e.g. the central planning organization, local authorities, voluntary agencies and the international agencies. It will thus ensure that its director will have the required authority.

In the health sector, it is useful to have a unit specifically in charge of organization, supervision and evaluation of plans and projects for redevelopment.

#### Conclusion

While it is clearly not possible to develop blueprints for action in the various phases of a disaster applicable to every situation and context, the Meeting has shown that a whole series of principles can be considered as of universal application. It will be the task of subsequent regional and national meetings to determine in more and more precise terms how these principles must be adapted to increasingly specific circumstances. As was stated at the beginning of this report, the unfortunate destruction following a disaster may, and perhaps should, be an occasion for reconstruction on more rational principles.

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#### PAPERS PRESENTED TO THE SEMINAR

1. Diagnosis of Recurrent Problems: The Role of WHO.
2. Problems related to Emergency Medical Relief in Disaster: The Chairman's Introduction.
3. The Role of Hospitals in Natural Disasters. A position paper presented by Dr Jose P. Caedo Jr., Member, Council of Management, International Hospital Federation (IHF).
4. The February 1976 Earthquake in Guatemala. Dr Rodolfo MacDonald K, General Bureau of Health Services, Ministry of Public Health, Guatemala.

5. Effects of Drought: Experience of Niger. M. Boubacar Issa Camara, Direction de L'Enseignement et de l'Education Sanitaire et Nutritionnelle, Ministère de la Santé, Niamey.
6. Public Health Management Following Natural Disasters: An Introductory Presentation.
7. Experience from Earthquake in Turkey. Dr Fethi Altay, Director General, Ministry of Health, Ankara, Turkey.
8. Public Health Aspects of Emergency Relief. Dr J.A. Seaman, WHO Consultant, London Technical Group, 85 Marylebone High Street, London W.1., UK.
9. Assessment of Health Needs and Priorities. Dr C. de Ville de Goyet, WHO Regional Office for the Americas, 525 Twenty Third Avenue N.W., Washington D.C. 20037, USA.
10. Case Study on "Emergency Health and Medical Care in Cyclone and Tidal Wave Affected Zones of Andhra Pradesh - November 1977". Air Cdre. P. Dharmaraju, Director, Civil Defence (Medical), Directorate General of Health Services, New Delhi, India.
11. Over-view of the Health Aspects of Natural Disasters. Paper presented by UNDRO on behalf of the sponsoring organizations.
12. Case Study on Emergency Care in Natural Disaster. N. Nishimura, M.D. Professor, and Y. Yamamoto, Lecturer, Nippon Medical School, Tokyo, Japan.
13. Emergency in Sudan. Mustafa Aiderous Ahmed, Emergency Office of the Ministry of Health, The Democratic Republic of Sudan.
14. The Mindanao Earthquake/Tsunami Disaster. Vic P. Majarocon, Disaster Preparedness and Relief Services, The Philippine National Red Cross, Manila.
15. The Planning of a Hospital System for a Disaster Situation. R. Eldar, M.D., D. Ph., The Ramban Medical Centre, Haifa, Israel.
16. The Earthquake of 31st August 1968 in the South of Khorasan Iran. Dr Parviz Memarzadeh, Assistant Director of Medical Affairs, Iranian Red Lion and Sun Society.
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