SECTION TWO

TECHNICAL PAPERS

ENVIRONMENTAL HEALTH MANAGEMENT IN EMERGENCIES IN THE EASTERN MEDITERRANEAN REGION

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1. INTRODUCTION

The World Health Organization, Eastern Mediterranean Regional Office (EMR) is convening this first workshop at regional level on Environmental Health Management in Emergencies.

Following the devastating effects of the disasters in Bhopal and Chernobyl, famine in the Sahel, earthquakes in Mexico and in Armenia, floods in Bangladesh and epidemics in West Africa, the importance of environmental health management during such emergencies with early preparedness and response is now globally recognized and EMRO is no exception.

An emergency is a sudden occurrence demanding immediate action that may be due to epidemics, technological catastrophes, strife or to natural or man-made causes.

Disasters natural and man-made to which many countries of the Eastern Mediterranean Region are prone, can impair the environmental conditions by sudden changes in air and water quality, soil pollution and by damage and even destruction of water supply and sanitation facilities and other basic community services. A disruption of the environmental balance can have serious consequences for the health and well-being of the stricken population.

In several countries of EMR very little is done to develop the staff and to set up institutional procedures for action in emergency situations. This is true for the health administration, water supply and sanitation agencies and for institutions responsible for environmental protection on environmental health management in emergencies. This workshop will provide an excellent forum to discuss the measures for strengthening the coordination between the environmental health and other disaster activities.

2. DISASTERS

Disasters of any nature, at any time, anywhere in the world are inevitable and can be inflicted on any country or community. These could be attributed to natural or man-made disasters and their principal categories are summarized as:

Natural disasters: hurricanes, floods, earthquakes, droughts; and
Man-made disasters: wars, epidemics, accidents, refugees.

Emergency preparedness/pre-disaster plans should be prepared in advance to be readily available to abate the emergencies in the shortest possible time. Delays in emergency operations could lead to havoc, chaos and loss of more human lives.

The success of any emergency measures involved in disaster relief works always depends on three key factors i.e. mobilization of resources, speed and management as indicated in Fig. 1.

3. PRE-DISASTER EMERGENCY PLANS

Pre-disaster emergency plans are normally to provide relief, rehabilitation, and mobilization of resources measures.

Lack of pre-disaster planning and farsightedness can create as much havoc as itself. The establishment of relief camps, which are foci of large populations, involves proper shelter, food, water supply, refuse disposal, sanitation, health and other general social and welfare services.

The concentration of a large population in camps can induce the spread of many diseases if all welfare and essential environmental health services are ignored or mismanaged.

It is of paramount importance for governments and communities to prepare emergency preparedness plans ahead of any adverse enventualities. These plans for the establishment of camps and the provision of all the essential welfare services should be readily available.

Occasional mock exercises for emergency preparedness, carried out to acquaint the population with pre-disaster plans and to train and coordinate all the responsible organizations involved, would be beneficial.

Education of the public using the media is also essential to train and develop awareness, to show how to cope with the disasters and to acquaint with emergency environmental health measures required to face such situations. Introduction of some subjects in this field in school curricula can imprint a long lasting impression on young children.

The pre-disaster plan for the emergency measures should be comprehensive including all the logistic support as specified below:

- Complete organization set-up indicating the chain of command and responsibilities.
- type and number of personnel, regular and volunteers and their availability.
- Equipment, supplies and transport.
- Provision of shelter/camps, food supply and storage.
- Water supply, sanitation and other environmental health services.
- Medical aid/hospital, dispensaries, field units.

The implementation of pre-disaster plans can be managed in the following three phases: (Table 1)

Phase I. Pre-disaster environmental health measures under which preparedness plans should be developed. It should define who, when, and what type of activities, using existing local resources and entail guidelines for coordinating all the activities that will be undertaken.

Phase II. Measures to be taken during disaster and aftermath, and it should be divided into two subphases: immediate measures, taken within the first three days after the disaster strikes; and consolidation measures initiated soon after the implementation of immediate measures.

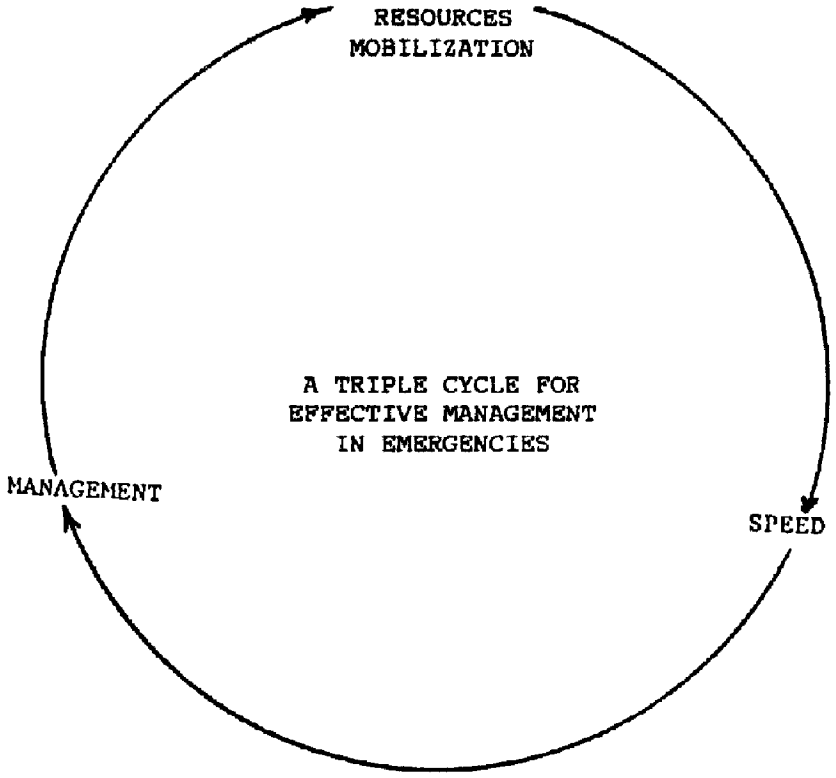

Fig.1. A triple cycle for effective management in emergencies

Table 1. ANTICIPATED SCHEDULE OF MEASURES FOR EMERGENCIES CREATED BY NATURAL DISASTERS

Phase	Measure	Predisaster	Postdisaster
			Days
		0	2 4 6 8 10 12 14 16 18 20 22 24 26
1	Predisaster		
2	Emergency —Immediate —Consolidation		
3	Rehabilitation —Short-term —Long-term		

——— Anticipated duration of measure

— — — Possible extension of measure

Source: PAHO Publication No. 430.
Environmental Health Management After Natural Disaster.

Phase III. Rehabilitation and or reconstruction of services should also be initiated soon after the phase II to restore all life line services: water supply, sewage, solid waste disposal, electricity, transportation, etc.

Like phase II measures, those of phase III also take place in two subphases: short-term measures and long-term measures.

It is recommended by the Pan American Health Organization/WHO that all post-disaster measures except for long-term reconstruction activities be carried out within three weeks of the occurrence of the disaster as per guideline for the timing of adoption and completion of all post-disaster measures.

4. EMERGENCY MEASURES

The emergency measures could be carried out in the following two simultaneous stages:

1st stage: evacuation, the rescue, first aid and medical care, recovery and disposal of human and animal corpses, fire fighting, spraying of disinfectants.

2nd stage: continue rescue and care of evacuees, provision of shelter, food, medical care, provision of water supply and sanitation and environmental health services, survey report and evaluation of the extent of damages.

5. ENVIRONMENTAL HEALTH MANAGEMENT

5.1. General

Environmental health is defined as the control of those factors in the environment that may have deleterious effects on people's physical, mental or social well-being.

Effective management of environmental health services during and after emergencies is crucial and vital for the protection and well being of individuals in high risk areas.

There is a relationship between the type of disaster and its effects on health, but the actual and potential health risks after disasters do not all occur at the same time. Instead, they tend to arise at different times and to vary in importance within a disaster-affected area. The risks of increased disease transmission take a longer time to develop and are greatest where there is crowding and standards of sanitation have declined or are non-existent.

5.2. Common diseases

The most wide-spread diseases which can be transmitted are grouped into the following categories:

(a) Faecal related (intestinal parasitic and infectious diarrhoeal diseases).
(b) Air-borne diseases (tuberculosis, pneumonia, diphtheria, bronchitis, whooping cough, influenza, measles, chicken-pox).

TABLE 2. MATRIX OF EFFECTS OF NATURAL DISASTER ON ENVIRONMENTAL SERVICES

Service	Most Common Effects on Environmental Health	Earth-quake	Hurricane/ Tornado	Flood	Tsuna-mis
Water supply and waste water disposal	Damage to civil engineering structures	●	●	●	○
	Broken mains	●	◑	◑	○
	Power outages	●	●	◑	◑
	Contamination (biological or chemical)	◑	●	●	●
	Transportation failure	●	●	●	◑
	Personnel shortages	●	◑	◑	○
	System overloading (due to shifts in population)	◑	●	●	○
	Equipment, parts, & supply shortages	●	●	●	◑
Solid waste handling	Damage to civil engineering structures	●	◑	◑	○
	Transportation failures	●	●	●	◑
	Equipment shortages	●	●	●	◑
	Personnel shortages	●	●	●	○
	Water, soil, and air pollution	●	●	●	○
Food handling	Damage to food preparation facilities	●	●	◑	○
	Transportation failure	●	●	●	◑
	Power outages	●	●	◑	◑
	Flooding of facilities	○	●	●	●
	Contamination/degradation of relief supplies	◑	●	●	◑
Vector control	Proliferation of vector breeding sites	●	●	●	●
	Increase in human–vector contacts	●	●	●	◑
	Disruption of vector-borne disease control programs	●	●	●	●
Home sanitation	Destruction or damage to structures	●	●	●	●
	Contamination of water and food	◑	◑	●	◑
	Disruption of power, heat fuel, water supply waste disposal services	●	●	●	◑
	Overcrowding	○	○	○	○

● Severe possible effect
◑ Less severe possible effect
○ Least or no possible effect

Source: PAHO Publication No. 430.
Environmental Health Management After Natural Disaster

(c) Vector-borne diseases (malaria, schistosomiasis).

(d) Food-borne illness (from organisms of *Salmonella*, *Staphylococcus*, *Clostridium*).

These diseases can be attributed mainly due to the following environmental health problems:

- inadequate water supply (in quantity and quality)
- poor excreta disposal
- poor housing conditions
- lack of personal hygiene
- poor refuse solid waste disposal systems
- poor drainage
- poor food hygiene
- insects and rodent infestation.

5.3. Effects of natural disasters on environmental health services

The primary objective in emergencies is to restore environmental health conditions and services to whatever levels existed before the disaster occurred, regardless of judgements about pre-disaster quality. Unfortunately the existing, pre-disaster quality of environmental health services in most of the EMR countries is not yet satisfactory at a desirable level. This can result in further increased risk of diseases during emergencies. Improvement in environmental health services should be a primary aim in emergency health management after a natural disaster.

A check-list of possible disruption in environmental health services is presented in Table 2.

5.4. Environmental health operations measures

The various environmental health measures for any emergency relief operations in a community disaster should be related to the nature of the disruption and be applied immediately with a systematic simple pragmatic approach.

"Sanitary rules and regulations designed for normal conditions are not easy to apply in emergencies because they are too elaborate and detailed for such situation.[1]"

Restoration of environmental health services involves the following operations:

- Rescue and evacuation
- Shelters, camps
- Water supply and sanitation
- Insect and rodent control
- Food sanitation
- Medical aid
- Survey of environmental health services damages
- Health education.

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1 M. Assar, Guide to Sanitation in Natural Disasters.

5.4.1. Rescue and evacuation

This should be carried out as quickly as possible to rescue the people who are injured, old and disabled and to provide them medical first aid and then transfer them to hospitals or camps according to the severity of the cases.

Dead bodies should be removed quickly and quietly from the public view for further identification, recording; the necessary precautions being taken in their handling, and disposal under proper sanitary measures.

Damaged water supply and sewerage systems should be repaired and restored where possible in order to avoid the flooding of streets and further pollution which may hamper the rescue and evacuation operations.

5.4.2. Shelters, camps

The locations for the establishment of relief camps near the major cities and towns should be predetermined and earmarked in the Government owned lands and no encroachments or any unauthorized construction should be permitted within its boundaries.

5.4.3. Water supply and sanitation

Provision of safe and adequate quantities of water for drinking purposes is of utmost importance after disaster. After securing sufficient quantities of water within the drastic stricken areas, hospitals, camps then the water for domestic uses should be provided.

All water supplies should be evaluated for quality and must be disinfected with chlorine compound or by portable chlorinators. Fleets of sufficient mobile water tankers should also be made available and they should be filled from safe water supply sources.

Excreta disposal should be given primary importance along with other measures for the solid wastes disposal in sanitary ways.

The cleaning of camps, collection and disposal of solid wastes to a designated sanitary land fill site, cleaning of latrines and spraying of disinfectant and insecticidal chemicals should be carried out regularly in order to control unpleasant odour and fly breeding places.

5.4.4. Food sanitation

Food sanitation if of vital importance where mass scale food is to be prepared and served in the camps. It can pose a major problem due to poor sanitation measures and can spread food-borne illnesses such as *Salmonella, Staphylococcus, Clostridium perfringens.*

Food poisoning can result from the bacterial toxins present in the stale foods. Adequate refrigeration, proper cooking, cleanliness and personal hygiene of the persons responsible to handle the foods is extremely important.

It is advisable to serve tin and dry foods during the initial stages till adequate arrangements are made available to handle the foods. Care must be taken that tin food is properly stored under required temperatures and is not

out dated. Raw, uncooked foods should be avoided and discouraged and no left over food is to be served.

Special care is required to control the food qualities, storage, handling, preparation and observation of adequate sanitary facilities.

5.4.5. Insect and rodent control

The environment of the rodent is also affected with same change as that of man after natural disasters. Their harbouring places and food sources are also damaged and will consequently be in competition with man for food and shelter.

The presence of insects and rodents in the camps will not only be a nuisance but can also transmit diseases apart from economic damage and fire hazards. The success of insect and rodent control largely depends on the application of basic sanitation and environmental control measures.

5.4.6. Health education

The sanitary installation should be simple, traditional, convenient and acceptable to the people. Simple rules of health education and sanitation should be introduced and applied.

Volunteer teams from the community should be created for the introduction and propagation of basic sanitation rules. This can be attained through displaying and distribution of posters and by regular announcement through loud speakers.

These simple measures in the beginning could save many problems arising from health hazards and huge expenses which would arise later to control the epidemics.

The following are the most important and simple measures for health education which should be announced and practised in the camps:

- Use boiled or disinfected water.
- Avoid wasting of water.
- Wash hands before handling foods.
- Wash hands with soap after defaecation.
- Do not scatter refuse and other food wastes.
- Clean and wash cooking/eating utensils.
- Avoid eating raw/uncooked foods and over-ripe fruits.
- Never leave the foods too long and uncovered.
- Observe personal cleanliness.

5.4.7. Survey of damage caused to water supply and sanitation facilities

The extent of damages caused to these facilities should be determined and maintenance operation teams must be sent immediately to restore the water supply and sewerage systems.

Teams should be organized to regularly disinfect not only the water supply systems in the camps but also all other potential sources of existing water supplies nearby the camps.

An inventory or record of all damages to these services should be maintained so that it could be used during rehabilitation and reconstruction work after disaster.

5.5. Chemical, nuclear, oil spill disasters

In our contemporary world, the perceived risk of above disasters has been increased due to numerous factors. Rapid industrialization, nuclear power demand and rising output of oil is growing increasingly in the Gulf States. Therefore, it is imperative that environmental health management emergency preparedness plans for the above complex nature of disasters should also be developed on the sound footings on the basis of lessons learned from Bhopal, Chernobyl and recent spills in the Gulf and Alaska.

5.5.1. Chemical

In recent years, public concern about major chemical disasters has been fueled by the occurrence of several accidents and poisonings, those accidents are among most notable but each year there are thousands of unintentional chemical releases under different circumstances of their occurrence, could have resulted in significant environmental health impact.

Most countries in EMR have neither the capability for assessing the potential toxic of the chemicals nor the facilities for quality control of imported substances.

Mechanisms of response to chemical accidents need to be established in each country with contingency plans involving the appropriate national authorities, as well as facilities to deal with chemical poisonings and a well coordinated poison control programme.

5.5.2. Nuclear power

Some of the countries in EMR are considering installation of nuclear power plants to meet the rising demands of energy. Nuclear accidents involving release of radioactivity from the reactor core either by accidents or sabotage could lead to severe damage to the environment and people's health.

It is high time and after the lessons learned from Chernobyl accident the public health authorities should consider seriously establishing and reviewing emergency arrangements concerning the evacuation of residents for radiological protection purposes. The authorities must also have capabilities to monitor and deal with transboundary releases of radiation affecting the country's environment, including food imports.

5.5.3. Oil spills

Oil spills can occur in all sorts of circumstances, despite equipment, safety devices either by leaks, breaks in pipelines or accident of ships. Oil pollution of the sea, shore, in addition to the reduction of amenity, also affects marine and shore life and vegetation. This results in affecting the people from the consumption of sea food contaminated by oil derived carcinogens such as polynuclear aromatic hydrocarbons.

Each country must have emergency preparedness plans, resources, personnel, necessary equipment to meet such accidents.

5.6. Refugees

Several countries of the EMR are facing refugee problems which are man made disasters. The refugee population in the host countries brought with them the same burden of health problems in addition to their pressing needs for food, shelter and clothing.

This has imposed fearful strains on the social and economic policies of the host countries. As a result of this the host countries have serious deficiencies regarding environmental health conditions in the refugee camp areas, if such conditions are changed mainly through improvements in shelter, water supply, waste disposal and vector control the quality of life and health status of the refugee populations can be enhanced immensely.

This workshop will also provide forum for discussion of strategies for the development of national capability to deal with environmental health problems in refugee situations, exchange of experience, and review of various aspects related to intersectoral coordination and external cooperation for environmental health interventions in refugee areas.

6. WHO EASTERN MEDITERRANEAN REGIONAL OFFICE (EMRO) POLICIES IN EMERGENCIES AND DISASTERS

Within the framework of above WHO guidelines the Eastern Mediterranean Regional Office (EMRO) offers technical cooperation and emergency assistance to its Member States in various ways as indicated in Appendix 1.

7. CASE HISTORY OF EARTHQUAKE IN YEMEN

A brief case history with some constraints and difficulties experienced in Yemen is given in Appendix 2. Case histories for other EMR Member States will be provided by the respective participants.

8. CONCLUSIONS

Steps to be taken at country level

(a) Each country should develop its own emergency preparedness plans for environmental health management for: (i) pre-disaster health measures; (ii) measures to be taken during disaster and in the aftermath; (iii) rehabilitation measures.

(b) Establish disaster relief department at national and at regional levels with proper budget allocation, logistic supports, resources, supplies and equipment.

(c) Appoint national focal points and establish national coordination mechanism.

(d) Introduce essential subjects on disasters, emergency relief coupled with hygiene and health education, first aid etc. in school curricula.

(e) Organize mock exercises in communities for training and awareness.

(f) Exhaustive training is the key in the success of emergencies and disaster preparedness plans, and it should be strengthened on a long-term and continuous basis.

Action being considered at WHO Regional level

(a) Establishment of environmental health "Disaster Modules" for the Region at CEHA.

(b) Support to the organization of regular workshops on Environmental Health Management in Emergencies at Regional and Country level for information exchange.

(c) Consideration is being given to establishing a disaster preparedness centre in the EMR possibly at CEHA.

APPENDIX 1

WHO ACTION IN EMERGENCIES AND DISASTERS

Policy Basis

50 The authority of WHO to take action in emergencies is derived from the WHO Constitution. Article 2(d) of the Constitution states that one of the functions of the Organization shall be to furnish "necessary aid" in emergencies. Article 28(i) authorizes the Executive Board to take "emergency measures within the functions and financial resources of the Organization to deal with events requiring immediate action:, and Article 58 provides for a special fund to be established to be used "at the discretion of the Board... to meet emergencies and unforeseen contingencies". Under resolution WHA35.9 concerning the operation of the Working Capital Fund, emergency supplies to Members and Associate Members can be provided on a reimbursable basis (see para. 170).

60 The guiding principles for WHO's emergency preparedness and response are set out in resolution WHA34.26. The resolution stresses that despite the undoubted importance of relief in emergencies, preventive measures and preparedness are of fundamental importance, and reaffirms that the Organization should assume a leadership role in the health aspects of disaster preparedness. Resolution 38.29 emphasizes the necessity for an integrated response to link emergency measures with long-term development and the need to intensify WHO's technical cooperation at country level to enable Member States to enhance their own disaster preparedness.

Objectives

70 The objectives of WHO's emergency preparedness and response are:

70.1 to promote emergency preparedness and response in Member States within the health-for-all strategies for health development;

70.2 to provide timely and appropriate response to emergencies, in collaboration with Member States and other organizations, in situations warranting an extraordinary response from outside the affected area.

Source: WHO Manual, Individual Programme Activities XV.4, pp 2-3, March 1989, WHO Geneva.

APPENDIX 2

A BRIEF CASE HISTORY OF EARTHQUAKE IN YEMEN

An earthquake of the magnitude of 6.4 on the Richter scale was almost a first experience on 13 December 1982 in the modern times of Yemen and the Government was neither aware of, nor prepared to face, its devastating results. One hundred villages were totally destroyed and about 400 villages suffered homelessness with 1500 casualties during the disaster. As a result of this a great confusion was created and the whole government machinery was baffled what to do and how to coordinate the evacuation and relief operation.

The international and bilateral assistance in material, medical personnel, medical supplies, and equipment etc. already started arriving in the country, but the Government's focal point coordinating team was not established.

Therefore, Resident Representative of UNDP himself approached the Government as a coordinator of the emergency work of the United Nations System and assisted in the formulation of a Government coordinating team from the Central Planning Organization.

Later the representatives of all the UN Agencies and Foreign Missions in the country were invited under the chairmanship of H.E. Minister of Central Planning, for coordination and their assistance for the evacuation, relief and rehabilitation task.

The World Health Organization team comprising of doctors, sanitary engineers, sanitarians along with its own supply, and equipment and project vehicles moved in the field and established a base camp in the provincial Headquarter Dhamar City. All the water supply and sanitation aspects of the relief operation were entrusted to the WHO team for its proper coordination, operation, and management along with the teams of other UN, international and bilateral agencies and from the Ministry of Public Works and Municipalities.

Many teams for relief operation works along with separate teams to determine the extent of damages pertaining to water supply systems and water sources were established and organized for different locations covering almost all the affected areas.

The water supply and sanitation aspects of this whole operation were entrusted under the command of qualified sanitarians. The various difficulties and problems faced were broadly as follows:

- Poor coordination due to lack of any pre-disaster planning.
- Lack of government resources, i.e. financial, supply, equipment, vehicles, fuel, qualified manpower etc.
- Lack of tents for shelter.
- Limited drinking water sources.
- Lack of proper communication system (difficult mountainous unsurfaced roads).
- Lack of sufficient water tankers.
- Lack of disinfectant equipment and chemicals.
- Lack of pipe material, pumps tools, equipment required for restoration of damaged water sources.

- Lack of equipment and material for latrine construction.
- Lack of personal hygiene.
- Socio-cultural factors.
- Improper use of community latrines, in the relief camps.
- Indiscriminate throwing of solid wastes around the tents.
- Improper storage of water and food.
- Lack of food sanitation concepts.
- Lack of health education facilities.

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