THE ROLE OF EPIDEMIOLOGICAL SURVEILLANCE IN DISASTER PREPAREDNESS AND MANAGEMENT IN INDONESIA

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INTRODUCTION

Disaster is an unusual and unwanted event which may be followed by widespread death, social disruption and outbreaks of communicable diseases and famine. These in turn may leave people in a disaster area entirely dependent upon support from outside.

Based on the cause, there are 3 classifications of disaster:

- Natural disaster (for example : volcanic eruption, flood, landslide avalanche)
- Disaster caused by biologic agents (disease outbreak, epidemic, pandemic).
- Disaster caused by human error and carelessness (for example: fire, disaster in a nuclear plant, disaster in an industrial plant, plane crashes, traffic accidents, etc.).

From the above classification it is seen that most of them are preventable or at least they are predictable, so that more victims can be prevented. Whenever possible an early warning system should be developed for all aspects of disaster preparedness in Indonesia. And when established, such a system will be very useful at all stages of disaster (before, during and after). To the extent possible, organization of the system should be based on the existing systems of administrative and health management.

Under normal circumstances, the existing National disease surveillance system serves the following purposes : **early warning, situation and trend assessment, and evaluation of the effectiveness of health promotion and disease prevention programs.** The purpose

of this paper is to describe the present surveillance system and its operating principles, to identify reporting sites in the vicinity of disaster prone areas of Indonesia, and to suggest ways in which these "Sentinel" sites and the National disease surveillance system could be used in disaster preparedness and response.

BACKGROUND

Throughout recorded time disasters in Indonesia especially natural disasters and disasters caused by biologic agent have been responsible for huge number of deaths, countless injuries and illness. The recent Tampomas disaster is an example of a disaster caused by human error and carelessness has killed hundreds of peoples. The injuries, illness and extensive psychosocial and economic effect will contribute indirectly to the further increase in the number of deaths.

Although that Indonesian peoples has always been exposed to disasters, data on their occurrence, nature and impact were not well documented.

Valid reliable and workable methods for utilizing the existing facilities hould be developed toward this end. For the sake of prevention and control, measures must vary from one disaster to another and it is greately influenced by the socioeconomical background of the community, their knowledge attitude and practice toward health and also it is dependent on the availibility of health facilities in the area.

If the existing precondition mentioned above is well recognized, appropriate action toward prevention and control measures will be better organized.

The scope of this paper is on disease surveillance where the system should be developed in such away that predictions must provide warning of the probable nature, location, of seasonal variation of the disease which are normally expected in the area.

In recent years health centers have spread widely thoughout the country increasing the ability to predict and provide adequate warning about disease occurrence.

Presently there are more than 5100 health centers which provide Primary Health Care to the people in the community with their basic seven to twelve services.

In general, the following should be born in mind :

1) There is a direct correlation between health problems and the type of disaster. This is clearly demonstrated in volcanic erruptions e.g.: Mount Agung erruption (Bali, 1963), Mount Galunggung erruption (West Java, 1982). These erruptions caused direct impact on human life and human health. They required immediate medical action.

2) Potential indirect effects of disaster to cause the increase of possible transmission of communicable disease because of the movement of the peoples into adjacent areas because of destruction dwelling. Overcrowding, lack of water supply, food shortage, and lack of sanitation facilities will lead to disease outbreaks because of the increase of the sensitivity to disease.

Based on the foregoing, we can sumarized that the effects of disaster to the population are as follows :

- Deaths.
- Severe injuries which need immediate and extensive medical attention, mild injureies which do not need special action.
- Communicable disease outbreaks.
- Psychosocial and economic effect.
- Famine.
- Population movement.

The above effect should be monitored, documented and evaluated. Until now the collection and evaluation of disaster data have been inadequate for the needs of those engaged in evaluation of disaster preparedness and management.

Interdisciplinary collaborative efforts could be very important in the design of disaster preparedness and management in Indonesia.

EPIDEMIOLOGIC SURVEILLANCE

The definition of epidemiology is the study of the distribution and determinants of disease frequency in man . . .,. Two main areas of investigation are indicated in this definition:

— The study of the distribution of the disease occurrence by time, place and persons affected and the search for determinant of the observed distribution.

Efforts should be made to implement the above definition, Epidemiologic surveillance consists of continuous collection, or

ganization, analyzing of interpretation of data on disease occurrence and distribution of that information to those who require it.
The objective of epidemiologic surveillance is :

- To develop early warning system by which we can predict possible disease outbreaks.
- To reduce disease transmission in order to minimize spread.
- As a tool for evaluation of the preventive and control measures in place.

In Indonesia, the epidemiologic surveillance unit is under the Directorate General of Communicable Disease Control and Environmental Health. The system is mainly intended to support the ongoing communicable diseases control programs.

This is because it is evident that communicable diseases still present a very important and pressing problem. Several easily preventable infectious diseases still have a high incidence. In this connection epidemiological surveillance is a prerequisite for effective control and prevention. At the present stage a provincial epidemiological surveillance unit is established in the existing provincial organizational structure. And surveillance functions which are being developed at all levels of the national health system should be integrated into the overall program effort.

Although progressing and useful in many respects, the epidemiological surveillance system still faces various implementation problem such as under reporting, delays in reporting, especially of epidemic diseases.

Many approaches has been made to supplement and strengthen the existing routine surveillance system. These were the integrated Health Center Recording and Reporting System, the Sentinel Surveillance, Disease Specific Surveillance, Hospital Surveillance, Weekly Epidemic Potential Diseases Report, Unusual Even Report.

This paper attempts to describe briefly the role of the existing surveillance system during disaster.

EPIDEMIOLOGICAL SURVEILLANCE ACTIVITIES IN DISASTER

According to the process of disaster, disaster may be devided into three stages :

- Before disaster (pre disaster)
- During disaster
- Post disaster

The epidemiological surveillance activities must differ according to the stage of the disaster.

PRE DISASTER

Routine surveillance is the most basic activity in our disease surveillance system. It depends heavily on the development and capability of the basic health infrastructure the PUSKESMAS (Health Center). A health center is the most peripheral health care unit which provide primary health care to an average of 30.000 population within each area. Within the context of the equity principles of our health development plan, health centers have been established in every Sub–District (Kecamatan). At present we have approximately more than 5100 Health Centers spread over the whole country.

Instruments available at Health Centers for disease surveillance activities implemented at present are as follows :

- W_1 Report : This is a 24 hour unusual event reporting system. This system was developed mainly for disease outbreak reporting in order that immediate action can be undertaken. This is a one page written report which should be sent from health center to a higher level within 24 hours. A carbon copy is sent to the local administrative. In practice this written 24 hour report is delayed in reaching the higher authority. So that normally, before this W^1 form is sent, reports have been sent via telecommunication systems available in the area such as CB radio, telephone, etc. This W^1 report contains a brief description of the disease outbreak such as number of cases and deaths, place of occurrence, major symptoms and signs and other important information that they think need to be reported. Requests for assistance depend on the magnitude and severity of the problem. The three reporting systems mentioned above apply to all Health Centers in Indonesia. Beside those three reporting systems there are still other special surveillance activity such as

Sentinel EPI Surveillance. From this sentinel EPI Surveillance at Health Centers, data are provided monthly on the occurrence of EPI target diseases according to AOF and vaccination status not only for those seen at Health Centers but also those who are seen outsides of the Health Centers by active case finding effort. The idea of sentinel concept is in order to develop a more complete surveillance system which is capable of coping adequately with the programme development. There are 61 sentinel Health Centers now and 27 sentinel Hospitals included in this system. These number will be expanded into 301 Health Centers now and 27 sentinel Hospitels included in this system. These number will be expanded into 301 Health Centers and 800 hospitals next year. This sentinel system will include not only EPI target diseases but also diarrhoeal disease. Ideally all Health Centers should become sentinel Health Centers.

Disease specific surveys and studies to support ongoing communicable disease control programs are periodically carried out. These studies provide reasonably accurrate estimates of disease occurrence which can be used for long term planning and for evaluation of national and provincial levels of program impact.

In the past, these surveys/studies were mostly carried out by the central surveillance unit. Recently, increased provincial capabilities made it possible for some provinces to plan and organize their own sample surveys with central assistance.

Routine surveillance system, special disease surveys and other surveillance activities such as surveillance done by the community will hopefully complete the epidemiologic picture of the diseases under surveillance in the near future. From the disease surveillance system which have been described is increasingly realized that understanding and skilled use of epidemiological concepts are crucially essential for effective disease control programs. Emphasis will be placed on the ability to take immediate action at the occurrence of disease outbreaks, and determining the effectiveness of intervention activities.

Using the early warning system which detects the occurrence of disease outbreaks, the pre disaster stage can also be derived from these available systems by utilizing the epidemiologic picture of disease occurrence in the areas which are potentially affected by disaster such as in the area surrounding active volcanoes, in the area of flooding and around industrial plants, etc. The epidemiologic picture should be visualized by specific diseases and its distribution by the variables of time, place and person. Spotmaps, graphs of bar diagrams can be used in visualizing the data. From this type of visualization we can portray the disease trend of epidemic potential.

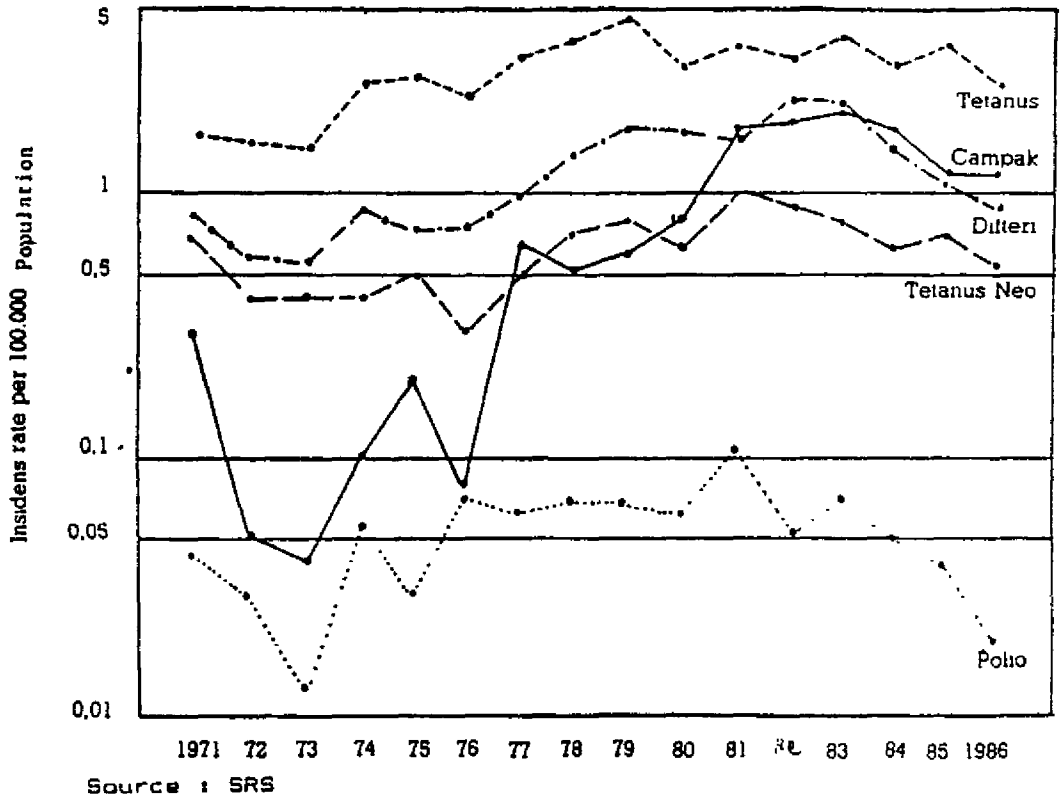
Due to the generally low area coverage of the Health Centers, epidemic disease reporting at present depends mainly on community reporting.

W^2 Report : This is a weekly report of notifiable diseases. This report is routinely sent from Health Centers to District Health office. Provincial Health office and to the Directorate General of Communicable Disease and Environmental Health. The purpose of this reporting is to develop early warning of potential outbreaks. Timeliness is a main problem of this reporting system.

— **The integrated Health Center recording and reporting system**

This integrated recording and reporting system at Health Center level (IRR) was initiated in 1981 to substitute for several other Health Center reporting systems formerly used. The system requires a combination of periodical reports and includes compilations of services provided, diseases recorded and detailed operational aspects of the Health Center delivery sistem. Beside this comprehensive report other programmed oriented reports still exist. The IRR is the main information source for the routine disease surveillance system and it therefore relies primarily on the recording of cases seen at the Health Centers. Little information is generated from the community except when an outbreak of substantial size occurs. Nevertheless, it still provide useful information on disease trends. Reporting is entered on a form LB^1 which is sent from Health Centers to District level, Provincial level and Central level.

Incidence rate of EPI diseases per 100.000 population
indonesia 1971 - 1986.



Source : SRS

DURING DISASTER (DURANTE DISASTER)

During a disaster all systems which normally existed are affected and disrupted, so that the normal disease surveillance system also malfunctions, or is inadequate to cover the disrupted stiuation. Disaster is not only accompanied with widespread morbidity death and social disruption as a direct effect of the disaster, but also is followed by the increase of disease transmission. This in turn could

cause outbreaks which will add to the number of victims. Risk factors that increase the disease transmission during disaster are as follows :

1. Over crowding, where many peoples are crowded into a smaller space which facilitate man to man disease transmission.

2. Population movement from affected area to the non affected area will enable them to transmit the disease to the inhabitants of non affected areas.

3. Lack of safe water supply and lack of environmental facilities.

4. Disruption of health services in the affected area.

Diseases usually occuring in the situations are usually diseases transmitted via the orofecal route, airborne and direct close contact. Because of the special situation., special efforts should be made in adjusting the surveillance system during disaster. This is a supplement or a modification of the existing system.

Rumors about disease outbreak occurrence often occur and these should be checked promptly.

In order to develop adequate surveillance activities during disaster, special efforts should be undertaken :

1. Immediate action for Public Health and administrative measures should be undertaken to minimize disease transmission by eliminating the risk factors mentioned above.

2. Develop sensitive and specific indicators for the public health measures.

3. Immediate field investigation should be undertaken as upon of receiving a report of disease occurrence.

4. Treatment and immediate control measures should be given to prevent a possible disease outbreak.

It should be born in mind, in order to avoid overleping of activities that disease surveillance being developed should cover not only communicable diseases but also non communicable diseases such as injuries.

POST DISASTER

Disrupted situations will slowly recover when the disaster is over. This dependings upon the type of disaster. There are two possibilities :

1. — The affected area can not be safely inhabited for a long period of time and the victims must be translocated to another area.

2. — The affected area can be resided in after rehabilitation measures are undertaken.

In situation no. 1 where the victims are translocated to a new area, the health services provided by the local health facilities in the new area must take on the additional work load. In situation no. 2 health service is provided by the existing health facilities and the emergency surveillance system developed during the disaster should be brought back to the normal system step by step.

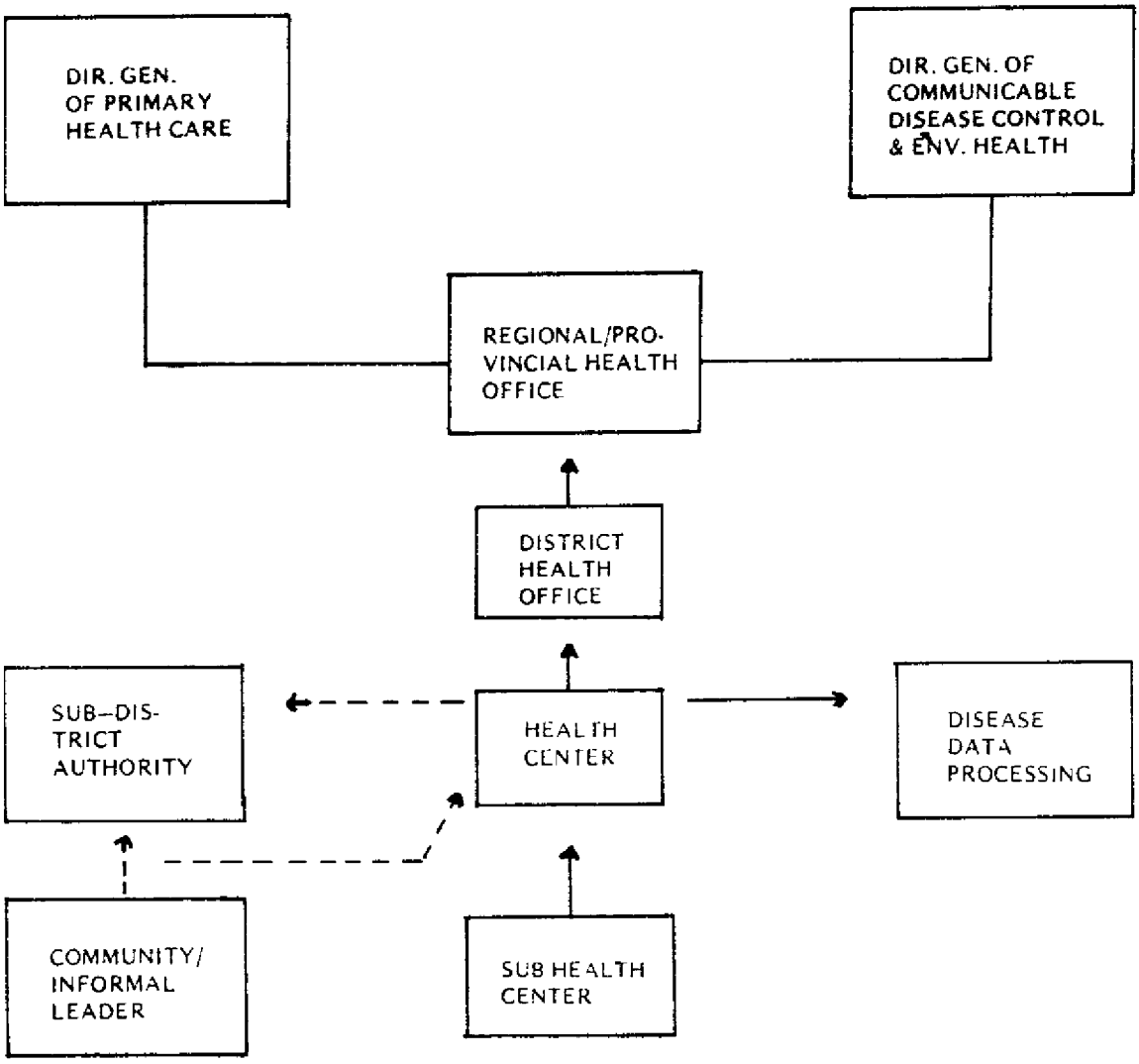
ORGANIZATION OF EPIDEMIOLOGIC SURVEILLANCE

Organizational structure and job descriptions for epidemiologic surveillance in disaster situations should be developed and described clearly in order that the mechanism of the system will work properly

PRE DISASTER

Before disaster the organizational structure of epidemiologic surveillence is the routine surveillance system normally existing at the Health Center in the area.

FIGURE 2
ORGANIZATIONAL STRUCTURE OF EPIDEMIOLOGIC SURVEILLANCE FLOW SYSTEM



From routine data collection and processing we will be able to portray the picture of potential epidemic diseases in the area. Based on this predictive surveillance of communicable diseases—we can take adequate measures against these diseases when disaster actually occurs in an area.

Of course we need much more information than that obtainable through case notification. For this reason, if possible health surveys in disaster potential areas should be carried out. Data from these survey would be based on household survey. In this way there are two major sources of information which cover all kinds of diseases classified according to International Classification of Diseases (ICD).

1. Patient surveys which are collected from the medical facilities.
2. Data which are investigated on the basis of house hold surveys.

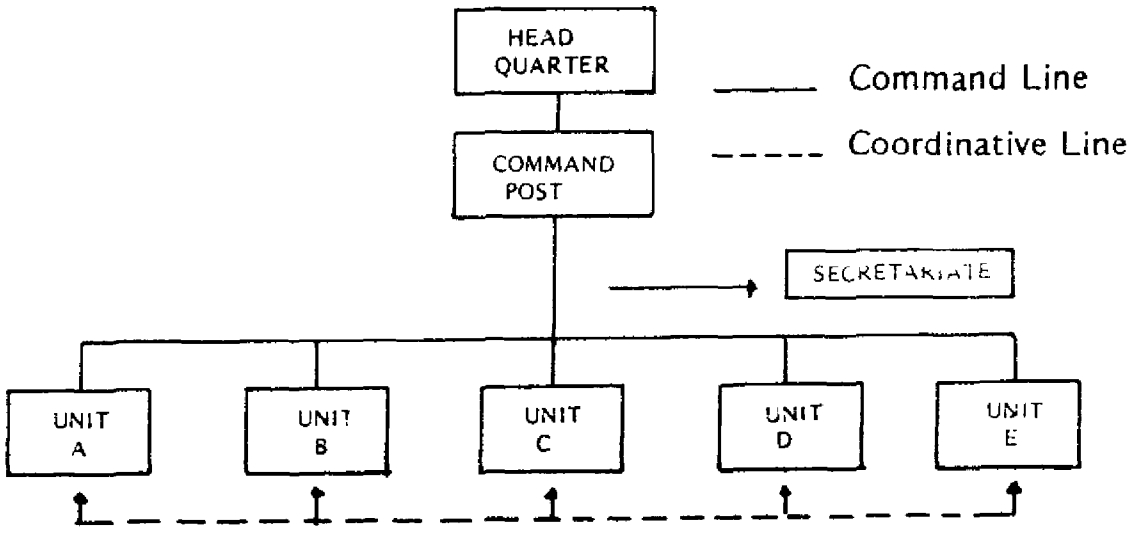
DURING DISASTER (DURANTE DISASTER)

In this situation the organizational structure of the disease surveillance unit is slightly different than in the normal situation. The structure should be created in such a way that immediate action can be undertaken and coordinative efforts among those who are involved in disaster control measures should be established.

It is evident that the disease surveillance unit in a disaster is only one part of the whole structure.

Figure 3 will show you where the surveillance unit should be.

FIGURE 3
ORGANIZATIONAL STRUCTURE OF SURVEILLANCE

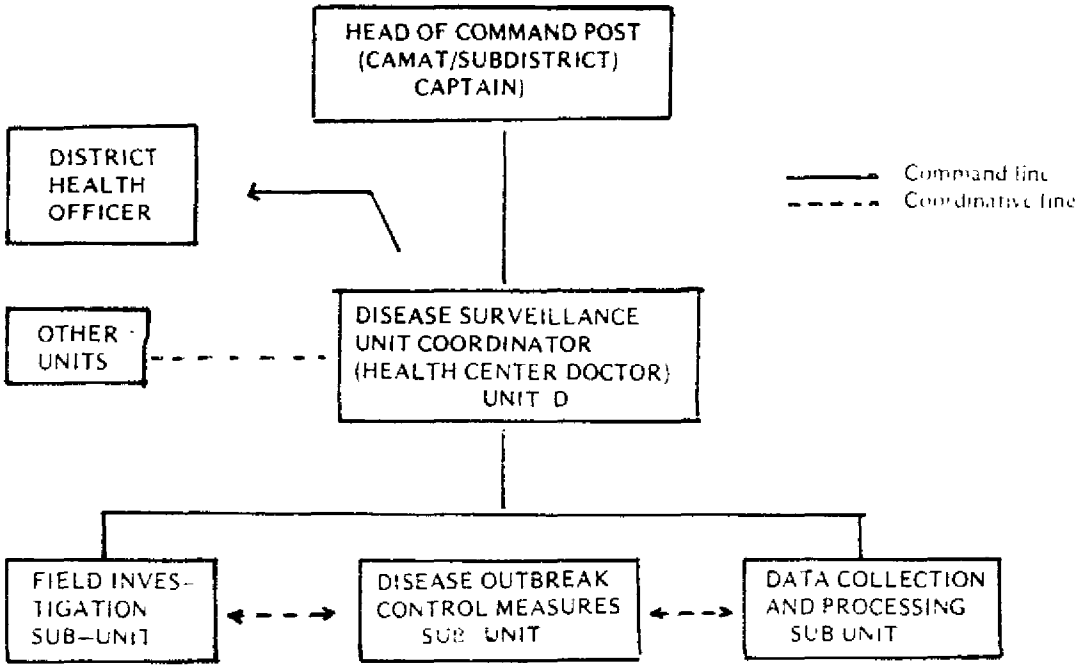


This structure is applied at the lowest level of the health structure, that is at the Health Center level in the Kecamatan.

If we look at that disease surveillance unit in detail as shown is figure 4.

FIGURE 4

ORGANIZATIONAL STRUCTURE OF DISEASE SURVEILLANCE IN DETAIL IN DISASTER



ACTIVITIES :
- Active case findings
- To refer the cases to the referral system
- Speciment collection

ACTIVITIES :
- Outbreak containment
- Treatment
- Vaccination
- Other action such as : fogging. spraying, dusting, water chlorination

ACTIVITIES :
- Collecting
- Organizing
- Analyzing, and
- Interpretation of data

PERSONNEL

Manpower involved in each sub-unit could be Health Centers personnel or personnel from district or Provincial Health offices. All personnel involved in the activities should be under one command (Health Center doctor).

Personnel involved in the activities should be those who has been trained on how to investigate disease outbreaks/epidemics. They are doctors, nurses, sanitarians or other health personnel depending on the type of investigation.

ACTIVITIES

The main activities of surveillance the unit are disease intelligence service and first aid control measures. Surveillance has been defined as "data collection for action". In disaster, surveillance should not only be confined to communicable diseases but also to other diseases particularly those identified as the top leading causes of morbidity and mortality during disaster.

Disease surveillance activities essentially consist of :

1. Collection and compiling data
2. Analyzing and interpretation of data
3. Reporting data
4. And providing feed back

To plan and evaluate the health activities during disaster one needs to know the following :

1. What caused disease/etiology
2. Who gets the disease/who are the victims?
3. Where they get them/where were they exposed ?
4. When they get them/time of exposure
5. How they get them/method of transmission
6. And why they get them/exposure

All of this information is processed at the disease surveillance unit.

By using the more general aspects of epidemiological reasoning and methods as well as the appropriate technique such workers could appreciate the magnitude and distribution of the health needs in their area so that efforts could be more accurately oriented towards the prevention and control of those health problems.

COMMUNICABLE DISEASES IN DISASTER

There are 5 classification of communicable diseases that could occur during disaster and some of them have the potential to cause outbreaks. These should receive special attention.

1. Food Borne diseases

The diseases which are transmitted through the orofecal route are :

- Typhoid fever
- Food poisoning
- Cholera
- Leptospirosis
- Dysentery
- Hepatitis A

2. Direct transmission diseases

These diseases are transmitted through close contact between people such as :

- Skin diseases : Scabies, Pyodermia, Framboesia, etc.
- Measles
- Acute respiratory infection
- Diphtheria
- Influenza
- TBC
- Meningitis

3. Vector borne diseases

- Scrub typhus
- Malaria
- Encephalitis and other arboviral diseases

4. Zoonotic disease

These diseases are transmitted by means of contact with animal through consumption of meat or animal bite :

- Plague
- Rabies
- Anthrax

5. Disease due to complications of injuries

- Tetanus
- Gas gangrene

RECORDING AND REPORTING INSTRUMENTS

Since in disaster immediate action must be taken, instruments should be developed in such a way, that then will provide all information needed.

INSTRUMENTS USED IN DISEASE SURVEILLANCE DURING DISASTER

The major instrument used in disease surveillance is forms. Most of forms used in routine surveillance are also applicable in disaster situation. The following are examples of those forms :

Form [1] : 25 hours unusual event report (W^1). This form is used to report an unusual event if any. Index cases found lead us to look for additional cases in the field.

Since Primary Health Care facilities are available throughout the country the problem comes to how to mobilize and how to organize that potential resources. Sound organizational structure and management should be established.

By using disaster spot map and fit it with disease incidence/ prevalence spot map we will be able to prepare in advance what is needed when the actual disaster occurred.

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THE ROLE OF INDONESIAN ENVIRONMENTAL HEALTH MANAGEMENT AND VECTOR CONTROL IN SEVERAL NATURAL DISASTER

(SOME EXPERIENCES IN INDONESIA)

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I. INTRODUCTION

Every year Indonesia suffers from disasters of one kind or another, of which the degree of losses and damages varies greatly. Being the world's largest archipelago consisting of about 13,000 islands, Indonesia is subject to potentially destructive natural phenomena that is more frequent and varied than in most other countries. The principle hazards are earthquackes, volcano eruption (128 active, of which 70 classified as dangerous) landslides, floods, storms, droughts, fires, and agricultural pests and diseases. Records have shown that during the Nation's Third Development Plan period (REPELITA III, 1979–1984), there was an average of 2,813 significantly destructive events annually, with an average of 1000 deaths, 5000 injured, 100,000 homeless, and 1,000,000 hectares of agricultural land destroyed. Total direct costs due to these damages was estimated to be approximately Rp. 125 billion annually (about US$ 76.0 million).

Natural disasters usually disturb the environment and induce adverse effects to public health by an large. Environmental Health management in disasters is therefore measures undertaken to minimize and control the deteriorating conditions and situation inter-related between the environment and people to such a level that they poses no public health hazards. In this context, measures undertaken to always maintain a good state of preparedness before, during and after disaster are of utmost importance.

The Directorate General of Communicable Diseases Control and

Environmental Health, Department of Health, is the Government agencies responsible for the disaster preparedness and Environmental Health Management aspects through its Environmental Health programme.

II. SCOPE OF ENVIRONMENTAL HEALTH

Environmental health is defined as the prevention and control of those factors in the environment that may have adverse effects on people's physical, mental, or social well-being. By this definition the scope of environmental health is vast in nature including following aspects:

1. Water supply and water quality control.
2. Excreta disposal.
3. Liquid and solid waste disposal.
4. Vector control.
5. Housing improvement.
6. Public places hygiene and sanitation.
7. Occupational health.
8. Food hygiene and sanitation.
9. Environmental pollution control.
10. Radiation control.
11. Prevention of accident.
12. Specific environmental control on epidemic, disaster and pilgrims
13. Other preventive measures to control the environment in order to reduce health risks.

In the occurings of natural disaster, the physical environments are disrupted and changes may take place. Consequently, people are subject to exposure to the unhealthy conditions of the environment which may be harmful to health. Disaster actions related to environmental health needed to be immediately undertaken include the following :

- Provision of suitable shelters that do not cause environmental health problems and disturb general public services.
- Provision of minimum requirement of safe drinking water supply.
- Provision of refuse disposal sites.
- Provision of sullage disposal facilities.
- Prevention and control of vectors to a level that is not harmful to health.

- Food sanitation inspection to ensure that the foods provided are safe and do not contribute to the spread of disease.
- Personal and household hygiene and health education to promote healthful living.

The Environmental Health management team must be well prepared and ready to handle any disaster at all times. Proper judgements and quick decisions to undertake measures in bringing the disaster situation under control are crucial. High-level decision makers therefore must be well-experienced in disaster undertakings and given accurate information on the event immediately. Mobilizing community to participate in all activities during and after disaster is another very important aspect in Environmental Health disaster management.

III. ENVIRONMENTAL HEALTH ORGANIZATIONAL STRUCTURE

In health sector, at central level, the Directorate General of Communicable Disease Control and Environmental Health, Department of Health is responsible for the development and implementation of environmental health programme.

At provincial level (all provinces), there are two units responsible for environmental health activities. One is the Environmental Health and Health Education Section which is under the Provincial Health Department (KANWILDEPKES). KANWIL DEPKES is responsible to the Central Health Department. The other is the Environmental Health Promotion section under the local Government Health Services (DINKES). In the political structural framework, Local Governments belong to Home Affairs Department.

At kabupaten (regency) level (all kabupatens and minicipals), under the Local Government Health Service, there is also a Section of Environmental Health Promotion. Then at kecamatan (subdistrik) level, under PUSKESMAS (Health Centre, about 5,150) one or more health personnel are appointed to be in charge of Environmental Health activities. They are Sanitarians or Environmental Health Personnel. However, not all Health Centres have Sanitarian, particularly in the remote areas.

When disaster taking place, responsible agencies at all levels are

involved in the tasks depending on the degree of the disaster. The Kecamatan and Kabupaten offices are normally the first units to take action. In areas where Environmental Health Personnel are not available, offices concerned at will coordinate the higher level activities requesting assistance from nearby Health Services offices to undertake the tasks until situations are back to normal.

IV. ENVIRONMENTAL HEALTH MANAGEMENT BEFORE AND AFTER DISASTER

Environmental Health programmes have been given priority in Health Sector since the Nation's first Five–Year Development Plan in 1969 upto the present Fourth Five–Year Plan as well as in the forthcoming Fifth Five–Year Plan. At Global level, the importance of Environmental Health was underlined by an extraordinary session of the United Nations General Assembly, which in 1980 declared the decade ending in 1990 as the International Drinking Water Supply and Sanitation Decade. Indonesia has committed itself in this declaration and implementing the National Decade programme through the sector's Five–Year Development Plan.

This Decade programme can actually be considered as the *"preparedness in disaster"* as the objectives of the programme among others are to improve the quality of living environment and to develop selfhelp attitudes and community participation in the development of Environmental Health.

In general, approaches in the development of Environmental Health Programme under normal situation may be grouped as follows :

a. Education:
   - Construction of excreta and sullage disposal facilities for "demonstration" purposes to be multiplied by the community on self-help basis.
   - Environmental Health Education and Training including personal hygiene, food hygiene and sanitation, housing, pesticide safety etc.

b. Financial and technical assistance for :
   - water supply schemes,
   - vector control, particularly at refuse disposal sites,

- By-laws preparation, etc.

c. Law enforcement :
   - public places sanitation.
   - industrial sanitation, etc.

d. Control of the Environmental quality :
   - monitoring (speculative).

Approaches in carrying out Environmental Health activities in events of disaster also fall in same lines with above with the exceptions that during disaster activities are carried out in a packaged and speedy manner under emergency situation.

V. DISASTER ACTIONS IN ENVIRONMENTAL HEALTH

A time-phased plan for post-disaster implementation in Environmental Health can be adopted only on an arbitrary basis as the phenomena may vary greatly from case to case. As a whole, the implementation may proceed along these lines :

Phase 1 (Roughly first 24 hours)

Main task	i)	Assessment of :	– the general situation and extent of environmental health problems; – the requirement for manpower and services, – the requirement for equipment, supplies and material etc.
	ii)	Information on: Assessment Results	– to Puskesmas – to Kecamatan office, – to Kabupaten level offices and the Coordination Board (SATKORLAK), – to Provincial Health Office, – to head office of the Department of Health.
	iii)	Coordination : with	– local authorities, – other Government departments, – other related health services.

iv) Action on : – water supplies,
– food supplies,
– disposal of the deads,
– survey of destroyed areas,
– communication,
– advise to people of environmental health measures they may cooperate.

Phase 2 (from end of phase I to the end of the second week)

Main task i) Planning for : – safe and minimum water requirement
– safe and sufficient food,
– excreta, refuse and sullage disposal facilities,
– shelters,
– insect and rodent control,
– other environmental health activities as necessary and required.

ii) Organization for : – emergency services,
– staff on more full time basis,

iii) Supply of : equipment, materials and supplies.

iv) Accommodation for: – staff and stores.

v) Communication: – from site to Relief Centre and vice versa.

vi) Action : – on planned activities to construct facilities, and provide services and mobilizing community participation.

Phase 3 (from end of phase 2 to end of emergency)

Main task i) Operation & Maintenance : – of constructed facilities.

ii) Reappraisal of : – situation and planned activities on longer term basis,
– housing situation

– other specific environmental health services,
– rehabilitation of environmental health schemes.

iii) Reorganization of : – administration from emergency to a more permanent basis.

iv) Action : – Consolidation of planned activities on a more permanent basis.

VI. EXPERIENCE ON MOUNT GALUNGGUNG ERUPTION AND PADANG PANJANG LANDSLIDE

A. Mount Galunggung Eruption

Galunggung volcano, located in Kabupaten Tasikmalaya of West Java Province, erupted on April 4, 1982. On April 5, about 31,000 people were evacuated from disastrous areas to several nearby kecamatans and the number increased to 33,491 on May 10. Distribution of these refugees varied from place to place, from less than 1,000 to about 8,000. Practically, within 24 hours of the disaster, immediate actions were taken by Environmental Health team in collecting information for assessing the situation. From after 24 hours onward, under the Coordination of the Coordinating Board of Disaster (SATKORLAK) refugees were relocated in schools, multipurpose building (Gedung Serba Guna), Madrasah (religious place), Offices, houses, etc. Damps and lava pockets to limit the dangerous zones were built. Immediately after the day of eruption, 70 shelters were built, 188 families were transmigrated while 2,000 families were planned for transmigration and the remaining 6,500 people for resettlement schemes.

Of the total 33,500 refugees, about 16,500 could not return to their villages as the results of the disaster. To relief the plight of these refugees, plan to build 330 temporary shelters for a period of 4–5 months was drawn up and implemented. Then permanent solution to solve their problems was made through resettlement schemes through :

– transmigration,
– resettlement (PIR)
– home base,
– movement to families/relatives.

Due to large number of refugees in many locations the Environmental Health personnel found themselves difficult and time consuming to move from one place to another. To facilitate their mobilization, the Dept. of Health provided them with motorcycles to discharge their duties. The urgent need for water supply and excreta disposal was determined as the available existing facilities were not adequate to cope with the demand. Though existing handpumps in the areas were not damaged, however, ground water table were substantially lowered preventing the pumps from pumping water out of the wells. Rivers and other water bodies were dried up or contaminated with mud and sand. The long dry season then also caused the decline of ground water table, further aggravating the situation. Survey conducted in 4 Kecamatans shown that 164 handpumps out of 349 (37%) were not functioning and flows from many protected springs decreased substantially.

In dealing with emergency water supply and sanitation problems, dugwells were constructed by the people and Department of Health provided 100 handpumps for installation. In addition trucks were brought in to transport water from other areas to the settlement sites. Funds for construction of 100 latrines were also made immediately available by the Department.

All handpump/well and latrines facilities were constructed with assistance from Provincial Health Services and SATKORLAK through community participation. In total, the 30 locations of the new shelters were provided with water supply from 1 pipe system and 218 handpumps (101 not functioning) and with 828 latrines.

Main constraints in this relief management experienced by the Environmental Health team were noted as follows: lack of coordination, slow in mobilization of assistance (manpower funds, S & E), lack of skilled personnel, and lack of information.

B. Padang Panjang Landslide

Padang Panjang is located in the Province of West Sumatera. The disaster occured in Bukit Tui, and Sungai Induk-Padang Panjang Municipality on May 4, 1987. The event caused 130 lives, and necessitated the evacuation of 653 people from the disastrous areas. Step-wise actions undertaken in the field of Environmental Health were the following :

During the disaster

A Health team including sanitarians was established and integrated with the POSKO or Disaster Relief Team. The Team of SARKOLAK at Kabupaten level accomodated the refugees in schools, sport hall and homes of local residents.

After Disaster

Food: Food for refugees was provided by SATKORLAK through "Public Kitchen" (Dapur Umum) and food inspection was made by sanitarians to ensure its safe and hygienic conditions.

Water supply: Water supply did not seem to be a problem in term of quantity, as there were several existing water supply sources in the areas. The major concern was on quality of the supplied water and chlorination was done to ensure safety of drinking water.

Excreta disposal

"Latrine without water" were built at suitable distance from water supply sources in collaboration with the refugees.

Refuse disposal

Refuse bins were provided and refugees were requested to cooperate in disposing the refuse properly. Refuse from bins were collected and disposed of at dumping sites daily.

Vector Prevention and Control

Efforts were made to prevent and control vector transmission diseases particularly from flies and rodents. It was observed that flies bred heavily on dead bodies as well as at refuse dumping sites and rodents were concentrated in these areas. Conditions at these places were strictly brought under control to prevent the possible spread of diseases. Insecticjdes and equipment used were provided from the Development Budget of Environmental Health for vector control. Information on how to prevent and reduce fly and rodent population, such as proper disposal of refuse, keeping kitchen clean etc. were given to the refugees.

Health Education

Health education on personal and household hygiene was also provided intensively in addition to other measures undertaken.

Post disaster situation

About 50 families were able to return to their home land, living in new, simple houses built by Government and provided with dug wells and latrines. About 140 people were transmigrated to Kabupaten Pasaman Barat and other areas for resettlement.

VII. CONCLUSION

The existing Environmental Health programmes have in the past managed to relief the plight of people at times of several disasters. Preparedness to cope with events in any emergency situation have always been in full effect. However, the programmes as a whole still need to be strengthened and improved. More attention and increased fundings from Government in disaster relief management is needed. Participation and involvement of community in disaster preparedness and health management is also another weak area need to be strengthened and require support from all parties concerned as well as problems related to shortage of professional and skilled manpower in dealing disaster events. The success of the programme depends much on the effective inter and intra sectoral coordination and for this a sound mechanism for speedy and effective implementation need to be established at all levels.

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