EPIDEMIOLOGIE VAN NATUURRAMPEN

DISASTER EPIDEMIOLOGY

EPIDEMIOLOGIE DES DESASTRES

PRINS LEOPOLD INSTITUUT
VOOR TROPISCHE GENEESKUNDE
ANTWERPEN

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ANVERS

INTERNATIONAAL COLLOQUIUM OVER DE EPIDEMIOLOGIE VAN NATUURRAMPEN

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INTERNATIONAL COLLOQUIUM ON DISASTER EPIDEMIOLOGY

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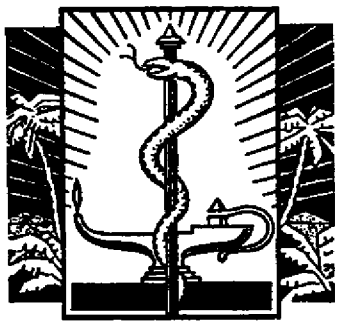

INGERICHT MET DE STEUN VAN HET MINISTERIE
VAN NATIONALE OPVOEDING EN NEDERLANDSE CULTUUR
EN HET NATIONAAL FONDS VOOR WETENSCHAPPELIJK ONDERZOEK

PROGRAMMA

5.12.1975 — 14.30 H

INLEIDING — INTRODUCTION

PRES. : W. MOHR (HAMBURG)

M. F. LECHAT (LOUVAIN UNIVERSITY) : DISASTER EPIDEMIOLOGY.

K. A. WESTERN (WASHINGTON) : EPIDEMIOLOGY OF COMMUNICABLE DISEASES IN DISASTER SITUATIONS.

H. DUPIN (RENNES) & A. M. RAIMBAULT (PARIS) : CATASTROPHES NATURELLES ET MALNUTRITION.

J ČERVENKA (BRATISLAVA) : HEALTH ASPECTS OF DANUBE RIVER FLOODS.

A. A. MOINFAR (TEHRAN) : EARTHQUAKE DISASTER

6.12.1975 — 9.00 H

WANVOEDING EN HONGERSNOOD — MALNUTRITION ET/AND FAMINE

PRES. : H. A. P. C. OOMEN (AMSTERDAM)

H. L. VIS (BRUXELLES) : EPIDEMIOLOGIE DE LA FAMINE

J. B. MASON (FAO - ROME) : SURVEILLANCE AND PREDICTION OF FOOD SHORTAGES AND MALNUTRITION.

E. M. DEMAEYER (WHO-GENEVA) : NUTRITIONAL INDICATORS IN TIMES OF EMERGENCY.

PRES. : D. J. SENCER (ATLANTA)

C. DE VILLE DE GOYET (UNIVERSITE DE LOUVAIN) : PRINCIPES METHODOLOGIQUES DE L'INTERVENTION EN CAS DE FAMINE.

B. I. CAMARA (NIAMEY) : EFFETS DE LA SECHERESSE : EXPERIENCE DU NIGER.

6.12.1975 — 14.30 H

SPECIFIEKE VOEDINGSTEKORTEN — CARENCES SPECIFIQUES — SPECIFIC DEFICIENCIES

PRES. : J. ČERVENKA (BRATISLAVA)

W. H. FOEGE (ATLANTA) : EPIDEMIOLOGIC SURVEILLANCE OF PROTEIN CALORIE MALNUTRITION.

H. A. P. C. OOMEN (AMSTERDAM) : VITAMIN A IN TIMES OF DISASTER.

S. FRANKEN (GRONINGEN) & J. G. F. ANTEN (AMSTERDAM) : THE PATTERN OF FAMINE IN BANGLADESH

PRES. : H. DUPIN (RENNES)

M. F. LECHAT, R. BOUCHE, C. DE VILLE DE GOYET & C. BOUCQUEY (UNIVERSITE DE LOUVAIN) : EPIDEMIOLOGIE DE L'AVITAMINOSE A AU NIGER.

J. P. W RIVERS, J. F. J HOLT, J. A. SEAMAN & M. R BOWDEN (LONDON) : LESSONS FOR EPIDEMIOLOGY FROM THE ETHIOPIAN FAMINES.

7.12.1975 — 9 30 H

SLOTZITTING — SEANCE DE CLOTURE — CLOSING SESSION

PRES. : I. B. CAMARA (NIAMEY)

R J B ROSSBOROUGH (GENEVA) : THE OFFICE OF THE UNITED NATIONS DISASTER RELIEF CO-ORDINATOR.

H. R. ACUNA & K. A. WESTERN (WASHINGTON) : ASSISTANCE INTERNATIONALE EN CAS DE CATASTROPHE.

D. J. SENCER (ATLANTA) : BILATERAL ASSISTANCE AFTER NATURAL DISASTERS.

A. OUCHFOUN (ALGER) : PLANIFICATION PRE-DESASTRE.

PRES. : A. A. MOINFAR (TEHRAN)

J. P. ROBERT-TISSOT (GENEVE) : UN ORDRE DU JOUR POUR LA CROIX-ROUGE.

E M. KINNEY (NEW YORK) : THE ROLE OF THE NON-GOVERNMENTAL AGENCY IN DISASTER AID.

ALGEMENE DISCUSSIE — DISCUSSION GENERALE — GENERAL DISCUSSION.

M. F. LECHAT (UNIVERSITE DE LOUVAIN) : CONCLUSIONS.

DISASTER EPIDEMIOLOGY

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Talking about disaster epidemiology, it might be good to define first what is a disaster.

For WHO, disaster is « a situation which implies unforeseen, serious and immediate threats to public health ». The NATO's CCMS (Committee on the Challenges of Modern Society) definition is broader in scope : « A disaster is an act of nature or an act of man, which is or threatens to be of sufficient severity and magnitude to warrant emergency assistance ».

The crucial words are those referring to the need for assistance. Can be considered a disaster any foreseen and sudden situation which the affected community cannot cope with. It therefore implies intervention.

Natural disasters may be regarded as extreme ecological events. In anything from a few seconds to a couple of days, earthquakes, floods or landslides leave human communities stripped or shelter, food and belongings. The dead can be numbered in hundreds or hundreds of thousands.

One remark should be made before proceeding further. Why here consider only natural disasters ? Do not man-made disasters, such as fire, explosion, even war, raise the same problems ? Very often they do. However, man-made problems have a number of distinct characteristics. They are ideally suited for prevention, for example for what concerns transport of hazardous material or industrial accidents. They have specific effects, often of a toxic nature. Last, they are occasionnaly planned, the expected effects being calculated in advance. This introduces a psychological dimension, in what then comes close to a game context, characteristics which are definetely absent from natural disasters.

There are many types of natural disasters : earthquakes, floods, tsunamis, landslides, avalanches, typhoons, volcanic eruption. Droughts with famine can be added for the sake of simplicity, for although not sudden, and easily predictable, they are quite similar in what relates to external assistance.

Disasters occur daily and in many parts of the world. Some of them, several each year, qualify as major disasters and make the headline.

Examples : the Callejon de Huaylas avalanche, Peru, March 1970, around 70,000 deaths; the Golf of Bengal's typhoon, November 1970, estimated

number of deaths between 200,000 and 500,000; the Managua's, Nicaragua, earthquake, Christmas 1973, 80 per cent of the City destroyed. According to figures published by the League of Red Cross Societies, in the twenty-five years period from 1949 to 1973, 223 major natural disasters, some of them involving several millions of people, required international assistance (45 earthquakes, 123 floods, 23 cyclones, hurricanes, typhoons and tidal waves, nine fires, and 23 others such as volcanic eruption, drought, extreme cold and avalanches, storms).

Natural disasters are probably not more frequent now than in the past. What has changed, however, is the fast world-wide reporting, through instantaneous communications and the mass-media, which makes it unlikely that a major disaster can go unnoticed.

Until quite recently, the approach to disasters was crisis dominated. This was particularly noticeable in the health field, where specific needs were most generally ignored. Instead, if I may quote a recent editorial on the matter, the emphasis was put on blood, blood and more blood for quite few casualties, dozens of large field hospitals, drugs of all kinds (each new disaster serving as a huge garbage deposit for the mailboxes of general practicionners in the donor countries), unsolicited surgical equipment clogging the airports, vaccines for diseases with zero incidence, swarms of expatriate neurosurgeons crossing the oceans, medical students volunteering for disaster-safaris, vitamine-loaded chartered jumbo jets, to say nothing of food items shipped for nutritional assistance, which could make another, and better, story.

It is now increasingly felt that some kind of disaster management should be possible. The emphasis is definitely moving from post-disaster improvisation to pre-disaster preparedness. The League of Red Cross Societies has increasingly encouraged pre-disaster planning in countries at risk. A few UN, for example — the United Nations Disaster Relief Office (UNDRO) — has been set up with headquarters in Geneva.

Coordination and exchange of information between agencies engaged in disaster relief are becoming the rule rather than the exception, and a number of groups have started with the specific objective of making professional expertise available to disaster management.

Social scientists, and also psychologists and geographers, have been quick to grasp the opportunity, viewing disasters as large-scale unplanned ecological experiments whereby the psycho-social reactions of populations can be investigated. Over the last decade, a number of individual and community reactions to disaster have been described. These have proved of considerable importance for the planning of relief activities.

Disaster-culture for example, that is the way communities which are frequently swept by disasters develop some kind of social adaptation, was described in populations repeatedly struck by typhoons in atolls of the Pacific. It shows that what will constitute a disaster in one community will not in another. This will have major implications for preventive measures, for reaction to warning system, or capacity for self-help and spontaneous community recovery, as well as acceptance of aid from the outside.

Why are people living on the slopes of a volcan ? Why are they rebuilding a city on the exact location of repeated earthquakes. Why do they refuse to move when flooding is imminent. As outlined by Burton,

there are many reasons for this. A not entirely obvious explanation is that men often have good reason to be where they are. Hazards areas may present economic opportunities superior to those available elsewhere. In some cases, people located in such areas would find it extremely difficult or even impossible to move for lack of outside help or because they have no place to go. Often, institutional arrangements, such as insurance schemes or relief payments to rebuild on the same site, operate to keep the people at the same place. Population increase is also a factor. The last typhoon of similar strength to the one which struck the Bay of Bangal in 1970 was in 1876. It made 100,000 deaths. In 1970, the number of deaths possibly reached half a million. It makes no doubt that the next one of similar strength, which has a probability of 1 in 100 years, will make more deaths.

The behavior of individuals in the course of a disaster has also been studied in detail. The pre-impact behaviour determines the usefulness of predictability techniques and the efficiency of warning systems. Too sensitive warning systems, that is too early ones, makes for a high proportion of false positive alarms with a resulting loss of confidence in pre-impact signals. The various patterns of impact behaviour, withdrawal or look for cover, have been shown to be highly organized socially. There is generally a family pattern of flight. Panic has been shown to be rare, occurring only under well defined circumstances when the choice of actions is limited and information is lacking on the consequences of disasters.

Various characteristics have been identified in the reorganization of communities under emergency conditions, such as emergence of totally new leaderships (the unexpected ones), spontaneous organization of rescue within the community (half an hour after earthquake over 75 per cent of the survivors are already involved in some highly effective, if not by common standards efficient, activities, which generally outside workers will disrupt), role conflict (hospital personal), professional stereotypes, identification of roles (uniforms), convergence (keep unauthorized personnel away), etc.

Epidemiologists, and public health workers in general, have been conspicuously absent from these recent developments.

If epidemiology is the study of health and diseases in populations, then there is no reason why disaster struck populations should not be amenable to epidemiological investigation. Drought in Somalia, an avalanche in Perou or floods in Florence can have not much in common. Still, they have no less than cholera in London 1849, amyotrophic lateral sclerosis in Guam, and lung cancer, and for investigating those the epidemiological is powerful.

At the moment, medical aid is still generally based on grassly exaggerated guesses. Health effects of disasters need to be measured through appropriate indicators.

In other words, decision making often lack the adequate information.

Death-rates according to environmental factors such as type of housing are already providing clues on the largest number of annual deaths from earthquakes occurring in some countries. In Turkey, a linear relationship has been found between the number of houses destroyed and the number of deaths. There are approximately 8.5 persons killed for 100 houses

destroyed or badly damaged. At times, the ratio can be much higher. In the September 6th, 1975, earthquake in Lice, Anatolia, 1,800 houses were destroyed or badly damaged for approximately 1,200 deaths in the city itself, which makes around 65 deaths for 100 houses destroyed.

Taking into account the relatively low number of residents per dwelling, this points to some factor in engineering characteristics which makes the houses particularly lethal in this part of the world. High death-rates are in fact associated with the introduction of cheap new building technology, using concrete slabs on insufficiently reinforced adobe walls. This open the way for preventive measures.

With respect to post-impact deaths, close to nothing is known of the death rates in the few minutes or hours following the impact.

The generally small number of heavy casualties available for medical care after a disaster suggests however that most casualties die before being rescued.

The cause of deaths should not be attributed ipso facto to wounds suffered at the time of impact. Snake-bites for example are suspected to contribute in a non-negligeable way to death associated to floods in survivors having taken refuge in trees.

That little is known with respect to the conditions of survival immediately after the impact is evidenced by surveys conducted among rescue workers and voluntary agencies on the type of drugs and equipment most widely used. Responses received from some 80 workers we interviewed by postal questionnaire indicated that the most universal drug is aspirine, to which could perhaps be added hot coffee. Therefore the decision taken by the League of Red Cross Societies in 1974 to produce a standardized still limited list of drugs and supplies which could cater for the widest possible range of needs in the early phase of relief.

Except for earthquakes, the number of casualties requiring medical attention is generally quite low as compared to the number of deaths. In most natural disasters, it is as though people die or survive, there is no middle term.

In floods, the proportion of people requiring medical care has been reported to range between 0.2 and 2 per cent. One of the most dramatic disaster of this century, the already mentioned avalanche of the Callejon de Huaylas, in the Huascaran massif, Peru, in 1970, has made 4.6 injured while it killed an approximate 70,000 persons (and caused 143,000 to suffer light wounds). This gives a ratio of 1 injured to 15.2 killed.

These observations are to be related to the rush of mobile hospitals of all kinds and teams of specialized surgeons, the net results of this crisis-dominated convergence being generally to drain the little facilities left in terms of accomodation, transportation and communication. This has clear implications with respect to the planning of foreign aid.

More should be known with respect also to the non-specific, non-disaster associated health needs in time of disasters, such as surgical emergencies and complicated deliveries. After the Huascaran tragedy in 1970, the army surgeons in foreign teams were heavily taxed for obstetrical care. During a simulated seism carried out in Lima last month, 64 real non-disaster emergencies had to make their way to the hospital in 3 hours interval only.

Data on post-disaster incidence and time trends for communicable diseases are badly needed, if only to test the appropriateness of mass-vaccination and provide baselines for the further evaluation of the long-term effects of control measures.

Typhoid vaccine is often flown in large quantities when floods occur in developed countries, although no firm evidence is available on recent typhoid outbreaks being associated with this type of disaster, in spite of a prevalence rate for typhoid carriers presumably approximating zero (notwithstanding the fact that a considerable amount of skilled manpower time is diverted to carry out a procedure whose net undisputable effect is likely to increase the incidence of hepatitis). In the Managua's, Nicaragua, earthquake, 1972, about a million unsollicited vaccine doses were flown in by donor countries. It was decided not to vaccine. Yet, about a quarter million doses were injected.

The respective value of vaccination, sanitation, and early detection of communicable diseases foci in time of disasters should certainly be carefully evaluated for each disease. Clearly, there is a place here for epidemiological surveillance.

Disasters can also in the long-run increase the incidence of diseases by interfering with undergoing control measures. A well-documented case is malaria in Haiti, following hurricane Flora in 1963. Sweeping accross the Southern districts of the country, Flora caused extensive damages to housing, about 68 per cent of the houses being destroyed and most of the roofs being blown off. This, occurring in the course of an extensive malaria eradication campaign, flushed away the residual insecticide which had been sprayed on the walls of the dwellings. A severe malaria epidemics developed 6 to 8 weeks after the hurricane, with an estimated number of 75,000 cases. It is by no mean sure that the ongoing transmission of malaria in the country up to the present days is not in some way related to this typhoon of 12 years ago.

Epidemiological surveillance system should be set up in view not only to monitor communicable diseases in the post-impact period, but to provide indicators which could assist in evaluating the long-term effectiveness of health measures. Of special concern is the possible negative, not to say disastrous counter effects of foreign agencies providing sophisticated medical care for a temporary period. On a removed, it leaves the population with great expectation which just cannot be fulfilled.

These are only examples. Malnutrition is another field of major importance. In recent years, malnutrition associated with disasters, including civil war situations and large numbers of refugees, has been a privileged field of study and action for epidemiologists. This problems, since it is the main topic of this seminar.

This is disaster epidemiology. It is an almost untouched field. It offers opportunities for a multifactorial approach in cooperation with other disciplines. It also provides a world-wide social challenge for epidemiologists and other health workers.

EPIDEMIOLOGY OF COMMUNICABLE DISEASES IN DISASTER SITUATIONS (SUMMARY)

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Epidemiologists involved in natural and man-made disasters frequently overlook the fact that communicable diseases have historically been the source of major disasters. Modern examples include the 1918 Influenza Pandemic and the 1974 decision by Brazil to declare a State of Emergency due to meningococcal meningitis. More frequently, however, epidemics of communicable diseases resulted from the social disruption, crowding, and deficient sanitation following disasters. War and famine have been the disasters most commonly associated with secondary outbreaks of disease. Famine represents a special situation in which the affected population has an increased susceptibility to and mortality from infectious diseases. Historical data indicate quite clearly that, in the past, communicable diseases frequently caused more deaths than the primary disaster.

Present evidence indicates that understanding of the epidemiology of communicable diseases, better educated populaces, improved environmental sanitation, preventive medicine, and modern clinical weapons have reduced the endemic levels of communicable diseases in the more developed countries. Since the end of World War II, there has not been a single outbreak of the classical communicable diseases in Europe, Canada, and the United States which can be attributed to a disaster. At the present time, the endemic diseases most likely to be affected following disasters in developed areas are : 1) non-specific diarrhea, 2) food poisoning, 3) Shigellosis, 4) infectious hepatitis, 5) influenza. In actuality, no studies have been done to document the effect disasters have on these conditions. The clinical experience is that these diseases rarely cause post-disaster medical problems at higher than expected numbers. The common practice of immunizing against typhoid para-typhoid, and tetanus, therefore, has no justification in these economically advanced areas.

Even in the less developed countries, classical diseases such as smallpox, plague, louse-borne typhus, relapsing fever, and malaria have disappeared or become severely restricted in their distribution. Despite absence of reliable surveillance information and laboratory diagnostic servic-s

experience in several large disasters since 1966 indicates that communicable disease outbreaks have not occurred. Rumors of epidemics are frequent and the epidemiologist has a critical role to play in confirming or repudiating these reports. These specific problems should receive particular mention. First, it is extremely common for medical teams to enter disaster affected zones which previously have had no organized health services and attribute endemic diseases there to the disaster. Second, disasters which result in the displacement of populations into temporary or permanent camps immediately increase the risk of communicable diseases unless strict sanitary discipline is enforced. Outbreaks of this type usually occur weeks or even months after the initial event. Third, developing countries frequently suffer the interruption of disease control programs immediately following a disaster. Unless these programs are resumed as soon as possible, the targeted disease is likely to recur in an « epidemic » form which is only indirectly due to the disaster. The smallpox and malaria eradication programs represent recent examples of this problem in developing countries.

Following disasters, active epidemiologic surveillance and investigation of communicable diseases should be put into action. Effective public health measures should focus on the provision of safe food, water, and environmental sanitation. Immediate vaccination programs against communicable diseases are unnecessary, expensive, frequently difficult logistically, and do not confer adequate protection. This general recommendation applies both to developed and developing countries. Epidemiologic surveillance provides a proven method of identifying an outbreak early in its course if it should occur and initiating immediate, specific control measures.

DISCUSSION

W. H. Foege : I think Dr Western's point is generally quite true, that while historically disasters have almost inevitably resulted in communicable disease epidemics, this has not been true in recent years. However, I would like to point out several recent exceptions to this, so that we do not get the feeling that this no longer happens. During the civil war in Bangladesh, smallpox spread had stopped as far as we know. At that point about 10,000,000 were refugees to various camps in India and while congregated in those camps, smallpox did again spread and when the 10,000,000 people returned to their original villages in Bangladesh, there was a marked increase in smallpox throughout the country.

I think a second example occurred just this last year in the northern districts of Mymensing and Rangpur in Bangladesh, where, because of a shortage of food and in fact fairly marked famine, there was a spread of people south. At that time Mymensing and Rangpur were the only places left in Bangladesh with smallpox, but because of the localized famine in the north, the migration succeeded in reseeding most of Bangladesh with smallpox. This has only within recent months been brought under control. So it still does happen, but the general thesis is certainly correct that in recent decades the communicable diseases have been less of a problem in times of disaster.

K. A. Western : The deterioration of the smallpox situation in Bangladesh was an example of the combined effects of incamped refugee populations which were not adequately immunized against smallpox in the encampment, were exposed to smallpox in India and then returned to a population in which smallpox control efforts had been severely disrupted. Perhaps typhoid would be a better example of the usual situation. In less developed countries there is no specific typhoid control program, but we still do not see an increase in typhoid following disasters in either communities or encamped refugees.

B. B. Waddy : A classical instance that ought not to be forgotten is the possibility of increasing malaria transmission through population movement. Suppose hypoendemic malaria exists in a community, causing no great concern or morbidity. If outsiders who are not fully susceptible to malaria are introduced into this community, the result will be an epidemic of malaria affecting not only the susceptible immigrants but also the indigenous community. It seems to me that this is still a very real danger in many parts of the world.

K. A. Western : I agree. The threat of increased malaria following disasters, however, can best be reduced by maintainance of the ongoing malaria control program rather than a special effort within the disaster relief.

B. B. Waddy : Malaria has returned with disastrous effects in recent years in Ceylon and parts of India. Malaria through aggregation of labour forces in the tropics is still a very real threat.

K. A. Western : Unlike Haiti, the resurgence of malaria in Ceylon did not seem to be precipitated by a natural or man-made event but a variety of social and economic factors which resulted in a premature abandonment of a very good malaria eradication effort on the island.

E. M. DeMaeyer : You have indicated that malnutrition may decrease resistance to infection, would you care to elaborate on the mechanisms involved ?

K. A. Western : Work dating from 1930's has shown that severely malnourished patients with low serum proteins and other laboratory abnormalities were at greater risk of morbidity and mortality from the communicable diseases. Although we now have better tools to monitor the nutritional and immunologic status of patients, a thorough understanding of the complex relationship between nutritional intake immune status, and risk of communicable diseases still eludes us, and Dr DeMaeyer might comment in more detail on this problem from the nutritional point of view. The problem in the field situation with communicable diseases is that one can not predict from the nutritional status alone whether an individual is at higher risk. If we take gastroenteritis for example, malnourished individuals may have considerable acquired immunity to specific agents such as typhoid fever or shigellosis. Furthermore, perhaps 60-70 per cent of gastroenteritis is not due to an identifiable organism and we need more epidemiologic

information on the role of enteropathogenic coliform bacteria and viruses in gastroenteritis to assess the importance of malnutrition in decreasing resistance to diarrheal disease.

W. Mohr : Concerning « Recrudescence of malaria under circumstances in a catastrophy » I would like to inform you of an experience we were able to collect in Central America.

Managua in Nicaragua was nearly free of malaria. After Managua was destroyed by the earthquake the control of malaria suffered a breakdown and in Managua and surroundings it came again to several outbreaks of malaria.

During the famine in Ethiopia our medical working-team observed two outbreaks of smallpox. It was not at all so easy to get these outbreaks under control, before all it was difficult with the nomades. My assistant and collaborator Dr Merkle may tell you himself about this experiences in the fight against these outbreaks of smallpox.

F. Merkle : We have seen two smallpox outbreaks by the Nomadic tribes in the eastern lowlands in Wollo-province in January and June 1974. The background of this outbreak was very interesting :

During the years before different teams had four or five times vaccinations performed. And then suddenly started a smallpox outbreak in connection with the first relief measures : The relief work collected a lot of people, who were waiting for grain distribution and who lived in compact slums and shelter-homes along the roads and I think this was one reason. Also some people from areas, where smallpox-vaccination-teams had never been, came to these camps. And this was the other main factor for the smallpox outbreak in a pre-vaccinated area, due to the disaster-following-relief !

B. B. Waddy : May I return to the epidemiology of disaster in relation to communicable diseases. Sleeping sickness in West Africa provided a classical example of the relationship between a communicable disease and economic conditions. It happened that the great West African epidemic of sleeping sickness reached the area of Ghana just at the time of the world economic depression, at the end of the 1920's. Because of the economic conditions all entomologists and similar technological workers had been axed, and so the disease was left unattended to wipe out entire populations. A similar annihilating epidemic of sleeping sickness took place in what is now Zaire, because all surveillance ceased with the departure of the Belgians and the breakdown of law and order. Sleeping sickness may be going on at the present moment in areas where surveillance has broken down. There is, in fact, a close connection between politics, economics and the spread of communicable disease.

K. A. Western : I echo Dr Waddy's concern that long-term effects of the present economic conditions in developing countries on communicable diseases may include the reappearance of communicable diseases previously eradicated from an area or controlled at low levels.

Furthermore, unless primary health care systems are developed in association with the maintenance of communicable disease control programs, there is a real danger of losing control of communicable diseases of public health importance and not achieving the extended coverage because of limited economic resources.