THESIS

IDENTIFYING A DESIRED ORGANIZATIONAL FRAMEWORK FOR DISEASE OUTBREAK MANAGEMENT IN KENYA

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A thesis presented
to the Graduate Faculty of Business Administration and Management
United States International University

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In partial fulfillment of the Requirements for the Degree of Master of Science in Management and Organizational Development

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by

Jeroen W. den Boer
Nairobi, 1993
Abstract of Thesis

IDENTIFYING A DESIRED ORGANIZATIONAL FRAMEWORK FOR DISEASE OUTBREAK MANAGEMENT IN KENYA

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Jeroen W. den Boer

United States International University

Committee Chairperson: Dr. Waruingi

THE PROBLEM. The purpose of this study was to identify an organizational framework for disease outbreak management in Kenya.

METHOD. Key experts in the field of disease outbreak management were interviewed to arrive at an applied model for Kenya.

RESULTS. Twenty-one experts from the Centers for Disease Control in Atlanta, from the World Health Organization Headquarters in Geneva, and from public health institutions in The Netherlands see great potential in an outbreak management team in Kenya. Their recommendations were very consistent in that they advised to start with a small group, closely connected to the Director of Medical Services and to relevant public health institutions, with basic office and travel facilities, and a budget for training, surveillance, outbreak management, and reporting on five to eight communicable diseases.
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Special thanks go to the enthusiastic experts in the field of disease outbreaks and emergency relief who were interviewed for this study. With a multitude of examples they showed the great potential of the study subject. I hope some of their vibrancy can be felt in Kenya when an outbreak management team becomes a reality.
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Chapter 1

INTRODUCTION

The number of outbreaks of communicable diseases has been increasing in recent years. There may be several reasons for this: the increased rapidity of national and international travel and the greater distances travelled; extensive deforestation and irrigation works; neglect of insect and rodent vector control programmes; explosive urbanization and overcrowding associated with poor sanitary conditions; more frequent opportunities for mass meetings resulting, for example, from improvements in public transport; frequent movements of populations and refugees; social or recreational events; tourism; and large-scale industrial food processing. Some of the increase, however, may be apparent rather than real, since better medical and epidemiological coverage in developing countries has improved the surveillance of these diseases, and outbreaks are now reported that would formerly have gone unnoticed. These reasons may also explain why a disease formerly considered as only occurring sporadically is now endemic or epidemic, although the possibility of changes in pathogenicity or virulence must not be overlooked (P. Bres, 1986).
Background of the Problem

In the latter months of 1992, a mysterious disease outbreak in Baringo and Elgeyo Marakwet districts in Kenya was reported to the Ministry of Health Headquarters in Nairobi. In the beginning of 1993, it became clear that the outbreak was due to Yellow Fever. Vector control activities were brought to a higher scale, and a vaccination campaign was executed in the two districts.

A Ministry of Health task force, meeting on a daily basis, took control of the situation. The members of the task force were senior Officers, epidemiologists, virologists, an entomologist, a nurse, and a public health officer, rapidly assessed the situation and organized necessary resources and manpower to fight the outbreak.

The rapid response of the task force and its successful control over the Yellow Fever outbreak underlined the desire to institutionalize a small team, specialized in rapid assessment of outbreaks of communicable diseases. Such a team could operate as a watchdog and get experienced in assessing outbreaks and their desired control. During an outbreak it would carry out a rapid assessment of the situation and then advise the Ministry of Health on required control measures.
Statement of the Problem

Since there is no experience in Kenya with a specialized team dealing only with outbreaks of communicable diseases, it was thought advisable to get the opinion of leading experts in this field of Public Health, especially with regard to the desired organizational framework.

Purpose of the Study

The purpose of the present study was to determine the organizational framework for a team specialized in managing outbreaks of communicable diseases. The study explored the likely goals and objectives of the team, the place of the team in the field of Public Health, the team's organigram, the composition of the team, the job specifications of the team, and the resources needed to start and develop the team.

Importance of the Study

Similar outbreaks of communicable diseases occur everywhere in the world. The organized response to outbreaks, however, differ from country to country. There are institutions specialized in technical assistance (World Health Organization, Centers for Disease Control) and there is considerable consensus about what kind of measures should be taken, given a known disease. Yet, countries in the world control disease outbreaks in different ways and through different organizational frameworks, depending on priority setting for available resources. It is clear, however, that a
quick response to a communicable disease outbreak will reduce human suffering.

As in the Yellow Fever example in Kenya, the rapid response was important in terms of lives spared, and also because it prevented panic reactions of the public by giving adequate and correct information.

The findings and recommendations of this study will enable the Ministry of Health to create a disease outbreak management team, tailored to the Kenyan situation, using knowledge and experience from other countries.

Scope of the Study

The study looks at requirements of a team specialized in rapid assessment and management of outbreaks of communicable diseases in Kenya, according to leading experts in the world. During the interviews, the Kenyan situation was explained to the experts, to assure appropriate advice. The eventual composition of a disease outbreak team in Kenya will fully depend on the local circumstances and priority setting by the Ministry of Health.

Experts from the Centers for Disease Control in the United States of America, from the World Health Organization in Switzerland, and from various institutions in The Netherlands were interviewed in the period between 17-04-1993 to 08-05-1993. The World Health Organization sponsored the journey to the three countries mentioned.

Interviewing experts seems a reliable and relatively
cost-effective way of getting a broadly supported view on a subject. The interviewees all worked in the field of Public Health, each with his own specialty, each stressing a different part of the whole picture of outbreak control. The opinion of health workers in Kenya will be important in the next stage of the development of the team. This study can serve as a starting point in the realization of the team.

Definitions

Three terms used in this study, epidemic, management and outbreak, need to be specified for a better understanding.

An epidemic of an infectious or parasitic disease is the occurrence of a number of cases of a disease, known or suspected to be of infectious or parasitic origin, that is unusually large or unexpected for the given place and time. An epidemic often evolves rapidly, so that a quick response is required (Bres, 1986).

Management is the function in an organization that defines organizational objectives, plans, organizes resources, initiates organizational actions, controls and communicates organizational activities (Murckick, 1986).

An outbreak is the occurrence of an epidemic disease at a particular time and place (Bres, 1986).
Summary and Organization of Remaining Chapters

This study addressed the topic of the control of outbreaks of communicable diseases. More specifically, it looked at the desired organizational framework of an outbreak management team in the Kenyan Public Health situation. The necessary information was gathered by interviewing leading experts in the field of outbreaks of communicable diseases. The study can be used to install an outbreak management team in the Kenyan context, after thorough consultation of health workers in the field.

Chapter two will give an overview of the literature, chapter three will outline the research methodology used. In chapter four the research findings are presented. In chapter five conclusions from these, followed by a discussion and recommendations for future research can be found.
Chapter 2

REVIEW OF THE LITERATURE

When epidemics occur, apart from panic, a lot of questions arise: What type of disease is causing the epidemic?, how widespread is the epidemic?, where does it come from?, how will it spread?, and how can it be controlled?

The most important reason to have a Disease Outbreak Management Team in a country probably is specialisation. The more experienced such a team becomes in dealing with outbreaks of communicable diseases, the more valuable they will be to the Health Care System. However, a Disease Outbreak Management Team has to be seen within its context. Without a good surveillance system, outbreaks go unnoticed or unreported, unless large numbers of deaths occur. Fighting an outbreak without a good assessment of its extent, origin, evolution, possible further spread, is like an army going to battle without using scouts. An outbreak management team without a functioning health system will achieve little to nothing. Last but not least, a team will not perform well without training. Clearly, the organizational context for an Outbreak Management
Team is vital to successful performance.

In this chapter, some general aspects of epidemics will be discussed, before reviewing the subject matter of this study. In the second part of this chapter, the existing literature concerning the process of disease outbreak assessment and control will be summarized. In the third part, a summary will be given on the literature dealing with the organizational context of a Disease Outbreak Management Team. Finally, in the last part of the chapter, the situation in The Netherlands concerning the control of communicable diseases is described, so as to give an example of what happens in one country in the western world.

General Aspects of Epidemics

Epidemics may occur because of some common circumstances (Kelsey, 1986). These include (1) When susceptibles are introduced into an endemic area where the pathogen exists. An example of this is the situation when city inhabitants of Nairobi visit rural areas where malaria is endemic; (2) When a new pathogen is introduced by traveling humans or animals from an endemic area into a susceptible human population, or when contamination of food, water, or other vehicles takes place by an agent not normally present. An example of this can be AIDS in the case of human transmission, or Cholera in the case of foodborne transmission; (3) When new and effective contacts are made between a preexisting infection of low endemicity and susceptible persons as a result of changes in
social, behavioral, sexual or cultural practices. An example of this is the recent outbreak of Yellow Fever in Kenya, where cases of the disease were associated with cultivation of new agricultural land; (4) When host susceptibility and response are modified by natural or drug-induced immunosuppression, nutrition, or other diseases. An example of this is the occurrence of outbreaks of acute respiratory infections in refugee camps.

Types of Epidemics

Epidemics can be classified according to the nature and length of exposure to the pathogen, the means of spread or propagation, and the duration of the epidemic.

A frequently used method classifies epidemics as common, point, propagative and mixed. All four types are discussed here: (1) Common source outbreaks refer to the exposure of a susceptible population or group to a common source of the pathogen. An example is a group of people who fall sick with symptoms of vomiting and diarrhea after eating the same dinner; (2) Point epidemics refer to outbreaks occurring in a group of susceptibles exposed at the same time to a common source of the pathogen, usually in a single exposure and most frequently resulting in a short, sharp epidemic curve, the shape of which depends on the dosage and pathogenicity of the agent, the duration of the exposure, and variations in host response. An example of this is an outbreak of measles in an unvaccinated population; (3) Propagative, or progressive,
epidemics involve the transfer of the pathogenic agent from one host to another. This usually entails multiplication and excretion of an infectious agent in the host and sometimes includes intermediate animal/human or arthropod/human multiplication cycles in the spread of the organism. An example of this is Bilharzia in standing water; (4) Mixed epidemics involve both a single, common exposure to an infectious agent and secondary, propagative spread to other individuals, usually by person-to-person transmission. Examples of this type include outbreaks of Hepatitis A and Tuberculosis.

Cessation of an Outbreak

An outbreak or epidemic usually ceases when one or more of the following events occur: (1) The source of contamination is eliminated or modified, or the pathogen is rendered nonpathogenic; (2) The node of transmission is interrupted or eliminated; (3) The number of exposed and susceptible persons is markedly reduced or exhausted. This can occur by their removal from the source of infection, by a development of the disease, by active or passive immunization to the infectious agent, by chemoprophylaxis against a sensitive infectious agent, or by some other modification of the pattern of host response; and (4) A cofactor or some other important risk factor for infection is modified or eliminated.
The Process of Disease Outbreak
Assessment and Control

Most epidemics are public health emergencies and require urgent and co-ordinated action to identify the cause and to institute effective control measures. It is wise to follow a systematic procedure in the investigation of outbreaks. The three main stages in an investigation are: (1) descriptive enquiries into the facts of the outbreak; (2) analysis of the data collected; (3) formulation of a causal hypothesis and testing its validity in the control of the outbreak (Farmer and Miller, 1984). A brief review of each of the three stages follows.

Descriptive Enquiries

To identify the origin of a possible outbreak, verification of the diagnosis by clinical and laboratory investigation of the patients is essential. If all patients have common denominators in the symptom complex and do have the same disease as verified by laboratory isolation of the causative organism, the next step is to verify the existence of an epidemic by comparison with previous incidence of the disease in the same population. A list of all cases should first be compiled and complemented later by active search for unreported cases. This search can be done by alerting hospitals in the district and neighboring health authorities. Patients and others who might be involved in the outbreak should be investigated. At this stage a recording system for
the personal characteristics of the patients (age, sex, address, etc.) should be set up. These data should include enquiries into shared experiences or activities that could carry risk of exposure to the suspected agent (e.g. occupation, school attended, recreational activities, consumption of foods, drugs, etc.) to find or confirm the type of outbreak. A vital step from investigation to control is the identification of the total population at risk. That is: all those who may have been exposed to the same hazards as the patients, whether ill or not. All the clinical and laboratory investigations required to confirm infection in patients and to determine the extent of sub-clinical infections should be carried out. Phage and serological typing of organisms may help to establish the epidemiological association between cases and to trace the paths of spread of the agent. In large outbreaks investigations can sometimes be confined to random samples of patients and persons thought to be at risk.

The following reservoirs and vehicles of infection which may be the source of the outbreak should be investigated.

a. Human reservoir.

An epidemic may originate from an individual who has had a minor episode or from a carrier who was ill many years previously. Therefore a careful history should be taken from all contacts of the patients.

b. Animal reservoir.

The contacts between patients and sick animals or animal
products known to harbor the infection concerned need investigation.

c. Environment.

Sources of foods consumed by affected individuals and the circumstances of their production, storage, preservation and preparation will sometimes give clues to the origin of an outbreak. Particular attention should be given to situations in which cross-contamination or incubation of organisms could have occurred. Food remnants, milk, and water supplies, and other relevant specimens from environmental sources (e.g. kitchen utensils, drains, etc.) should be examined in a laboratory for isolation and typing of a causative organism.

Analysis

Plotting the epidemic curve (number of patients over time) may already give a clue to the mode of spread and probable time of initial exposure. Plotting the cases on a map will help to detect clustering. The distribution of cases must be examined with reference to that of the population at risk. The incidence rates in different groups (e.g. age or occupation) must then be analyzed. A high rate in a particular group suggests that the cause lies in a common experience of its members. Attack rates must be calculated both in those exposed and in those not exposed to the suspected agent. It should be noted that variations in the biological response may result in attack rates of less than 100 % in the exposed
population. The finding of a quantitative relationship between the degree of exposure (or dose) and attack rate (e.g. amount of suspect food consumed or closeness to a source of pollution) will support the hypothesis concerning the cause of an outbreak. The hypothesis should take account of:

a. The properties of the agent, its reservoirs and favored vehicles for transmission and also of the nature of the illness it causes.

b. The probable route of transmission (in this, added information on the typing of the organisms may be particularly helpful).

c. Time and duration of exposure of the patients to the agent in relation to the onset of their illness.

d. Attack rates of the different sub-groups of the population at risk.

Support for the hypothesis can be found by further investigation of cases, to confirm the proposed explanation of their illness. Enquiries among those who suffered from a similar illness but who have no apparent connection with the outbreak might be especially helpful.

The implementation of appropriate control measures on the assumption that the hypothesis is correct and the monitoring of their success in reducing the incidence of further cases is the final step in the process. Its form will fully depend on the hypothesis formed during the disease outbreak assessment.
The Organizational Context of a Disease Outbreak Management Team

Concerning the organizational context of a Disease Outbreak Management Team, most of the consulted authors (WHO/ERO/EPR, 1990), (Dunsmore, 1986), (Esteves, 1991), (Toole et al., 1992), refer to the work of Bres: "Public Health action in emergency casued by epidemics". So, rather than going into detailed differences, Bres' view of the context of a disease outbreak management team will be outlined below. Bres uses the term Emergency health service (Bres, 1986), instead of the long term, "communicable disease outbreak management team". Bres divides the subject of context into three parts: (1) Organizational structures; (2) Early warning system; (3) Contingency Planning. Each of the subjects is explained below.

Organizational Structures

The organization of an emergency health service should form an integral part of communicable disease prevention and control. One individual must be ultimately responsible for planning and coordinating. This person must be supported by an advisory committee. The advisory committee should consist of 10-20 persons representing all the organizations that might have an important role in the epidemic.
Early Warning System

At some point in time during an outbreak, it is imperative that it be detected. To ensure this at an early stage, surveillance systems are put in place. These systems consist of (Mandel, 1979):

(1) Morbidity reports; (2) Mortality reports; (3) Laboratory reports; (4) Reports on epidemics of communicable diseases; (5) Case investigations; (6) Epidemic investigations; (7) Special surveys; (8) Reservoir and Vector studies; (9) Biological utilization; and (10) Demographic and Environmental data.

Outbreaks may be detected by routine epidemiological surveillance and, when justified, by special additional active surveillance of those diseases representing the greatest potential danger. Therefore, the early warning system is divided into a routine surveillance, and an active epidemiological surveillance.

Routine surveillance. Morbidity and mortality statistics on a number of diseases must be reported from the peripheral to the central health services on a regular basis. These statistics provide the background information against which current data are evaluated and the epidemic threshold determined.

Active epidemiological surveillance. This is only for selected diseases which are likely to cause severe epidemics so that rapid action can be taken to prevent further spread.
Active epidemiological surveillance is a costly system to maintain. Criteria for the selection of diseases amenable to active surveillance give greater weight to those of major public health importance and to those that may appear when there are unusually favourable conditions, such as close links with an active focus in another country, presence of competent vectors, immunity level of the population and ecological changes.

**Contingency Planning**

A contingency plan must be prepared by the coordinator and approved by the advisory committee and the responsible authority at the Ministry of Health. Criteria for selection of diseases for which special plans of action should be prepared are: (1) epidemic diseases capable of causing an emergency; (2) epidemic diseases known to have caused emergencies locally in the past; (3) locally endemic diseases that may become epidemic; (4) diseases that may be imported. For each potential epidemic disease selected, a study should be carried out to establish for the locality concerned, the nature of the source(s) or reservoirs of the infectious agent, the vehicle(s) of transmission and the receptive host(s).

**The situation in The Netherlands**

Since the process of assessing and controlling a disease outbreak is basically the same the world over, emphasis will be placed here on the organizational framework and context of
disease outbreak management teams in The Netherlands.

The Organizational Framework in The Netherlands

During the eighties, in The Netherlands, a nationwide network of Basic Health Facilities (Basisgezondheidsdiensten) was founded, based on the vast and positive experience with similar institutions in the big cities: Amsterdam, Rotterdam, The Hague, and Utrecht. The tasks of these institutions were determined by law (Wet Collectieve Preventie). One of these tasks is the control of communicable diseases. For this purpose, each of the institutions in the 63 districts has at least one medical officer (arts infektieziektenbestrijding) in charge on a 24 hour per day basis. During the training of medical officers in charge of control of infectious diseases, emphasis is put on networking at district and national level. The district network consists of a Sentinel Practice Network (Bartelds, 1989), of the hospitals in the district, of the general practitioners in the district, of the hospital and district laboratories, and of the district Food and Goods Inspectorate. The national network consists of the 63 District Medical Officers, the National Institute for Public Health and Environment Protection, the Chief Inspector for Infectious Diseases in the Ministry of Health, and specialized hospitals and laboratories.
The Surveillance in The Netherlands

The surveillance on which the control is based, is also determined by law (Wet bestrijding Infektieziekten en opsporing Ziekteoorzaken, 1929). Each and every medical practitioner in the country has the obligation to report certain diseases within certain time limits to the above mentioned medical officer. In total, 43 diseases in three categories (A, B and C) have to be reported. The diseases in category A have to be reported immediately, in category B within 24 hours, and in category C also immediately, but anonymously (see Appendix C.). The anonymously reported diseases are reported with age, gender, residence, and date of onset for registration purposes. At central level, information on reported diseases is gathered from all districts, and fed back on a monthly basis. These data give very good background information on endemcity of diseases. For example, since the mid-eighties, a continous rise in Tuberculosis cases has occurred in The Netherlands.

The medical officer of a district has to take action if he suspects an outbreak, and this medical doctor also has to warn the neighbouring districts and the Ministry of Health. The Ministry of Health in The Netherlands only exists on a central level, since all Basic Health Facilities are governed locally. In the Ministry of Health, the Chief Inspector for Infectious Diseases (Hoofdinspecteur Infektieziekten) has the ultimate responsibility for the control of outbreaks, but most
of the time outbreaks are dealt with at District level. Only in large or significant outbreaks, like the outbreak of Poliomyelitis in 1992 (42 cases), does the Chief Inspector take over personally. For most of the diseases, a local hospital laboratory can perform diagnostic tests, but for a selected group only one or two specialized laboratories have this facility. For example, DNA-fingerprinting for Tuberculosis and identification of Leptospires is only done at the RIVM (National Institute for Public Health and Environment Protection) in Bilthoven.

Each District can set up its own active surveillance on specific diseases, guided by its needs.

Contingency Plans in The Netherlands

Contingency plans have been drawn up recently. For the most common infectious diseases, this was first done by a group of medical officers in one Province in The Netherlands (Noord-Holland), after which representatives of all Provinces came together for two days to make National Contingency Plans for Infectious Diseases. The results of this meeting have been published and are now used extensively by medical officers in all districts.

Summary

In this chapter, some general aspects of epidemics have been discussed. Epidemics may occur because of some common circumstances. Epidemics can be classified according to the
nature and length of exposure to the pathogen, the means of spread or propagation, and the duration of the epidemic. Thus four types of epidemics can be differentiated. An outbreak or epidemic will cease following one of four different events described in this chapter.

The process of disease outbreak assessment and control can be divided into three main stages: (1) descriptive enquiries into the facts of the outbreak; (2) analysis of the data collected; (3) formulation of a causal hypothesis and testing its validity in the control of the outbreak.

The organizational context of a Disease Outbreak Management Team can be divided into three parts: (1) Organizational structures; (2) Early warning system, consisting of routine surveillance and active epidemiological surveillance; (3) Contingency Planning.

In the last part of the chapter, the situation in The Netherlands concerning the control of communicable diseases was described, so as to give an example of an organizational context in the western world.
Chapter 3

RESEARCH METHODOLOGY

The method of inquiry on which this study is based is the sample survey. The data were collected in personal interviews. The population of interest and the selection of the sample is discussed first. Next, the questionnaire and the procedure used is presented. Lastly in this chapter, a brief discussion of the plan of analysis is discussed.

The Population of Interest

The existing models for disease outbreak management can be found all over the world. However, the Centers for Disease Control (C.D.C.) in Atlanta, Georgia (U.S.A.) is considered as the leading institute in this field. Therefore, C.D.C.-officers would be a good source of information. In terms of knowledge, the World Health Organization (W.H.O.) in Geneva, Switzerland is a leading source of technical assistance and information in the field of Public Health. Several units in the World Health Organization deal with outbreaks of communicable diseases. Thus, the W.H.O. was a major source of information for this study. Furthermore, the author is working
for this organization, which enhances access to information. Since the author has extensive knowledge of the network in The Netherlands that deals with the control of communicable diseases, this source was used as well.

Selection of the Sample

Twenty-one key officials in (1) the Centers for Disease Control; (2) the World Health Organization; (3) five Public Health Institutions in The Netherlands, were interviewed in April and May 1993. A list of interviewees can be found in Appendix A.

For the Centers for Disease Control, all experts chosen were recommended by at least two other experts already selected, starting with the team that visited Kenya during the Yellow Fever Outbreak. For the World Health Organization, the directors of relevant Divisions were written a letter, asking if they were willing to select one person in the Division who is an expert in the field of Disease Outbreak Management. Those Divisions are: (1) Division of Control of Tropical Diseases; (2) Division of Communicable Diseases; (3) Special programme for research and training in tropical diseases; (4) Epidemiological Surveillance and health situation and trend assessment; (5) Emergency Relief Operations; (6) Division of Environmental Health.

The selection of the experts from The Netherlands was based on a representation of the entire field of communicable disease control. Therefore, two representatives of two
different universities, one representative of a small and one representative of a big Basic Health Facility, and one representative from the National Institute for Public Health and Environment Protection were selected.

Research Instrumentation

Information was gathered in unstructured interviews. Six open-ended questions were presented to each of the respondents during the personal interviews. The questions which dealt with issues related to a Disease Outbreak Management Team were the following:

1. What tasks should a Disease Outbreak Management Team execute?

2. For what diseases should a Disease Outbreak Management Team be installed?

3. What members should a Disease Outbreak Management Team consist of?

4. What kind of ongoing activities should be executed by a Disease Outbreak Management Team?

5. What facilities are needed for a Disease Outbreak Management Team?

6. What budget is needed for a Disease Outbreak Management Team?
Research Procedure

In the Centers for Disease Control case, most staff members were scheduled to attend the Epidemic Intelligence Service Conference from 19 April to 23 April 1993 in Atlanta, Georgia (U.S.A.). With this information and the goal of interviewing as many experts on outbreak management as possible, the author attended this conference. Each interviewee was asked to name other experts in the field. At the end of the week, the list of people named appeared to be fairly consistent and limited. Nobody refused to be interviewed, two experts were not interviewed because of lack of time, and one expert was interviewed very briefly, but was included in the study nevertheless. A total of eight CDC-officers were interviewed.

In the World Health Organization Headquarters in Geneva interviews were held in the week of 26 April to 30 April 1993. With five people, meetings were already arranged by the Directors of the Divisions who were asked to select an expert for the study. Three further experts were interviewed: One colleague who had just finished a two-year assignment in which he had been dealing with (training of staff during) cholera outbreaks in Zambia, and two experts from the Expanded Programme on Immunization. During the interviews it became clear that this Division had been wrongly overlooked in the sample of experts.

In the Netherlands, experts from Amsterdam, Rotterdam,
Bilthoven, Maastricht and Den Helder were interviewed from 3 May to 7 May 1993.

On average, the interviews took one hours time, with the longest lasting one and a half hour, and the shortest twenty-five minutes.

**Plan of Analysis**

The findings of the interviews were integrated to arrive at a description of the most desired framework of disease outbreak management for the Kenyan situation. Integration occurred only when at least two interviewees came up with the same suggestion.

**Summary**

The research methodology used in this study is the sample survey. Data were collected through unstructured interviews. The population of interest were the experts in two leading institutions in the world: Centers for Disease Control and the World Health Organization, as well as experts in The Netherlands. The sampling was different for all three sources of information. A questionnaire was used to gather the information. The analysis used is identification of overlap of opinions on the subjects discussed in the interviews.
Chapter 4
RESEARCH FINDINGS

This chapter presents the findings of the study. The findings touch on various aspects of Disease Outbreak Management. The answers and suggestions to the questions used in the unstructured interviews will be presented here question by question. For each question an overview will be given of the most frequent answers and suggestions.

Tasks that a Disease Outbreak Management Team Should Execute According to the Respondents

There are two major tasks for a Disease Outbreak Management Team:

a. Training of staff.

To ensure sustainability of the program, ongoing training of staff is necessary. This is true for doctors, nurses and public health workers alike. Certification is important, because it increases people's market value once they have successfully completed the course. The course content must
be field oriented, having an emphasis on practice.

b. Providing service.

The main service offered is the control of disease outbreaks. To arrive at a good level, surveillance, and epidemic preparedness are as important as the actual rapid assessment of an outbreak, which usually takes two weeks to execute. A direct telephone line, manned during office hours, should become a focal point for health workers in the field who want to report.

As shown in Table 1, thirteen tasks were suggested for the Disease Outbreak Management Team. The four most often mentioned tasks were: (1) rapid assessment, (2) control of outbreaks, (3) training of staff, and (4) active surveillance.
Table 1. Overview of suggested tasks *) for a Disease Outbreak Management Team

<table>
<thead>
<tr>
<th>Task</th>
<th>Number of times suggested</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid assessment</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>Control of outbreak</td>
<td>18</td>
<td>86</td>
</tr>
<tr>
<td>Training of staff</td>
<td>18</td>
<td>86</td>
</tr>
<tr>
<td>Active Surveillance (weekly by telephone)</td>
<td>16</td>
<td>76</td>
</tr>
<tr>
<td>Reporting of surveillance data</td>
<td>14</td>
<td>67</td>
</tr>
<tr>
<td>Making contingency plans</td>
<td>14</td>
<td>67</td>
</tr>
<tr>
<td>Networking</td>
<td>13</td>
<td>62</td>
</tr>
<tr>
<td>Research and publication</td>
<td>11</td>
<td>52</td>
</tr>
<tr>
<td>Educating policy makers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>on preventive measures</td>
<td>9</td>
<td>43</td>
</tr>
<tr>
<td>Taking precautions</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td>Educating health workers</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>Disaster preparedness</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Isolation of the causative agents</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

*) There were twenty-one respondents, who were free to give more than one suggestion.
Diseases for which a Disease Outbreak Management Team should be installed

Remarkable consistence was obtained in the set of diseases mentioned by the interviewees, who were free to mention as many diseases as they wanted. Table 2 summarizes the interviewee's responses.

Table 2. Overview of suggested diseases *) for which a Disease Outbreak Management Team should be installed.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Number of times suggested</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow Fever</td>
<td>19</td>
<td>90</td>
</tr>
<tr>
<td>Cholera</td>
<td>17</td>
<td>81</td>
</tr>
<tr>
<td>Polio</td>
<td>13</td>
<td>62</td>
</tr>
<tr>
<td>Measles</td>
<td>12</td>
<td>57</td>
</tr>
<tr>
<td>Meningococcal Meningitis</td>
<td>12</td>
<td>57</td>
</tr>
<tr>
<td>Malaria (in virgin areas)</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td>Dysentery</td>
<td>7</td>
<td>33</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Hepatitis E</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Tetanus</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Typhoid Fever</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Rabies</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Pertussis</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

*) There were twenty-one respondents, who were free to give more than one suggestion.
As shown in Table 2, fourteen diseases were mentioned by at least two of the 21 interviewees. The five most often mentioned diseases are: (1) Yellow Fever, (2) Cholera, (3) Poliomyelitis, (4) Measles, and (5) Meningococcal Meningitis.

Some of the respondents indicated that relative importance of a list of diseases on which a Disease Outbreak Management Team should act. They emphasised the fact that a Ministry of Health must see the need for control of a certain type of disease. Looking at different countries in the world where similar services have been set up, it was found that any one disease can serve as a starting point for a systematic approach to a number of infectious disease outbreaks. For example in Mexico, where some 200 staff have been trained in a similar program, a Cholera outbreak was the starting point in the structuring of an organized response to a variety of infectious diseases. The same is true for Zambia, where a Disease Outbreak Management Team has been installed recently.

**Suggested Composition of a Disease Outbreak Management Team**

Apart from local and international training and supervision staff, at least one Kenyan Medical Doctor, preferably with an M.P.H., should take the lead. He or she should be helped by public health nurses and supportive staff (secretariat). Close ties to the Director of Medical Services,
Kenya Expanded Programme on Immunization (KEPI), Health Information Systems (HIS), Kenya Medical Research Institute (KEMRI), and all District Medical Officers of Health are essential for such a team to operate. Table 3 presents the respondents' suggestions on the composition of a Disease Outbreak Management Team.

Table 3. Overview of suggested team composition

<table>
<thead>
<tr>
<th>Team member</th>
<th>Number of times suggested</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Health nurse(s)</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>Local Medical Doctor with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masters of Public Health</td>
<td>19</td>
<td>90</td>
</tr>
<tr>
<td>International staff</td>
<td>17</td>
<td>81</td>
</tr>
<tr>
<td>Secretarial staff</td>
<td>17</td>
<td>81</td>
</tr>
<tr>
<td>Public Health Technician</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td>Clinical Officer</td>
<td>7</td>
<td>33</td>
</tr>
</tbody>
</table>

The respondents mentioned six different types of members who should be part of the Disease Outbreak Management Team. Most often, they suggested: (1) Public Health nurse(s), (2) A Kenyan Medical Doctor with a Masters of Public Health degree, (3) International staff, and (4) Secretarial staff.
Ongoing Activities that should be executed by a Disease Outbreak Management Team

As mentioned before, surveillance, and epidemic preparedness are as important as the actual rapid assessment of an outbreak. Together with HIS, the surveillance of some five to eight diseases should be strengthened to get background information on endemicity. Contingency plans regarding these communicable diseases must be drawn up, involving leading national experts. Keeping in touch with all District Medical Officers of Health is vital to an alert surveillance system. Another asset in this is the feedback on surveillance provided through a bulletin or newsletter aimed at health workers in the field.

Table 4 shows the interviewees' suggested team activities. Many more were given but are not listed, because of the desire to document a consensus opinion.

Table 4. Overview of suggested team activities

<table>
<thead>
<tr>
<th>Team activity</th>
<th>Number of times suggested</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surveillance</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>Making Contingency Plans</td>
<td>14</td>
<td>67</td>
</tr>
<tr>
<td>Networking</td>
<td>13</td>
<td>62</td>
</tr>
<tr>
<td>Providing feedback</td>
<td>11</td>
<td>52</td>
</tr>
<tr>
<td>Research and Publication</td>
<td>3</td>
<td>14</td>
</tr>
</tbody>
</table>
As shown in Table 4, five different activities were suggested by at least two of the interviewees. The three most often mentioned are: (1) Surveillance, (2) Making contingency plans, and (3) Networking.

Facilities needed for a Disease Outbreak Management Team

An office, with office equipment, including direct telephone line (for surveillance), computer, and printer were mentioned most often as the facilities needed for a Disease Outbreak Management Team. Also a vehicle with a driver and a budget for fuel and per diem seems necessary. During an outbreak at local level an interpreter and other necessities should be provided. To speed up rapid assessment, a laptop and portable printer are a prerequisite (see Table 5).
Table 5. Overview of suggested facilities

<table>
<thead>
<tr>
<th>Facility</th>
<th>Number of times suggested</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>Vehicle</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>Office equipment</td>
<td>19</td>
<td>90</td>
</tr>
<tr>
<td>Driver</td>
<td>17</td>
<td>81</td>
</tr>
<tr>
<td>Computer and printer</td>
<td>17</td>
<td>81</td>
</tr>
<tr>
<td>Telephone</td>
<td>16</td>
<td>76</td>
</tr>
<tr>
<td>Fuel</td>
<td>10</td>
<td>48</td>
</tr>
<tr>
<td>Fax</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td>Per diem</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td>Laptop/portable printer</td>
<td>6</td>
<td>29</td>
</tr>
<tr>
<td>Interpreter</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

Budget needed for a Disease Outbreak Management Team

Most of the interviewees were reluctant to answer the question on the magnitude of the budget needed for a Disease Outbreak Management Team precisely. "This depends on how extensive the Ministry of Health wants to set up a disease outbreak management team", was the answer given mostly.
Table 6. Size of the budget needed for a Disease Outbreak Management Team

<table>
<thead>
<tr>
<th>Answer</th>
<th>Number of times suggested</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depends on Ministry of Health</td>
<td>14</td>
<td>67</td>
</tr>
<tr>
<td>Depends on local costs</td>
<td>7</td>
<td>33</td>
</tr>
<tr>
<td>Depends on costs of training</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Depends on number of outbreaks</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

Although these answers are not satisfactory for planning purposes, it is still possible to budget for a Disease Outbreak Management Team. This can be done based on the answers given to question four and five and after making some assumptions. The assumptions should include the need for extra staff, local prices for all the items mentioned, an assumption as to the number of outbreaks per year to be expected, a differentiation between starting up a Disease Outbreak Management Team and the running cost of the team per year, the immediate or delayed linkage to the Centers for Disease Control's network of Field Epidemiology Training Programmes.
Summary

A striking coherence in views held was found among all persons interviewed, with each highlighting different aspects with varying emphasis. The respondents were of the opinion that a Disease Outbreak Management Team should execute a number of tasks: (1) Rapid assessment; (2) Control of outbreaks; (3) Training of staff; (4) Active Surveillance.

The diseases which a Disease Outbreak Management Team should focus on are: (1) Yellow Fever; (2) Cholera; (3) Polio; (4) Measles; (5) Meningococcal Meningitis, and maybe a few more diseases, depending on the local prevailing situation.

Members of the Disease Outbreak Management Team should come from various disciplines: (1) Public Health Nurse; (2) Medical Doctor with a Masters in Public Health; (3) International staff; (4) Secretarial staff.

The suggested ongoing activities for the team are:
(1) Surveillance; (2) Making Contingency Plans;
(3) Networking; (4) Providing feedback

The facilities which should be made available for the Disease Outbreak Management Team are:
(1) Office; (2) Vehicle; (3) Office equipment; (4) Driver;
(5) Computer and printer; (6) Telephone

The required budget for a Disease Outbreak Management Team was not given in precise terms by the interviewed experts. Their answers on this were inprecise, but it is
possible to deduce estimates from the answers given to other questions.
Chapter 5
CONCLUSIONS, DISCUSSION AND
RECOMMENDATIONS FOR FUTURE
RESEARCH

This chapter concludes the study by dealing with two
topics. First, the major findings, implications and
limitations of the study will be considered. Then, some
suggestions for future research will be made.

The findings, implications
and limitations

Twenty-one experts from (1) the Centers for Disease
Control in Atlanta, (2) the World Health Organization
Headquarters in Geneva; (3) public health institutions in The
Netherlands, see great potential in an outbreak management
team in Kenya. Their recommendations are very consistent in
that they advise that the establishment of the team should
start with a small group, closely connected to the Director of
Medical Services and to relevant public health institutions,
with basic office and travel facilities, and a budget that
enables it to do training, surveillance, outbreak management,
and reporting on five to eight communicable diseases.

Limitations

The assumptions held in this study are that by asking a range of experts in the field of Disease Outbreak Management in various Institutions, an independent and comprehensive view can be abstracted regarding a desired organizational framework in Kenya. The sampling method used may have biased the outcome of study, however.

Another limitation of this study is that no Kenyan experts were included in the study. Clearly, during the recent Yellow Fever outbreak, many of them were involved, and many of them will have an experienced opinion on how to set up a Disease Outbreak Management Team. The reason for not including them is this study was purely one of time constraint. However, the findings of this study will be used to start discussions with key officials in Kenya, to arrive at a model which fits the Kenyan situation.

A few shortcomings of the questionnaire used have become apparent during this study. One of them is that question number two and four are too much alike. Another is that the question on the required budget for a Disease Outbreak Management Team should have been more specific. It might have been better to ask the interviewees to tick items on a more structured questionnaire form where all possible requirements and their prices are listed.
Suggestions for Further Research

Given the above mentioned limitation of the study regarding Kenyan experts, the same questionnaire should be used to derive their opinion. For the future, once a Disease Outbreak Management Team has been established, emphasis should be placed on the cost-effectiveness of the interventions of the team during outbreaks.
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REFERENCES CITED


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REFERENCES CONSULTED
REFERENCES CONSULTED


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APPENDICES
APPENDIX A

LIST OF PEOPLE INTERVIEWED
List of consulted staff in alphabetic order.

Dr. J. Clements, WHO/EPI, Geneva
Dr. C. Davis, WHO/EPR, Addis Abeba
Dr. D. Fishbein, CDC, EPO, Atlanta.
Prof. J. Huisman, Erasmus University Rotterdam
Dr. H. Hull, WHO/EPI, Geneva
Dr. J. Leduc, WHO/CDS/MIM, Geneva
Dr. A. Leentvaar, GGD Amsterdam
Dr. B. Maclachlan, CDC, EPO/FETP, Atlanta.
Dr. A. Marfin, CDC, Arbovirology laboratory, Fort Collins
Dr. P. Moore, CDC, Arbovirology laboratory, Fort Collins
Dr. M. White, CDC, EPO/FETP, Philippines
Dr. B. Maclean, CDC, Primatology laboratory, Fort Collins
Dr. I. Op den Kamp, GGD Den Helder
Prof. A. Osterhaus, National Institute of Public Health and Environment Protection, Bilthoven, The Netherlands
Dr. A. Raisin, WHO/GPA, Geneva
Dr. P. Reiter, CDC, Dengue Laboratory, San Juan
Dr. M. Toole, CDC, Medical epidemiologist, CDC, IHPO/TSD, Atlanta
Dr. H. Troedsson, WHO, Zambia
Dr. R. Waldman, WHO/HST/SES, Geneva
Dr. A. de Wit, University of Limburg in Maastricht
Dr. T. Yasukawa, WHO/ERO, Geneva
APPENDIX B

EXPLANATION OF EPIDEMIOLOGICAL TERMS
Eplanation of Epidemiological Terms.

Attack rate

see Incidence rate.

Endemic

(Of a disease) continually present in a given area or community. Endemicity may be low or high, or even evidenced by only a few sporadic cases. An endemic area is the limited zone in which a disease is known to occur constantly.

Epidemic

An epidemic of an infectious or parasitic disease is the occurrence of a number of cases of a disease, known or suspected to be of infectious or parasitic origin, that is unusually large or unexpected for the given place and time. An epidemic often evolves rapidly, so that a quick response is required.

Incidence rate

The incidence rate is one of the disease occurrence rates used in epidemiology to quantify the occurrence of a disease in a population. They are calculated as fractions, in the form: number of cases divided by the number of persons in the
population investigated. In the incidence rate, the numerator is the number of overt cases appearing during a specified period of time; the nature and extent of the population at risk should be defined (denominator).

Outbreak

The occurrence of an epidemic disease at a particular time and place.
APPENDIX C

LIST OF DISEASES WHICH HAVE TO BE REPORTED IN THE NETHERLANDS
List of diseases which have to be reported in the Netherlands

Group A (report immediately):
1. Typhoid Fever
2. Lassa Fever
3. Pest
4. Poliomyelitis anterior acuta
5. Rabies
6. Variola

Group B (report within 24 hours):
1. Anthrax
2. Rotulism
3. Brucelloses
4. Cholera
5. Diphteria
6. Dysenterià bacillaris
7. Febris recurrens
8. Yellow Fever
9. Hepatitis A
10. Hepatitis B
11. Legionella pneumonia
12. Leprosis
13. Leptospirosis
14. Malaria
15. Meningococciosis
16. Morbilli
17. Ornithosis/Psittacosis
18. Paratyfus B
19. Pertussis
20. Q Fever
21. Rubella
22. Scabies
23. Tetanus
24. Trichinosis
25. Tuberculosis
26. Tularemia
27. Typhus exanthematicus
28. Food poisoning and foodborne infections

Group C (anonymously):
1. Sexually transmitted diseases
2. Parotitis epidemica