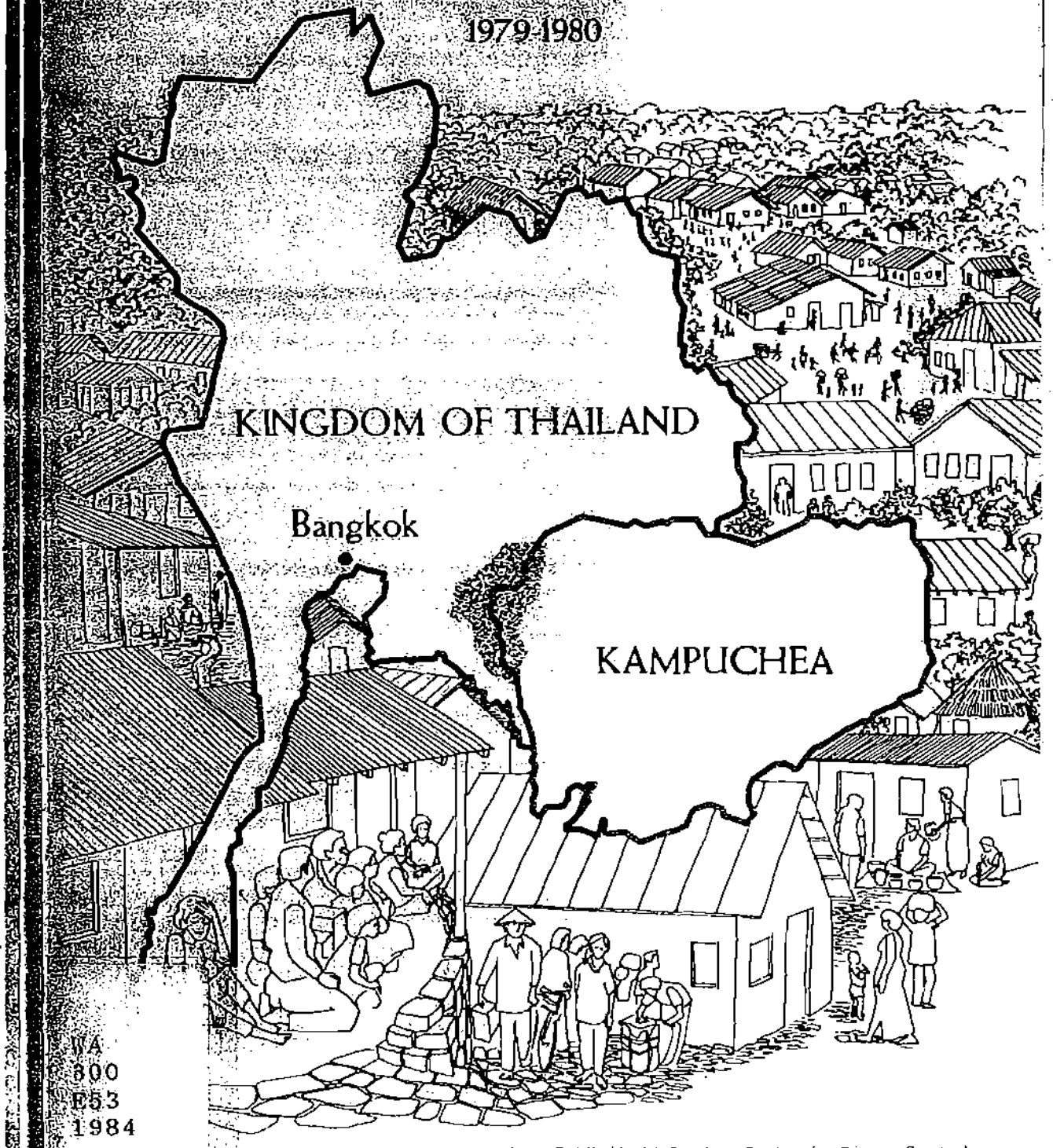
EMERGENCY REFUGEE HEALTH-CARE

— A CHRONICLE OF EXPERIENCE IN THE KHMER ASSISTANCE OPERATION 1979-1980



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Emergency Refugee Health Care—A Chronicle of the Khmer Refugee-Assistance Operation

1979-1980

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This monograph is dedicated to all health workers and organizations involved in refugee health care worldwide.

FOREWORD

Identifying the eause and source of critical epidemic disease outbreaks and determining and monitoring control measures have been essential parts of the Centers for Disease Control (CDC) activities since epidemiologic services became an integral part of CDC in 1949. Support of relief efforts following national and global disasters, however, has been a relatively new application of epidemiologic practice for the health professionals at CDC.

The initial involvement of CDC in large-scale relief was in the context of the major famine and health-care problems of approximately 20 million people directly affected by the 1967-1970 Civil War in Nigeria. Through the aegis of United States Agency for International Development (US-AID), 24 CDC epidemiologists were assigned at various times to serve with the International and Nigerian Red Cross. One of the chief lessons learned in the course of this international relief program was the effeetive application of epidemiology as a management tool for famine relief.

In the same time frame: 1) A damage and needs assessment was carried out following an earthquake in Callejon de Huaylas Province and a devastating avalanche that destroyed the town Yungay in Peru on May 31, 1970. 2) Extensive damage and health-needs assessments were carried out in two helicopter surveys immediately following a disastrous cyclone that struck East Pakistan (now Bangladesh) the night of November 12-13, 1970. Five CDC epidemiologists carried out a more comprehensive survey 2 months later. 3) A CDC survey and surveillanee effort was initiated 16 hours after a major portion of Managua, Nicaragua, was destroyed by the earthquake of December 23, 1972. 4) Four suecessive nutritional surveys based on assessment teehniques originally developed during the Nigerian Civil War were carried out during the massive famine in Sahelian countries in 1973-1975. 5) CDC epidemiologists began conducting a health-needs assessment and detailed surveillanee program the day following a widespread earthquake in Guatemala on February 4, 1976.

More recently, in the period 1978-1980, mortality and morbidity and associated causes were investigated in association with two snowstorms, a devastating tornado, and a severe heatwave in the United States. Another domestic post-disaster intervention carried out by CDC epidemiologists was an 8-month study of the public health implications of several volcanic eruptions of Mt. St. Helens, beginning on May 18, 1980.

The 1979-1982 Khmer Thailand-Kampuchea refugee-relief action—followed by long-term epidemiologic surveillance of refugees in Somalia in

1980-1983 and periodic health and nutritional assessments of Afghan refugees in Pakistan—represents the most comprehensive refugee-assistance program in which CDC has been involved to date. This large international effort involved widespread use of epidemiology and other public health measures in an effort to make famine relief more effective and to help improve the quality of control and prevention measures in general.

The large international relief effort associated with the Nigerian Civil War in 1967-1970 was made more effective by the first organized field use of epidemiologic management of famine control. Although the nature of the events precipitating the crises in Nigeria and Kampuchea varied tremendously, and although the relief efforts occurred many years and many thousands of miles apart, they shared several important characteristics.

- Large numbers of people in fixed camps or on the move searching for food were largely dependent on external aid provided by many organizations and many nations.
- No administrative structure to provide and coordinate assistance of the necessary magnitude existed before the crisis and thus had to be created after the fact.
- Assistance was complicated by the uncertainty associated with military activity, i.e., such direct effects as threatened or actual shelling or attack and such indirect effects as the difficulties involved in passing through roadblocks and coping with other security measures.
- Finally, data that were relatively simple to gather and analyze provided health workers and administrators in both relief programs information needed to plan and monitor assistance.

As in other international rescue efforts, a major goal of the relief efforts in Nigeria and on the Thai-Kampuchean border was identifying and eliminating preventable morbidity and mortality. In order to be most effective, planning for such efforts requires identifying and benefitting from lessons learned in the past, such as characteristic or predictable demographic patterns, health-status indicators most useful for analysis, and avoidable errors of commission or omission. In both relief operations mentioned above, the principles of the surveillance arc (data collection, data analysis, response to data, and assessment of response) and other public health techniques became integral parts of the relief efforts. Retrospective evaluation of these efforts (*1*) has also proven useful.

Perhaps unavoidably, the relief effort during the Nigerian Civil War was not documented in a manner that provided useful information to relief workers in subsequent operations. The report that follows is the result of a conscious decision at the peak of the Khmer assistance operation in Thailand to attempt to discern, present, and analyze the health-related "lessons learned" in a manner useful to workers in similar operations in the future.

Most of the emergency relief assistance efforts carried out by CDC staff members have been supported and encouraged by both the U.S. Government and international agencies—such as US-AID, Refugee Program of the Department of State, Federal Emergency Management Agency, International Committee of the Red Cross, Nigerian, Thai and other national Red Cross Societies, United Nations High Commissioner for Refugees, and the World Health Organization. Our deepest gratitude is extended to all of them.

William H. Foege, M.D.
Assistant Surgeon General
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September 1983

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PREFACE

This report is devoted entirely to health aspects of refugee relief. This is a timely topic, since there has been an enormous increase over the last few years in the number of refugees in the world, and relief organizations have had to expand their activities in many areas. In addition to the Khmer and other refugees in Southeast Asia, large numbers of refugees have been associated with other conflicts in Central America, Asia, and Africa. These expanding refugee populations have major public health and medical problems that need to be addressed.

The 33 contributors to this report are from 11 countries in Asia, Europe, North America, and Australia. All worked in the early days of one of the largest emergency humanitarian relief efforts ever undertaken—the Khmer refugee-relief operation of 1979-1980. The authors represent a variety of medical and public health disciplines, including administration, nutrition, epidemiology, laboratory technology, sanitation, and clinical specialties.

This document is intended to serve as a compendium and chronicle of recent experiences of various health professionals and to extract from these experiences some general principles and lessons that will be of use to health workers in future refugee operations in developing countries. Clearly, the Khmer operation was in many ways unique—rarely in the history of humanitarian relief has there been such an outpouring of money, personnel, and other resources from a concerned international community. The combination of available resources and a cooperative host country (Thailand) enabled the Khmer operation to pursue and achieve goals often impossible in refugee-assistance programs. Despite this unique aspect of the operation, there are many important lessons to be learned from this experience that can be applied in other refugee-assistance programs.

Major components of the report include a historical prospective of the area, the organization of the camps, and specific health problems encountered—and the large area covered by public health practice—societal influences, administrative concerns, and logistics of dealing with large groups of displaced persons.

In the interests of clarity and readability we have tried whenever possible to avoid using medical terminology or the specific jargon of any medical or public health specialty. When technical words or abbreviations are used, an effort has been made to define them or place them in context.

We wish to thank all of the contributors to this report—including the many reviewers. We also wish to express our gratitude to our support staff, including Ms. Martha Jean Giglio, Ms. Susan Arpin, Ms. Betty Sanders, Ms. Edna Jordan, Ms. Kistler Campbell, Ms. Ruth Greenberg, and Ms. Beverly Holland.

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PART I

The Setting and the Health Problems

Chapter 1

Historical Background—The Historical Context of the Khmer Refugee-Assistance Effort in Thailand

Magnus Grabe

Kampuchea (Cambodia) has a rich historical and cultural background, which reached a high point in the period 800-1300 A.D. Signs of this period are still present in such monuments as Angkor Wat, a huge temple in the tropical forest of Kampuchea's lake district. Characterized by a rather low density of population and sandwiched between the large kingdoms of Thailand (Siam) and Vietnam (Annam), the country of the Khmer people has been the scene of numerous wars throughout its history (Figure 1).

Kampuchea was proclaimed independent in 1953 after nearly 100 years of French colonization. Some 10 years of peace under the rule of neutralist Prince Norodom Sihanouk followed, but the country then gradually became increasingly involved in the war in Southeast Asia. In the early 1970s, Kampuchea was the scene of extensive military conflict involving both internal and external factions. This culminated in the April 1975 capture of Phnom Penh by Khmer Rouge (i.e., the Red Khmer) forces who subsequently ruled the country, then called Democratic Kampuchea, for almost 4 years. This group became less allied with and eventually hostile to the Vietnamese who had earlier supported their revolution. The Khmer Rouge became notorious because of their policy of forced evacuation of the urban populations—a policy that was said to be associated with much brutality and loss of life.

The nearly 15 years of intermittent military activity and changing government in Kampuchea led to social and political disruption, inadequate harvests, broken communications, and thousands of homeless people wandering in mosquito-filled rain forests or hiding in rugged mountain terrain. International relief organizations and volunteer agencies, some of them already working in previously established refugee camps in northern Thailand, had offered their assistance to Kampuchea for several years and were available to begin a large-scale relief operation.

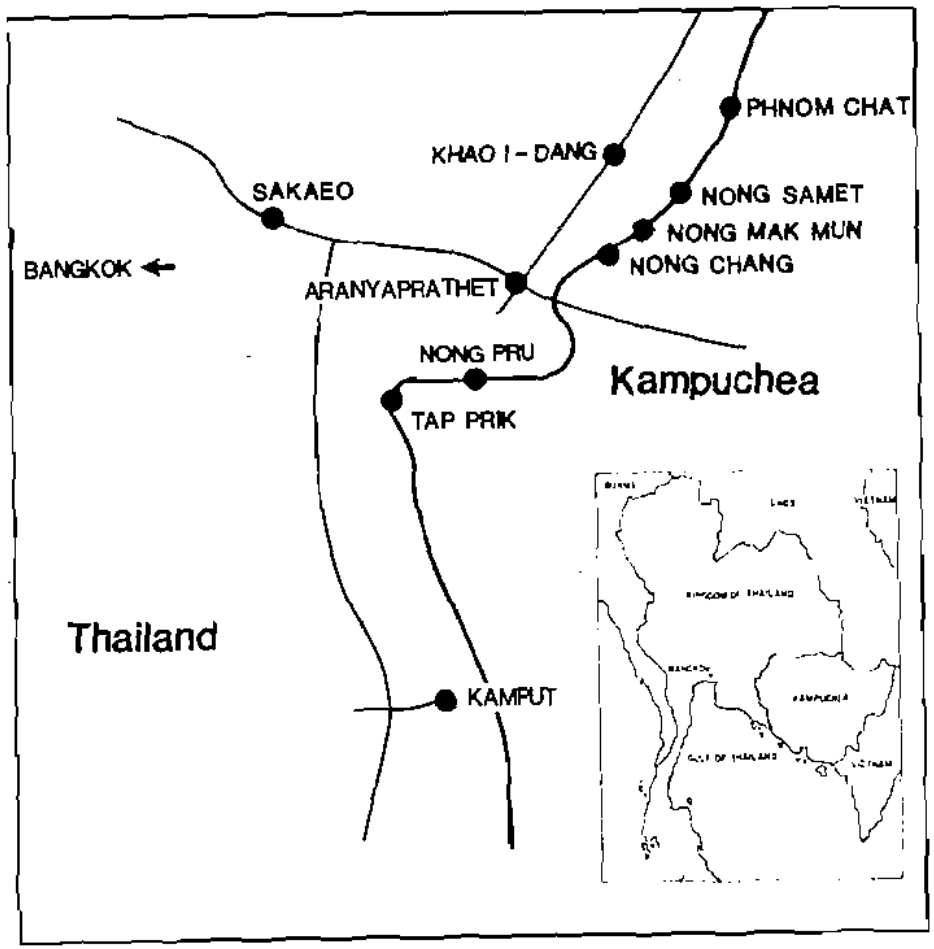

FIGURE 1. Map of Thai-Kampuchean border showing area of major refugee concentrations, 1979-1980

A Vietnamese invasion of Kampuchea in December 1978 was followed by the flight of the Khmer Rouge government from the capital toward western Kampuchea. By the spring of 1979, Kampuchean (Khmer) refugees of various political affiliations had begun arriving in small numbers at holding centers run by the Office of the U.N. High Commissioner for Refugees (UNHCR) in Thailand and in larger numbers at camps on or near the Thai-Kampuchean border (Figure 1). As fighting inside Kampuchea intensified, at the beginning of the dry season—in late October that year—approximately 28,000 refugees were taken from the border to a rice field about 60 kilometers (1 km = 0.62 miles) inside Thailand, which was to become the UNHCR holding center at Sakaeo. A small number of refugees arrived at about the same time at Kamput, another UNHCR holding center in Thailand south of the village of Aranyaprathet.

These two groups of refugees were composed mostly of Khmer Rouge soldiers and their families, and the two holding centers to which they had come were to remain open until December 1982.

A few weeks later, in mid-November 1979, the UNHCR holding center at Khao I-Dang, about 10 kilometers inside Thailand and 30 kilometers north of Arayaprathet, began accepting refugees. This camp, at the foot of a small mountain of the same name, was planned for a population of 300,000 and eventually held a population of 130,000. Many of those people had originally been opponents of, and refugees from, the Khmer Rouge regime that had ruled Kampuchea before the Vietnamese invasion. An unknown—but thought to be larger—number of Kampucheans remained behind in the various border camps that straddled the unmarked and uncertain Thai-Kampuchean border. The tragic picture of exhausted civilians, dying children, crying mothers, and wounded of all ages provided the impetus for spontaneous humanitarian action. Hundreds of doctors, nurses, nutritionists, administrators, engineers, and relief specialists from many countries assembled quickly to help a large displaced population. Despite the enormity of the task and the inherent difficulties involved in coordinating many relief agencies and personnel with different languages, perspectives, and experiences, the relief operation was implemented.

At the request of the Royal Thai Government, the International Committee of the Red Cross (ICRC) took charge of health-care activities and construction in both the Kampuchean holding centers inside Thailand and in camps along the border. The League of Red Cross Societies, a Geneva-based Red Cross umbrella group, arranged for a large number of national Red Cross teams from many countries (including Thailand) to work under the leadership of ICRC to provide such help. In addition, a large number of health workers were provided by the many voluntary agencies working under the loose coordination of the Coordinating Committee for Service to Displaced Persons in Thailand. Issues concerning food, water, and administration were handled by UNHCR within the holding centers and by the United Nations Children's Fund (UNICEF) within border camps. (At almost the same time, UNICEF and other organizations had begun what was to become a major assistance program within Kampuchea.)

The area north and west of Aranyaprathet, where Sakaeo and Khao I-Dang were located and where much of the activity documented in this report took place, is a flat plain characterized primarily by empty rice fields, scrub vegetation, and small groves of trees. There is little, if any, water visible or available during the dry season from September to late April. Although a small amount of water was eventually obtained by drilling at Khao I-Dang, both of these larger holding centers, as well as many of the border camps, remained dependent for water on daily supplies transported in UNHCR trucks. Neither site had particularly good water drainage, which necessitated moving the Sakaeo population to another site when the rainy season began in May 1980.

The border camps south of Aranyaprathet as well as the UNHCR holding center at Kamput, Thailand, were in more densely forested areas and closer to

both standing and running (non-potable) water. In fact, persons coming to these areas were and are at year-round risk from chloroquine-resistant *Plasmodium falciparum* malaria.

As of January 1983, ICRC had withdrawn from all holding center activities except the surgical ward in the hospital at Khao I-Dang, which continued to function as a medical evacuation and referral center for border camp inhabitants. Most health and all feeding activities at the border were provided either by volunteer agencies under the direction of the U.N. Border Relief Organization (UNBRO), which is a U.N. Food and Agriculture Organization umbrella group, or directly by UNBRO itself.

The story of the Khmer refugee-assistance program (October 1979-November 1980) in the chapters that follow provides vivid documentation of some basic principles of refugee-relief efforts and of lessons learned that may be applicable to future assistance programs for natural disasters or large-scale social disruption.

Timetable of Events—Kampuchean Refugee Relief

1953	Kampuchean (Cambodian) independence after many years of European Colonial rule.
1970	Prince Sihanouk leaves power; Lon Nol assumes power.
1975	Khmer Rouge (Red Khmer) defeat government military forces and assume power.
Dec. 1978	Vietnamese invade Kampuchea and eventually capture Phnom Penh (capital). New Kampuchean government assumes power.
Spring 1979	Kampuchean refugees begin crossing into Thailand in large numbers.
Oct. 1979	Large numbers of Kampucheans enter Thailand; Sakaeo (population about 28,000) and Kamput (population about 2,000) holding centers established.
Nov. 1979	Khao I-Dang holding center established.
Spring 1980	Khao I-Dang population peaks at 130,000.
Dec. 1982	Sakaeo and Kamput closed; remaining population transferred to Khao I-Dang (combined population about 57,000).

Chapter 2

Organization of Health-Care Efforts for Khmer Refugees in Thailand

General Administrative Structure

The overall coordination of the relief- and medical-assistance program for Khmer refugees in Thailand was the responsibility of a General Coordination Committee. For all foreign help, a Sub-Committee for Medical Assistance, chaired by the Deputy Under-Secretary of State for Public Health of the Royal Thai Government, was established. Members of this sub-committee included Thai health authorities, the Thai Red Cross Society, and representatives from the ICRC, UNHCR, UNICEF, WFP (World Food Program), and other volunteer agencies.

The Thai Red Cross, the League of Red Cross Societies, and their international administrative structures formed a task force to coordinate health-assistance programs in holding centers and the border area under the direction of the Sub-Committee for Medical Assistance. Volunteer agencies supporting the task force were included in the various activities and were given specific areas of responsibility. As of mid-1981, the relief program in the border area was still in operation under the administrative structure of an advisory board headed by the Border Medical Coordinator.

On the local level, in the centers at Sakaeo, Khao I-Dang, and Kamput, overall administrative responsibility was assumed by the UNHCR, while medical-care programs were coordinated by ICRC and others. During the initial emergency phase, the medical coordinators chaired an advisory board that included representatives of the various health programs. As the situation became more stable and long-term health-care programs began to emerge, the responsibility for coordinating most of the efforts spread to include the private volunteer agencies.

Chapter 3

Organization of Sakaeo Refugee Center, October 1979-January 1980

Hans Nothdurft

On October 24, 1979, the first trueks carrying Khmer refugees arrived at the camp of Sakaeo from the southern Thailand-Kampuchea border area 50 kilometers away. Eight thousand came the first day, 6,000 the second, and another 6,000 on days 3 to 5. Within 8 days, there were approximately 28,000 refugees in Sakaeo.

Initially, the camp was no more than a feneed-off area of bushland with no housing facilities, no water, and no sewage system; approximately 2.7 square meters of space were available for each person. Part of the area was designated for the camp hospital; a bulldozer-cleared field with some bamboo-canvas construction provided primitive shelter for approximately 300 patients. When the first refugees arrived, there were three doctors and eight other health workers with limited resources. Nearly 2,000 severely ill or dying refugees were brought to the hospital area in the first few days.

A few weeks later, the situation had changed considerably. Water, initially brought into the camp by truck, was now provided by two deep wells that supplied a network of pipes throughout the camp. Trench latrines had been installed around the periphery of the camp, and people were taught to use them properly. General sanitation was improved by spraying insecticides, clearing rubbish, and draining stagnant pools of water.

A 1,100-bed hospital was initially set up in large tents and was partially moved some weeks later into more permanent, solid, bamboo-thatch construction with gravel floors and septie tank-type toilets. Separate wards were designated for pediatrics, obstetrics, intensive feeding, contagious diseases, and surgery.

Each ward had about 150 beds and was staffed by doctors and nurses from one of several private volunteer organizations. All hospital admissions were channeled through an admission center, where immediate attention could be given to the emergency cases and where initial patient data were recorded. Four out-patient departments located in the camp area—each staffed by one doctor,

several nurses, interpreters, and other helpers—treated up to 2,500 patients each day. Because of the number of patients with severe anemia (primarily as a result of *Plasmodium falciparum* malaria and undernutrition), a blood bank was set up where typing and cross-matching for transfusion could be performed. In the beginning, blood was drawn from health workers and visitors; later a regular blood supply was provided through the Thai Red Cross. In the first 4 weeks of the camp's operation, more than 500 patients received blood transfusions as a lifesaving measure. Later, a clinical laboratory equipped with several microscopes and basic stains was added and was used for laboratory surveys as well as for technical aid to individual diagnosis. From the beginning, a hospital kitchen supervised by a nutritionist provided up to 2,200 calories/day to hospitalized patients and their relatives.

Four weeks after Sakaeo opened, about 200 volunteer medical workers from 15 different organizations and 20 different countries, not including Thai officials and numerous other local volunteers, were working there. The number of refugees in the camp remained at 28,000.

Organization of Medical Services

By necessity, the medical organization and coordination were characterized in the beginning by day-to-day planning.

A daily meeting was chaired by the medical coordinator. Following the initial emergency phase, an advisory board was formed, including a medical administrator and representatives of public health and epidemiology, hospital wards, out-patient clinics, nutrition, and sanitation. Its daily meetings were chaired by the medical coordinator, and the board was responsible for developing and enforcing the general health policies of the camp.

Press and Visiting Dignitaries

Rarely has human disaster attracted such extraordinary international attention as did these events in Thailand in 1979-1980. Numerous photographers, news representatives, and television camera crews, as well as politicians and dignitaries, came to visit the camp in Sakaeo and wanted to be shown around. It quickly became evident that a camp press officer responsible for providing information would have been very useful and would have saved much time for the medical coordinator.

Individual Volunteers Not Sponsored by an Organization

Many individuals living in or traveling through Thailand came and volunteered to work in the camps. In the beginning they were happily accepted because workers were desperately needed; some worked hard and efficiently, and their enthusiasm and willingness were greatly appreciated. However, many were available for only a few hours a day or for only a few days, which created a training and scheduling problem.

Medical Personnel

The medical personnel involved in this relief program (up to 60 doctors and 170 other medical personnel) represented different nationalities with different languages, cultural values, and medical training. But more important for the actual work in the camp were differences in the practical experience of the teams. Only a few team members had ever worked in a developing country or had seen malaria and severe undernutrition before—the two prevailing problems in the camp. However, these differences in experience and perspective could be overcome by applying enthusiasm and devotion to the work and by placing less-experienced personnel on a team with more seasoned workers.

Almost all of the teams had difficulty in establishing appropriate priorities and in relating to the needs for, and level of, medical care appropriate for a refugee situation. They had to deal with an inherent reluctance "to help many people a little rather than a few people a lot." The repeated calls for x-ray facilities, for more laboratory support, and the preference for expensive drug regimens reflected medical cultural values of developed countries. Few of the staff initially understood that a serious problem would be created if the sophistication of medical services provided to refugees tended to reach a level not previously provided to them or not available to people in neighboring villages. This problem was brought up in discussions among the health workers on several occasions, and gradually staff members began to understand this issue.

Recommendations

- A medical coordinator starting in a new operation must objectively determine the refugees' health status. What diseases are prevalent, and which are life endangering? What is the nutritional status, and which groups of the population are most at risk? What quantity and quality of personnel, equipment, and supplies are available for the relief effort? Objective answers can improve the effective use of limited resources.
- From the beginning of a program associated with chaotic circumstances, the medical coordinator must help create and stimulate a reporting and data collecting system on which future decisions can be based. The daily reports should at least document the actual number of personnel as well as the number of out-patients, in-patients, hospital admissions and discharges, and deaths in and out of the hospital. The medical teams should also be asked for weekly statistics on the most common diagnoses. In addition, the medical coordinator has to ensure that any special or unusual medical events are reported immediately.
- In a major operation when medical teams from different organizations and of different nationalities are involved, it is important to have regular meetings with representatives of all teams in order to exchange information. These meetings should be used more for presenting information and planning the general health-care strategy in the camp than for discussing specific cases of illness.
- The refugees themselves should be involved whenever possible in the planning and decision-making processes.

Chapter 4

Organization of Khao I-Dang Center, November 1979-January 1980

Magnus Grabe

Khao I-Dang went from being a green, uninhabited plain to being a city of 112,000 people in 10 weeks (November 21, 1979, through the end of January 1980), with an average of 1,650 arrivals a day (range: 76 to 7,770). The international relief agencies had 4 days to plan for the first refugee arrivals; to build the first shelters, warehouses, roads, latrines, and medical facilities; and to assure provision of food, water, drugs, and technical supplies. UNHCR assumed responsibility for general coordination of the refugee center, and the ICRC was responsible for coordinating medical assistance with teams from the Thai Red Cross Society, other national Red Cross societies, and various private volunteer organizations. Within a few days, the first medical facilities were built, water containers were placed, a kitchen was established, medical supplies and drugs were delivered, health screening of the arriving population was planned, and preliminary information on the arriving population was obtained. At the same time, medical teams that had arrived in Thailand as a result of the international response to the Khmer refugee problem were given their initial assignments and were sent out from Bangkok.

The Settlement Characteristics

Khao I-Dang was built during the dry season in a savannah area between a hill and the road leading north from Aranyaprathet, approximately 15 kilometers by road from the border area where several hundred thousand refugees had settled in hastily constructed shelters.

Provision of adequate food and water was a major logistical problem. Water was brought in each day by trucks from supply areas 1-2 hours away (10-15 liters/person/day in the camp and 50-60 liters/hospitalized patient/day). Because local resources and food storage facilities were limited, food had to be shipped from other areas. Fortunately, Thailand had abundant resources of food, water, and building supplies, as well as of trained health, construction,

and administrative workers. Also, the presence at Khao I-Dang of a large number of refugees with education and experience in administration, health, teaching, or technical skills reduced the language problems and allowed early involvement of refugees in all fields of activities.

Health Care in Khao I-Dang

Initial reports indicated that within a period of days, or perhaps a few weeks, several hundred thousand Khmer refugees would come over the border to Khao I-Dang. Since refugees were to be brought to the camp in trucks and buses, a very simple health-screening system could be implemented at the point of entry into the camp. Refugees were given a basic initial medical evaluation (e.g., nutritional status and need for hospitalization), and simple preventive health measures were applied (e.g., measles vaccination for the ≤ 5 year olds). The screening system was a valuable source of basic information on the health status of the population. The screening activities are described in detail in Chapter 8. Some days only one or two screening teams were needed, and other days up to eight or 10 teams.

Screening was continued on a permanent basis in the out-patient departments. One was located in each section of about 10,000-12,000 persons and was staffed by one doctor, three to four nurses, one midwife, interpreters, and other staff. The out-patient departments were built near the supplementary-feeding centers in order to provide complete primary health centers.

By the end of January 1980, about 2 months after the camp opened, the health system was well-established, and there had been a significant reduction in illness and death:

- 111,672 persons had been screened on arrival. Of these, 1.8% were transferred directly to the hospital; 3,082 pregnant women had ante-natal screening.
- The mortality rate fell from 8.3 deaths/100,000/refugees/day to 2.3/100,000/day. The hospitalization rate also fell from 19.2/1,000 refugees to 11.2/1,000. Approximatively 600 children were born in the camp in this period, and the birth rate remained constant at about 0.9/1,000 refugee inhabitants/day. Almost all children ≤5 years old were vaccinated against measles, and further vaccination campaigns were planned.
- Each of eight out-patient departments treated up to 4,000 patients/day (40% new visits, 50% ongoing treatments, 10% maternal and child health).
- Two hospital areas with 17 functioning wards were completed: four pediatric wards, including one intensive feeding center; two wards for gynecology and obstetrics; two surgical wards, including an admission and emergency center; one tuberculosis center; and eight general medicine wards. In addition, there was a surgical unit with two operating rooms containing four operating tables, and there were two hospital kitchens, a warehouse, a laboratory, and an x-ray room. Each ward housed 70-120 patients, and the maximal capacity of the entire facility was about 1,800 beds. An excess number of beds was intentionally made available so that hospital services could be expanded rapidly in case of a sudden large influx of refugees or of a large number of war casualties. In mid-January 1980, the month of peak influx, the maximum hospital census was 1,290, representing 11.7 patients/1,000 inhabitants in the camp.
- Five hundred and twenty operations were performed: 422 (81%) procedures were emergency surgery, including 162 (38%) for war wounds. From equipment and supplies donated by the French ship *Ile de le Lumiere*, a fully equipped operating suite was constructed and in place within 4 weeks. The unit could handle up to 20-25 major emergency operations each day.

Press and Foreign Visitors

During this period, as they had at Sakaeo, reporters, photographers, television crews, and even camera-wielding sightseers rushed to Khao I-Dang. Although the news media play an important positive role in such emergency situations by providing accurate information and by mobilizing moral and financial support for the relief organizations, extensive media involvement can present a hindrance to a relief operation. For example: a) By focusing only on the dramatic and the heroic, news reports give a distorted picture of the situation to the outside world. b) The constant demand for information, pictures, and interviews directed at health workers can make it difficult for them to perform the duties they have been assigned. c) Photographing refugees without obtaining their permission creates confusion and is likely to be perceived by the refugees as demeaning.

Rumors

Rumors concerning issues such as the movement of refugees, future military action, diseases in the camp, and crimes circulated constantly at Khao I-Dang. They often required serious consideration and investigation. For example, a sudden outbreak of nausea and vomiting in the camp was accompanied by a rumor that the food was being poisoned. In fact, a rapid (< 24 hours) epidemiologic investigation showed that a plant growing near the camp that some of the refugees had picked and eaten had made many of them ill. Informing the refugee community of this fact and warning the refugees not to eat the plant resulted in a prompt cessation of the outbreak and that particular rumor.

Safety

Physical safety of refugees and of volunteer health workers was a matter of deep concern. A contingency evacuation plan was agreed upon by the participating organizations. Although warnings were repeated frequently, there was a feeling among senior officials that volunteer health workers did not take security matters seriously enough.

It was suggested that, in case of military activity close to the Khao I-Dang camp, volunteers from the Red Cross National Society teams would take on the

following tasks inside the area protected by the Red Cross emblem (in accordance with the Geneva Conventions):

- save lives of wounded and sick persons who had a chance of survival;
- maintain minimum services on the medical wards, focusing attention particularly on the pediatric and obstetric wards;
- conduct simple epidemiologic surveillance inside the camp to avoid outbreaks of preventable disease.

This plan required the participation of surgical teams and of a few internists or pediatricians trained in epidemiology and community health.

In case of an attack on the camp itself, all staff were to be evacuated.

Recommendations

- In emergency humanitarian activities (i.e., medical; provision of food, water, and shelter; and tracing of families), workers should be recruited on the basis of their qualifications and not simply because they volunteer. Inexperienced people should certainly be encouraged to participate, but only if they can work effectively in a needed task area under the supervision of more experienced staff. Amateurism and a desire for adventure can be distracting for other staff and, more importantly, dangerous for staff and refugees.
- All work should be carried out while adhering to the concept of respect for the refugees and humanitarian ideals in general.
- Personal interests should not be allowed to conflict with the interests of the refugees. Creativity and flexibility are the two most important characteristics needed. The humanitarian worker, in dealing with medical as well as political, military, social, and psychological problems under changing conditions, should be recruited according to strict guidelines, and should then receive comprebensive training.
- Although news agencies and the stories they transmit can be of considerable value for any relief operation, representatives of the news media, and indeed all visitors, must uphold the same humanitarian standards expected of relief workers—including respect for the dignity of the population being served.

Chapter 5

The Border Camps—Health Assistance in Khmer Refugee Camps under Less Stable Conditions

U. Engzell, J. Cobey

At the beginning of the relief action of 1979-1980, medical assistance and coordination along the border were assigned to the Red Cross by the Thai Government. The border area north and south of the Thai village of Aranyaprathet had become a temporary haven for refugees from all provinces of Kampuchea, and camps of various sizes grew up along the border, with movement in and out of Kampuchea despite the military situation.

The Khmer Rouge were grouped in small camps south of Aranyaprathet just inside Kampuchea. On or near the border north of the town, there were three large camps and a few small camps of Khmer Serai or Moulinaka (i.e., supporters of Prince Sihanouk). Each camp had its own defense force armed with light weapons. The entire Thai border area was under martial law; the Kampuchean side of the border was considered a war zone.

An estimated 250,000-500,000 Khmer sought refuge in the border area, including an unknown number in camps inside Kampuchea in areas too hazardous to allow direct assistance to be provided. Access to the border camps was limited in terms of both personnel and supplies. Security and personal safety were a source of constant anxiety. Census data, necessary in providing useful health analyses, were difficult and in some cases impossible to obtain.

In late 1979 and early 1980, many refugees in the border camps were moved into the somewhat more secure environment of the Sakaeo and Khao I-Dang holding centers, which were clearly within Thailand. Beginning in February 1980, Thai authorities permitted only wounded or severely ill patients to be transferred from the border to the holding centers. But because these restrictions often resulted in family separations, many such patients refused to be transferred.

By the end of 1979, a large number of medical volunteers had come to Thailand in response to a worldwide call for assistance. In a 3-month period, the number of medical personnel serving on the border grew from a handful to about 150. Medical teams sent to the border camps usually included a doctor,

four or five nurses, and a technician or administrator. In many cases, a team worked as a unit in running a ward, or a stationary or mobile clinic. Some team members with different skills helped direct sanitation efforts, construction, or public health programs. English, the official working language, was not always clearly understood by some team members. This caused a number of misunderstandings, injured feelings, and occasional security problems.

Medical Coordination Activities along the Border

Medical work along the border was directed by a board headed by the border medical coordinator, who was stationed in Aranyaprathet. He was directly responsible to the sub-delegation head of the Red Cross and to the ICRC Chief Medical Coordinator in Bangkok. One camp medical coordinator was responsible for the medical work in each of the larger border camps. This organization seemed appropriate because of the large medical staff and because operating each camp involved different needs and problems. Coordinators met each evening with representatives of the various health specialities (i.e., epidemiology, nutrition, pharmacy) and of participating volunteer agencies.

Medical activities were concentrated in 10 camps scattered along the border about 50 kilometers north and south of Aranyaprathet. The border medical coordinator maintained an overall view of the health situation in the area and in conjunction with the individual camp coordinators was in the position to make decisions affecting the security of foreign workers and the health of the refugees. In conjunction with the coordination board and the sub-delegation, the duties and responsibilities of the border coordinator were as follows:

- To organize the daily medical activities along the border. This was accomplished by frequent visits to the camps and by the evening coordination meetings.
- To allocate the teams and specialists in the border area. Medical assistance needs changed constantly; new teams were arriving on a 3-months' rotation scheme. Accurate prediction of future human resources and material needs was often impossible.
- To brief, advise, and inform medical personnel and visitors. It was essential to brief new teams on the current situation, standard operating procedures, the security system, and the working conditions. Frequently, high-ranking visitors from donor countries and journalists had to be briefed and given on-site inspections of the camps. For information and consultation purposes, there was a weekly general meeting with all medical personnel and regular meetings with all team leaders.
- To negotiate with local authorities, United Nations organizations, volunteer agencies, and other involved groups. Close contact was maintained with the Thai military authorities; meetings with other groups were also arranged as needed.
- To make surveys and plans for future activities in close cooperation with all parties involved.

- To cooperate with the medical coordinators of the camps inside Thailand, especially in arranging for transport of sick and wounded refugees to the larger and better-equipped camps inside Thailand.
- To carefully monitor the military situation so that no medical team was sent into a camp where military action was occurring or was imminent.

Camp Medical Coordinators

In large camps with populations of >50,000 that had large medical staffs, it was necessary to have a medical coordinator who was familiar with the overall situation in the camp. Coordination initially involved assessing the needs of the population and working with local leaders in allocating the resources and volunteer help to areas where the most assistance was needed. The unstable political and military situation and the lack of information about the future of the camps made long-range planning (e.g., for the construction of clinics, hospitals, sanitary facilities, and water supplies) extremely difficult. Occasionally, just when camps appeared to be stable and construction was in progress, they would be destroyed as a result of military action.

The intent of the refugee-relief program in Thailand was to supply medical care to counteract the effects of war and famine—not to provide a higher level of medical care than would have been available to the Khmer in peacetime. It was often difficult to convince Western-trained health workers of this fundamental principle. Great efforts were made to develop teaching programs for the Khmer, to assist in the camps with public health services, and to develop a sanitation program. The continuity of these programs was interrupted many times by sporadic military action. The teams worked in the camps by day; when the security situation deteriorated, as often happened, some or all of the teams had to be withdrawn from a camp for hours or even days.

Security and Personal Safety

One of the major coordination issues related to security and personal safety. Little could be offered to refugees in this area other than providing staff from the participating agencies as witnesses to the everyday occurrences. Efforts to protect the refugees were made and, when Vietnamese refugees appeared in increasing numbers in the camps, special precautions had to be taken to protect these refugees from the Khmer in the camps.

In every camp, the medical areas were clearly marked with Red Cross emblems. However, these areas could not be considered safe even when protective trenches were available close by all hospitals and clinics, because of sporadic fighting and long-distance shelling. The policy, therefore, was to evacuate all relief workers when there was an immediate threat of attack in order not to jeopardize lives unnecessarily.

The concern over security for the health workers was very real. At times workers had to enter the trenches when there was small-arms fire overhead. Each camp coordinator had to know the location of all personnel so that each person could be accounted for at the end of the day or warned when shelling

started in an area of the camp. Using a network of portable radios, all clinics, mobile teams, and hospitals maintained radio contact with the coordinator and headquarters. Public health activities such as epidemiologic surveys, vaccination campaigns, and sanitation work were sometimes hampered by an inadequate supply of radios and by the prohibition of moving around the camps when fighting was occurring or was imminent.

Maintaining discipline among relief workers of many nationalities was difficult and was complicated by many false alarms. In an already stressful situation of providing security for personnel of cooperating groups, other volunteers and foreigners would often appear unannounced in the camps. This greatly complicated security matters, because without precise information on the number, identity, or whereabouts of these individuals and groups, little could be done to warn them of impending military activity or provide a means of evaeuating them in an emergency. Fortunately, no relief worker was killed or even seriously injured in military action along the border.

Traffie on the roads leading to the camps also posed a hazard. Strict rules and regulations were issued, but traffic accidents involving relief workers oceurred; at least one relief worker was killed in such an accident. Experiences from this program and similar programs in other areas of armed conflicts show that traffic tends to be extremely hazardous and often represents a greater danger than military action for international workers.

When several agencies are supplying medical personnel in a potential eombat zone, one agency must be appointed as the overall coordinating body assigned with the responsibility for the safety of all foreign workers. No group should be allowed to operate in such an area without the full knowledge and consent of the coordinating organization. The camp eoordinators need to be experienced in working in areas of conflict.

Conclusions

Health-assistance programs in temporary refugee eamps in an area of political and military instability involve special problems in the way of coordination and planning.

Firm control of the action is necessary, and the relief workers taking part must understand the importance of strict discipline. The camp coordinators, who have a broad overview of the entire situation and access to information not available to individual medical workers, must determine what constitutes a security risk. The camp coordinators should be responsible for the safety of the relief workers.

Before any relief program is begun, reliable surveys and a census are essential to the process of determining as precisely as possible the needs of the population to be served. A badly planned medical program with an inexperienced medical staff might be more detrimental than no medical assistance at all. The medical relief program must be integrated in an overall relief program encompassing the basic needs of food, sanitation, and shelter. Every effort must be made to set public health as a medical priority integrated with curative medicine on a low level of sophistication.

When conditions are unstable, coordination of the medical work must bc flexible and open-minded, and the responsible individuals must carefully follow developments on a day-to-day basis. Medical teams must be relocated or kept on alert, and plans to handle extensive military activity must be made. Priorities have to be constantly reassessed in order to utilize the medical staff efficiently in giving assistance where it is most needed.

The importance of having accurate and timely information cannot be overemphasized. A good relationship with civil and military authorities is essential in providing security for foreign workers and in facilitating the medical work. Concern for the safety of local inhabitants and the refugees and respect for their culture and religion are prerequisites for a successful operation.

In a large program with medical staff from various countries with different backgrounds, education, language, and eultural attitudes, there are always individual problems that can adversely affect coordination efforts. Before relief workers leave their home country, they should be given a thorough briefing on the situations they are likely to encounter and on what will be expected of them. In the field, care must be taken to assign thc teams and individuals to appropriate positions, and relief workers must always be kept informed of the progress and problems associated with the program. If this is properly done, a common goal of effective humanitarian assistance to needy people in difficult circumstances can unite the relief workers, and their morale can be maintained even when they must work near areas of armed conflict.

Chapter 6

The Role of the Thai Red Cross Society in Providing Health Care to Khmer Refugees, 1979-1981

Wong. Snidvongs

From the beginning of the influx of Khmer refugees into Thailand in the middle of 1979, the Thai Red Cross Society was heavily involved in providing health care for these refugees. Before October 1979, the small number of Khmer who arrived at Aranyaprathet were given food, temporary shelter, and medical care with the assistance of the staff from the Thai Red Cross Health Center Number 6. The six nurses who staffed this center were eventully to be joined by personnel from the Relief Division in Bangkok.

A major Thai Red Cross Society commitment to the Khmer refugee-relief program began in May 1979, when almost 2,000 ill and starving refugees crossed the border at Kao Larn. Her Majesty the Queen, as the Thai Red Cross Society's President, immediately ordered assistance to be given, and the Thai Red Cross Refugee Camp at Kao Larn was established. The Thai Red Cross Society provided dental and medical teams on a rotational basis as well as financial assistance and food. Apart from basic assistance, the refugees in Kao Larn were provided with health-education, vocational, and other training programs. Unaccompanied minors were cared for by volunteers and by some Buddhist nuns.

The Thai Red Cross Society's Commitments

Medical Personnel. With the arrival of large numbers of refugees in October 1979, more medical personnel were recruited through cooperation with the Faculty of Medicine, Chulalongkorn University. Teams members for this emergency period included one physician, one surgeon, one assistant surgeon, one anesthetist, one anesthetist assistant, nine nurses, four helpers, and two drivers. Each team was equipped with medical and surgical supplies and had its own transport in the form of converted pickup vans.

A general appeal was also made for volunteers—from other faculties of medi-

cine, from government hospitals, and from medical personnel in the private sector—to join the relief operation. Finally, temporary staff for the Relief Division were employed in order to release permanent staff for field duties.

Medical Responsibilities. Concurrent with the refugee-relief operation, the Thai Red Cross Society distributed supplies and provided medical assistance to the affected Thai border population. Mobile medical teams, operating in cooperation and coordination with the Thai military and provincial authorities, visited villages, distributed relief supplies, and treated patients. In addition, a special budget was provided for the seven provinces bordering on Kampuchea to help the local Thai population affected by the nearby fighting.

- Wards—From the beginning of this relief operation, the Thai Red Cross Society fielded teams responsible for medical and surgical wards in the refugee centers at Sakaeo (two wards), Khao I-Dang (one ward), Kamput (one surgical ward), and Kao Larn (one ward). By the end of September 1980, 7,587 patients had been cared for in these wards by 60 medical teams (each team on 10-day rotation because of Thai Government regulations regarding an annual 10-day vacation allowance). During this same period, more than 530,000 outpatients were treated by Thai Red Cross Society medical teams deployed in the refugee Centers of Sakaeo, Khao-I Dang, Kamput, and Kao Larn, and in the border camps near Aranyaprathet.
- Medical, surgical, and other relief supplies—Each medical team from the Thai Red Cross Society had its own basic medical supplies that were replenished continuously by the Relief Division, Bangkok. The Relief Division also helped provide supplies to the Sakaeo pharmacy and later to the Aranyaprathet pharmacy. Eventually, personnel from the Relief Division assumed responsibility from ICRC for managing the pharmacy and supplying the three UNHCR holding centers at Sakaeo, Khao I-Dang, and Kamput, plus three smaller camps. Most relief supplies represented donations from abroad; the rest were purchased from the fund provided by international agencies, the Thai Red Cross, or from the Thai Red Cross Society's own budget.

Logistical Support. Deployment of so many medical teams in the field (up to 14 teams and 112 people at the height of activity in January 1980) required substantial logistical support. The Red Cross Task Force set up a liaison office in December 1979; one of its functions was to provide logistical support for the medical teams, including recruiting and deploying teams to refugee centers under the direction of a senior relief division coordinator. Housing, meals, and transportation also had to be arranged. Evacuation plans were worked out in cooperation with military and provincial authorities.

Interaction with Other International Agencies

The Thai Red Cross Society was a member of the Red Cross Task Force, which met each week to discuss problems and to initiate policies. The Thai Red Cross Society was also represented in the Subcommittee for Medical Assistance to Khmer Refugees by the Deputy Under Secretary of State for Public Health of the Royal Thai Government. Members of this Subcommittee included representatives from ICRC, UNHCR, and other United Nations and volunteer agencies. Finally the Thai Red Cross Society was and continues to be a member of the Committee for Coordination of Services to Displaced Persons in Thailand (CCSDPT), which coordinates and directs the activities of all voluntary agencies.

Policy and Trends for the Future

As the front-line national organization operating in Khmer relief, the Thai Red Cross Society must maintain its presence or representation in most of the activities of a refugee-relief program. However, adjustments have had to be made because of the nature of the problem and because of commitments to the Thai people. Plans for the future have included: a gradual phasing out of long-term, non-emergency commitments in order to prepare for emergency situations; development of more university support for medical assistance in relief operations; acting in an advisory capacity on public health activities, sanitation, and preventive and tropical medicine for volunteer medical personnel; expansion, intensification, and cooperation with other agencies in tracing activities.

At the beginning of 1981, the Thai Red Cross Society began moving toward more involvement and cooperation with individual agencies in small-scale development projects for Thai border population. Reorganization, development, and expansion of the Society will mean diversification of its activities and future training and development of personnel. This will enable the contemporary Thai Red Cross Society to better serve the people of Thailand and the needs of refugee populations within its borders.

Editorial Commentary

The Thai Red Cross Society was involved in Khmer refuee relief efforts well before the major refugee influx in October 1979. When that influx began, the Society continued its important role as a provider of direct aid and, in addition, assisted in the coordination of the many international and voluntary agencies participating in the relief effort. Throughout this entire period, the Thai Red Cross Society remained true to the humanitarian Red Cross tradition, acting as an effective advocate for the refugees.

Chapter 7

Patterns of Illness and Death among Khmer Refugees in Thailand, October 1979-April 1980

Phillip Nieburg

Distinct changes in patterns of illness were noted in the first 5 1/2 months of the intensive refugee-assistance efforts along the Thai-Kampuchean border between mid-October 1979 and late March 1980 (Table 1). Nearly all of the data used by the health workers and agencies to set priorities in this operation depended on the existence of a reasonably accurate census, the importance of which cannot be overemphasized. Census data—which in their simplest form include total numbers, age (in broad but standardized groupings: <1 month, 1-11 months, 1-4 years, 5-14 years, 15-44 years, ≥ 45 years), sex, and, in some cases, ethnic grouping—are necessary to determine rates* at which disease occurs. In addition, knowledge of the population structure can be helpful in predicting the likelihood of future problems. For instance, the data on age groups that became available within the first few days after the opening of the Khao I-Dang camp provided the basis for predicting that a major vaccination program for children <5 years old would be necessary to prevent outbreaks of potentially serious vaccine-preventable diseases such as measles. They were also useful in predicting the number of vaccine doses needed to confer protection to persons in high-risk age groups.

The data that follow deal mainly with the Sakaeo and Khao I-Dang camps. The problems at Kamput were similar to to those at Sakaeo, except that malaria was a relatively greater problem at Kamput, and there were fewer refugee children at Kamput. The border camps are not dealt with in this section because the rapidly shifting population hindered the understanding of changing patterns of disease in those places.

The patterns of growth of Sakaeo and Khao I-Dang differed. The 28,000 people at Sakaeo all arrived within a few days, overwhelming for a short time

*The term "rate," used elsewhere in these articles to refer to the numbers of events per 1,000 people, or per other multiple of 10, is the most useful way to compare the magnitude of problems for population groups of different sizes.

TABLE 1. Sociopolitical and health data, Sakaeo and Khao I-Dang, November 1979-February 1980

Category of classification	Sakaeo	Khao I-Dang
Major political group	Khmer Rouge	Khmer Serai
Community organization	Para-military	Elected leaders
Population (1 February)	28,000	112,000
0-4 years (%)	(7)	(10)
≥45 years (%)	(6)	(12)
Initial death rate (deaths/1,000 refugees/day)	1.05	0.16
Deaths outside hospital (%)	(56-0)	(0)
Neonatal death rate	170/1,000 births	50/1,000 births
Mean birth weight	2,510 gm	2,810 gm
Initial *Plasmodium falciparum* prevalence (%)	(39)	(4)
Undernourished children (<80% weight/height) (%)	12	6

the meager health resources available on site and in Bangkok. In contrast, Khao I-Dang grew at a rapid but controlled pace from mid-November to 129,000 refugees by late February. Although the numbers were large, the controlled growth at this latter camp enabled the organizations responsible for assistance there to expand their operations much more efficiently than was possible at Sakaeo.

Specific Patterns of Illness and Death

Deaths. At Sakaeo, the initial death rate was very high. The numbers of deaths fell relatively quickly (Figure 2), until by mid-December 1979 the mortality rate was no higher than expected for a Khmer population under normal circumstances. The rate remained low into the spring of 1980.

Initially, most deaths at Sakaeo were caused by one or more of four major problems: malaria, undernutrition, pneumonia, and/or diarrhea. The death rates associated with each of these four problems fell rapidly early in the period described above, although the number of deaths from malaria fell less rapidly than did the others—numbers and causes of death for the beginning and the end of this period are shown in Table 2.

The expected pattern of higher death rates for the oldest (≥45 years) and youngest (0-4 years) members of the groups of refugees was seen at Sakaeo. Although the rates for all age groups fell in the period November 1979-April 1980, refugees in the oldest and youngest groups continued to have higher death rates than did persons in the intermediate age groups (Table 3).

Many of the initial deaths at Sakaeo did not occur in the hospital. Only after daily searches of the huts for sick people intensified were relatively more of these refugees identified and transferred to receive the care they needed. Unlike the deaths at Sakaeo, out-of-hospital deaths were never a major problem at Khao I-Dang.

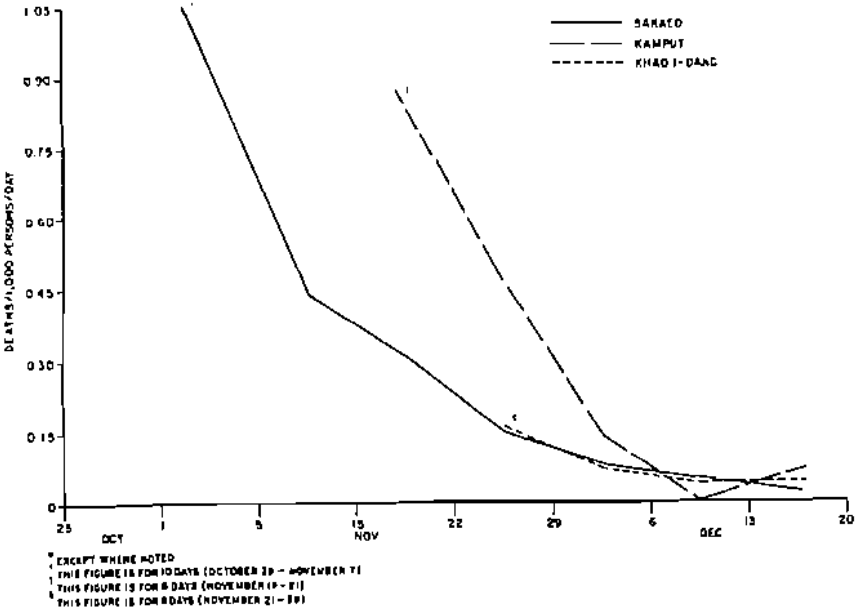

FIGURE 2. Crude mortality rates, by 7-day periods, Sakaeo, Kamput, Khao I-Dang, October 28-December 19, 1979

TABLE 2. Deaths by primary diagnosis in two time intervals, Sakaeo, November 8, 1979-April 2, 1980

Diagnosis	8 Nov. 79-9 Jan. 80	31 Jan. 80-2 April 80	Percentage decrease*
Malaria	46	9	80.4
Pneumonia	29	2	93.1
Undernutrition	23	0	100.0
Diarrhea/dehydration	17	0	100.0
Meningitis	6	2	66.7
Tuberculosis	3	0	100.0
Other	94	15	84.0
Total	**218**	**28**	**87.2**

*No significant population change occurred between these two intervals.

TABLE 3. Death rates* by age group, Sakaeo, November 8, 1979-April 2, 1980

Age group (years)	8 Nov.-30 Jan.	31 Jan.-20 Feb.	21 Feb.-12 Mar.	13 Mar.-2 Apr.
0-4	38.4	7.7	11.8	1.9
5-14	6.6	0.0	0.0	0.7
15-44	5.4	1.2	0.2	0.6
≥45	27.3	5.4	5.4	5.4
All ages	9.2	1.6	1.2	0.9

*Numbers represent deaths/10,000 persons/week in each age group.

At least in part because of the severe undernutrition of the refugees (including pregnant women) at Sakaeo, the initial neonatal mortality rate was very high (Table 1). As the overall mortality rate fell, so did that for neonates.

Death rates at Khao I-Dang never reached the levels seen at Sakaeo (Table 1), although the major causes of death (fever/malaria, undernutrition, pneumonia, diarrhea) were the same. Death rates associated with each of these causes decreased with time. In addition, premature birth/low birth weight was a major cause of death in the early days of the camp. Malaria, however, never assumed the same importance as a cause of death in this camp that it did at Sakaeo. As described in the article on malaria (Chapter 9), this difference probably resulted from different exposures to malaria on different routes of travel to Thailand.

Although overall death rates were lower at Khao I-Dang, the pattern of higher death rates for the oldest and youngest members of the community, as observed at Sakaeo, also applied at Khao I-Dang. Again, although overall rates and rates for each age group fell over time, the highest mortality rates continued to be for the oldest and youngest.

Hospital Admissions. At Sakaeo, which opened in late October 1979, relatively more of the refugees were ill than at Khao I-Dang, and the hospital admission rate remained high at the former camp until the end of January 1980. Initially, for instance, at Sakaeo there were approximately 100 admissions each day (equivalent to a rate of about 3/1,000 persons/day). By the end of March, admissions had fallen to about 60/day (equivalent to 0.8 admissions/1,000 persons/day). Again, this decrease reflected the greatly improved health and nutritional status of the population.

At Khao I-Dang, which opened in mid-November 1979, there were 562 hospital admissions in the first 3 weeks of the camp's existence, a rate of 3.8 admissions/1,000 persons/day. This rapidly fell to a rate of <1 admission/1,000 persons/day by January of 1980. It should be noted, however, that because of the rapid growth in the size of the camp's population, there was for a time an increase in the actual numbers of patients admitted to the hospital in Khao I-Dang. For example, nearly 2,000 persons were admitted in the last 3 weeks of January, but once the camp was closed to new arrivals at (i.e., the end of January), the number of hospital admissions fell even further.

In both camps, the pattern for admission diagnosis was similar to that for cause of death. For example, at Sakaeo, malaria, pneumonia, diarrhea, undernutrition, and tuberculosis accounted for most hospital admissions. Although the number of patients admitted with each of these diagnoses fell between November 1979 and April 1980, these same diagnoses continued to account for most admissions. At Khao I-Dang, the numbers differed slightly. Whereas malaria, pneumonia, diarrhea, and undernutrition were again the major causes for admission, surgical patients were also a major admission group at this camp—reflecting the use of this hospital as a back-up for persons wounded in border fighting. As with the pattern at Sakaeo, numbers of and rates for persons admitted with each of these diagnoses fell with time, although, again in parallel with Sakaeo, the same diagnoses plus surgery continued to be the major reasons for hospital admission. One exception to this pattern occurred during a measles outbreak in the first months of 1980 when nearly 700 children with measles were admitted to the hospital within a few weeks.

At both camps and again in parallel with the risk of death, the admission rates were highest for the youngest and oldest refugees. Because there were so few very young (<5 years) and old (≥ 45) refugees at Sakaeo, these age groups represented only a small proportion of the total hospital admissions.

Out-Patient Visits. At Sakaeo, although nearly 29,000 out-patient visits occurred in the first week of November, the number fell to about 10,000/week by mid-December, and it continued to fall until it was $<6{,}000$/week by late March. In the later months, approximately 1,000 visits/week represented "new" out-patients, i.e., persons were coming in with a new complaint as opposed to being followed up for an existing problem. In Khao I-Dang, rates of out-patient visits were, at all times, lower than those at Sakaeo. However, the much larger number of people at Khao I-Dang meant that the actual numbers of visits were similar to those at Sakaeo. For instance, out-patient visits peaked at about 2,000/day at Khao I-Dang. This tapered off by the end of March 1980 to about 1,100 visits/day. In both camps, the major causes for out-patient visits were, in order, upper respiratory infection, diarrhea, fever or suspected malaria, and anemia. This is similar to the pattern seen in other refugee situations and in almost any developing country.

Discussion

Several aspects of the above data are important. First, although initially more of the refugees at Sakaeo were sick than those at Khao I-Dang, the overall patterns in the two camps were similar. In both, the oldest and youngest refugees were at highest risk of dying and/or being admitted to the hospital. In both camps, infant mortality was initially high and fell as adequate nutrition was reestablished. In both camps, death rates fell first, followed by hospital admission rates, followed by out-patient visit rates.

The rapid decrease in the death rate at Sakaeo (to within the expected range by mid-December 1979, 7 weeks after the camp opened) suggests that by that time the "emergency" phase was over. Although many deaths were prevented through the use of antibiotics, transfusions, and skilled nursing care, many others were probably prevented merely by the timely provision of safe water, shelter, and food.

Available information on refugee health-care assistance suggests that the general changes in the patterns seen above occur in most refugee-relief programs, but that the specific health problems may differ in different parts of the world. These changes in patterns of illness were not unexpected and were caused by a number of factors. For instance, at the Khao I-Dang camp, the population increase (0 to 119,000) that occurred from mid-November 1979 to mid-February 1980 was associated with an increase in numbers of ill persons needing health care in that camp. Another factor was the increase in number of health workers arriving to work in various camps; this resulted in larger numbers of refugees having access to treatment for various illnesses and perhaps led to a more rapid reduction in cases of disease. One other significant factor was that the refugees in the camp became healthier. Their nutritional intake and status improved markedly over this period; they benefitted from a number of prevention programs (e.g., adequate water supply, sanitation, vaccination, supplementary feeding). Finally, marked reduction in the incidence of endemic disease (such as malaria) or epidemic disease (such as measles, poliomyelitis, and meningococcal disease) occurred during this time.

Chapter 8

Rapid Assessment of Health Status an Preventive Medicine Needs of Newly Arrive Kampuchean Refugees, Sakaeo, Thailand

Roger Glass, Phillip Nieburg, Willard Cates, Jr.
Cornelia Davis, Susan Peel, Hans Nothdurft, Richard Turnbul

Although epidemiologic techniques have proved valuable in retrospective evaluations of health services in disaster relief, they have seldom been used prospectively (*1*). Surveillance, i.e., the collection and analysis of data with appropriate response, has often been initiated after an acute-emergency phase has passed. Thus, such health programs have often been founded more on rumor than on fact, and limited health resources have been inefficiently or inappropriately used.

In the disaster relief program for the Kampuchean refugees in Thailand, epidemiologic techniques were incorporated into the health-planning process in the 2-week period in which refugees began arriving. Epidemiologists collected and analyzed data in order to assess rapidly the health status and preventive medicine needs of the Kampuchean refugees. The findings not only influenced health care in the first refugee camp but also affected the delivery of medical services in camps established later.

Background

In October 1979, the government of Thailand agreed to give refuge to the Khmer population displaced by the war in Democratic Kampuchea. Reports of poor health and many deaths among the estimated 600,000 Kampucheans along the Thai border led the United Nations and others to provide food, shelter, and medical relief.

On October 24, an estimated 28,000 Kampuchean refugees crossed the border into Thailand and camped in a 33-acre field near Sakaeo. When they arrived, they were given food, cooking utensils, and shelter. A 1,050-bed field

*This article has been adapted with permission from a paper published in *The Lancet* (*2*).

hospital was built, staffed, and administered the ICRC and a number of volunteer agencies.

Within a week after the first refugees arrived, epidemiologists began to identify the principal causes of death and severe illness so that the need for public health interventions (e.g., mass treatment for malaria) could be assessed. They were also asked to identify specific problems in the delivery of health care and to implement programs to improve the health of the refugees. In this section, the activities at the Sakaeo camp in the period November 4-December 12, 1979, are summarized (*2*).

Facilities

Selection of Campsite. Sakaeo has a moderate climate with little rain. The camp site is located near a main highway leading to Bangkok and is accessible to electric power. The refugees were initially crowded into a small area (average 2.7 square meters/person), but in December 1979 the camp was enlarged.

Water, Sanitation, and Vector Control. Water was initially carried by truck to the camp and stored in aluminum drums. Three deep wells drilled during the second week of operation were eventually connected via a network of pipes to distribute water throughout the camp. A trench latrine was dug around the periphery of the camp. The Thai provincial health authorities provided insect control by draining stagnant water and spraying insecticides.

Hospital Services. A hospital, set up originally in large tents, was moved to 10 wards in roofed structures with bamboo framework and gravel floors. One ward each was designated for acute undernutrition, obstetrics, and pediatrics; the others were for general medical problems. Each ward had 100-150 beds and was staffed by physicians and nurses from the same volunteer agency. At the beginning of the second week, an admission ward was set up to allow criteria for admission to be applied more uniformly and to ensure that prompt attention was given to true emergencies. This ward maintained a log in which were recorded the name, age, sex, and diagnosis of each patient admitted. A record card for each patient included identifying information, diagnosis, treatment, and laboratory information. During the second and third weeks of operation, three outpatient clinics were set up in the camp; each was staffed by a physician, nurses, and interpreters.

A blood bank was set up during the second week to type and cross-match blood for transfusion. On November 9, a clinical laboratory was added, with bacteriology testing provided by the provincial health department laboratory.

Surveillance and Findings

Mortality. Burial data collected from Thai health authorities indicated that 54% of the 281 deaths in the camp between October 28 and November 5 did not occur in the hospital (Table 4). In order to ensure that severely ill persons in the camp were identified and properly treated, a tent-by-tent search for patients requiring admission to hospital was begun on November 6; many new patients were identified in this manner.

TABLE 4. Age-specific mortality rates at Sakaeo, October 28-December 5, 1979

Age group (years)	Estimated population	Deaths/10,000 refugees/day* Oct. 28-Nov. 7 (Number)	Nov. 8-14 (Number)	Nov. 15-21 (Number)	Nov. 22-28 (Number)	Nov. 29-Dec. 5 (Number)
≤1	1,200		10.7 (9)	8.0 (5)	4.9 (4)	4.8 (4)
1-4	1,500		7.6 (8)	4.8 (5)	3.7 (3)	0.0 (0)
5-14	7,900	(145)	2.0 (11)	2.1 (12)	0.2 (1)	0.0 (0)
15-44	19,100		2.2 (29)	1.0 (13)	0.7 (9)	0.3 (4)
≥45	2,200		3.2 (5)	7.1 (11)	3.9 (6)	3.2 (5)
Unknown	–	(175)	(23)	(14)	(8)	(2)
Total	**31,900**	**9.1 (320)**	**3.8 (86)**	**2.7 (60)**	**1.3 (29)**	**0.7 (16)**

*Out-of-hospital deaths.

On November 7, a registry of all hospital deaths was begun; data included age, sex, and diagnosis. The crude death rate for the total population during the first 5 weeks of the disease surveillance effort fell from 9.1 to 0.7 deaths/10,000 population/day (Table 4). Children <1 year and adults >44 years were at greatest risk of death. The sex-specific rates were reviewed for the first 3 weeks; for women the relative risk of death was 1.7 times that for men (95% confidence interval 1.1-2.4). The prime causes of death in the hospital in the first week were fever/malaria and undernutrition (Table 5). Numbers of deaths from undernutrition, diarrhea, and pneumonia fell each week during the first month. Prematurity was consistently listed as the cause of death for a minority of persons during this period.

TABLE 5. Primary causes of death among in-patients, Sakaeo field hospital, November 8-December 5, 1979

Diagnosis	Nov. 8-14	Nov. 15-21	Nov. 22-28	Nov. 29-Dec. 6	Total
Fever/malaria	19	8	7	4	38
Pneumonia	10	13	3	0	26
Undernutrition	13	6	0	1	20
Diarrhea	7	4	4	1	16
Prematurity	4	3	2	2	11
Other	9	12	7	5	33
Total	**62**	**46**	**23**	**13**	**144**

Morbidity. The chief physician of each ward submitted data on hospital admissions, discharges, and bed occupancy to the medical director at a daily meeting. The logbook of the admitting team was surveyed daily for four diagnoses—fever/malaria, undernutrition, pneumonia, and diarrhea; meningitis and anemia were added later. The daily number of out-patient visits was recorded, but initially no attempt was made to classify the chief complaints of these patients.

The Sakaeo field hospital averaged 1,042 (± 104) in-patients and 89 (± 29) new admissions/day in the first month. Throughout the first month, the number of hospital admissions, the hospital occupancy rate, and the number of out-patient clinic visits did not decline, and approximately 13% of all the camp's population were seeing a doctor or nurse each day. Fever/malaria, pneumonia, anemia, and undernutrition were the most common conditions leading to hospital admission (Table 6). An outbreak of meningococcal meningitis identified on November 8 and confirmed through spinal-fluid culture several days later led to the inclusion of meningitis on the surveillance record and to a separate investigation of that outbreak. No other acute-disease outbreaks were identified through the morbidity registry during the first month.

TABLE 6. Primary causes of admission, Sakaeo field hospital, November 11-December 6, 1979

Diagnosis	Nov. 11-14	Nov. 15-21	Nov. 22-28	Nov. 29-Dec. 5	Dec. 6-12
Fever/malaria	112	150	304	306	317
Pneumonia	63	52	60	49	47
Undernutrition	24	67	23	27	21
Diarrhea	20	21	20	13	20
Meningitis	20	10	3	0	0
Anemia	28	41	43	45	47
Other	23	173	133	172	205
Total	**290**	**514**	**586**	**612**	**657**

Community Survey. The second week a survey was conducted to evaluate the need for specific health interventions in the refugee community (*3*). From a map of the camp, 11 of the 15 residential blocks were selected at random. A landmark was identified on the edge of each of these blocks, and occupants of the six-to-eight tents closest to this landmark were included in the survey. The age and sex of each person who had slept under each tent the previous night were recorded. Children <110 cm tall were weighed and examined by a physician, who looked for signs of vitamin deficiency and other medical problems; people who needed medical attention were treated or referred to the hospital.

Anthropometric information was analyzed as a percentage of the median reference weight for height. This measure was chosen because it is independent

TABLE 7. Age and sex of systematic sample of Kampuchean refugees, Sakaeo, November 8, 1979

Age (years)	Male	Female	Total	Percentage
<1	9	3	12	4
1-4	10	5	15	5
5-9	12	19	31	10
10-14	24	24	48	15
15-24	54	68	122	38
25-34	19	24	43	13
35-44	12	14	26	8
45-54	6	6	12	4
≥55	5	5	10	3
Total	**151**	**168**	**319**	**100**

of the child's age, relatively easy to use, and sensitive to recent food deprivation (*4-5*). Every fourth person was tested for malaria with thick and thin blood smears, asked about recent use of antimalarial drugs, and checked by a physician for splenomegaly and fever. Smears were made and read by a senior technician from the malaria unit at the Armed Forces Research Institute of Medical Sciences in Bangkok. Because of the small number of children examined in the survey, a physician and two nurses also weighed, measured, and examined a larger but non-representative sample group of children who were housed in adjacent tents or were bystanders at the time the survey was being conducted.

There were relatively few older adults and children <5 years in the population (Table 7). Of the 41 children <110 cm tall included in the survey who were available for the anthropometric measurement, only four (10%) were <80% of the reference median weight for height (Table 8); 24 (18%) of the non-representative sample of 136 children were also undernourished by these criteria. None of the children in either sample had clinical evidence of vitamin deficiencies.

Thirty of the 80 people examined for malaria had either gametocytes alone (10) or ring forms with or without gametocytes (20) on their thick smears; thin smears showed that all isolates were *Plasmodium falciparum* except one (*P. vivax*). Although nearly a third of those tested had already been given a fixed-combination tablet of pyrimethamine and sulfadoxine (Fansidar), the smear results for this group were not significantly different from those for persons who had not been treated. Only six people in the entire group had palpable spleens; two of these had negative smears, two had only gametocytes, and two had gametocytes with ring forms. Fever was a significant predictor of positive malaria smears; nine of 20 patients with ring forms were found to have fever, as were seven of 10 with gametocytes alone and nine of 41 with negative smears ($p < 0.05$).

TABLE 8. Nutritional status of children 50-110 cm tall, from representative and non-representative samples, Sakaeo, November 1979

Percentage of median weight for height		Samples*			
		Representative (n=41)		Non-representative (n=136)	
110		7		19	
90		18		52	
80		12		41	
70	Under-nourished	3	10%	21	18%
60		1		3	

*The difference in the percentage undernourished in the two samples is not significant.

Laboratory Surveillance. Logbooks in the laboratory were monitored for the results of sputum examinations for acid-fast baeilli, stool examinations for parasites, cerebrospinal-fluid (CSF) examinations for cells and organisms, malaria smears, and typing and cross-matching of blood used for transfusions. Because of limitations in the number of specimens that could be processed each day, wards were asked to submit sputum specimens only from patients who had had cough and fever for >2 weeks, stools from patients admitted with severe or bloody diarrhea, and blood from patients either severely anemic (type and cross-mateh) or with complications of malaria (e.g., cerebral malaria); the CSF of all patients admitted with meningitis was examined.

During the third and fourth weeks the camp was in operation, 236 sputum specimens from in-patients with a history of chronic cough and fever were examined for acid-fast bacilli; 54 (23%) were positive, indicating the presence of tuberculosis. In the same period, 63 stool specimens from in-patients with severe or bloody diarrhea were cultured at the local health department and examined for parasites. Nine (14%) smears examined contained *Entamoeba histolytica*, and six (10%) had hookworm (*Ankylostoma*) ova. Ova of *Ascaris* (2), *Strongyloides* (2), and *Enterobius* (1) were also identified.

In the first 5 weeks, >500 patients received blood transfusions. *P. falciparum* malaria and undernutrition were apparently the primary causes of severe anemia; chloramphenicol, the most commonly prescribed antibiotic, may have delayed the return of a normal number of red cells for many anemic patients (*6*). No glucose-6-phosphate-dehydrogenase deficieney or hemoglobinopathy (thalassemia or hemoglobin E), known to occur in the Kampuchean population, was identified in these surveys.

Discussion

The rapid collection and analysis of basic medical information early in the refugee-relief program influenced health planning at Sakaeo and at the newer refugee camps of Kamput and Khao I-Dang. The epidemiologic approach at Sakaeo was directed at identifying medical priorities and assessing the usefulness of specific health interventions. The results of the surveillance system were made available to the medical coordinator so that appropriate action could be taken. A fortnightly surveillance report was distributed to keep those providing health services informed of existing surveillance activities, important findings, and interventions in the camp.

The close relationship between surveillance and timely health-intervention measures is partially reflected by the decline in the mortality rate. Registration of all deaths in the camp showed that initially a large percentage of people who died had not sought medical attention. This led to an intensification of the tent-by-tent seareh for severely ill persons at Sakaeo and to a recommendation to hospitalize all severely ill refugees when they entered the newer camps. Within days of the tent-by-tent search, the percentage of out-of-hospital deaths fell significantly. Review of the death register revealed the rapid deeline in mortality rates and a decrease in the number of deaths from undernutrition and malaria. Although little could be done immediately to reduee the number of deaths associated with prematurity, a prenatal clinie was organized to provide supplementary feedings and antenatal care for pregnant women at Sakaeo; in the newer camp at Khao I-Dang, all pregnant women were enrolled at a prenatal clinic when they entered the camp (*7*).

Surveillanee for meningitis began when the first suspected case of meningococcal meningitis was diagnosed (see Chapter 13). After 10 days, the outbreak had subsided; only two eases werc diagnosed in the following 2-week period. No apparent outbreaks of diarrheal illness, typhoid, or cholera were noted in the camp. This negative information was useful in assessing water quality, sanitation, and the personal hygiene of the people. The data also supported the decision not to give eholera and typhoid vaecines.

The absenee of vitamin deficiencies obviated the need for an immediate supplementation program. The representative and non-representative samples in the community survey identified only two children who required intensive supplemental feeding. All ehildren in the representative sample who were below 80% of the reference median weight-for-height were already receiving supplementary food. This suggested that the most severely undernourished children had been identified and admitted to the hospital in the first week the camp was open.

P. falciparum malaria or fever was identified as the most prevalent health problem of the refugees—i.e., the major cause of death and/or admission to hospital. The organism was present in 38% of the refugees tested. Since a third of this group had already been treated with antimalarial drugs and 13% of the camp's population were seeing a physician or nurse daily, the logistical difficulties of treating the population *en masse* initially seemed to be greater than allowing them to seek attention through already-established channels. As out-patient

services at Sakaeo improved, a policy for malaria screening was planned in coordination with the malaria team from the Thai Ministry of Health. For new camps, mass treatment of newly arriving Kampuchean refugees with Fansidar was recommended (*8*).

Tuberculosis was a potential problem at Sakaeo when the camp opened, but uncertainties about how long the refugees would remain at Sakaeo and early limitations in hospital space and laboratory support initially dictated that diagnosis of and treatment for tuberculosis not be given high priority. When the laboratory was opened, resources allowed staff to begin screening in-patients with symptoms most characteristic of tuberculosis—i.e., chronic cough (>2 weeks) and fever. Within a few weeks, 236 patients had been screened, and more than 50 sputum-positive cases of tuberculosis identified. A ward was set aside to treat such patients with the three-drug regimen recommended by the Thai Red Cross. Further screening was done in the out-patient department, and children <12 years (including neonates) were given vaccine. With the guidance of the Thai Ministry of Public Health and the help of Khmer workers recruited from among the refugees, an extensive out-patient tuberculosis prevention/control program was initiated. A program to screen and treat the large refugee population arriving in Thailand was planned by representatives of the Thai Ministry of Public Health and the Thai Red Cross.

At Sakaeo, as in other disasters (*9*), blood transfusions sometimes made the difference between life and death. Both *P. falciparum* malaria and undernutrition had led to a high prevalence of severe anemia, and a large number of these refugees needed transfusions. Separate efforts by the Siriraj Hospital, Bangkok, led to the provision of blood from volunteers during the first month the camp was open.

The use of surveillance at Sakaeo allowed rapid development of health measures directed at eliminating preventable causes of death and severe illness (*10*).

Chapter 9

Malaria among Newly Arrived Refugees in Thailand, 1979-1980

Eugene S. Hurwitz

Background: Malaria in Thailand and Kampuchea

Malaria is a major health problem in Southeast Asia, particularly in areas where there has been a disruption in control (prevention) programs. Since Kampuchea experienced such disruption before Khmer refugees began arriving at the Thai-Kampuchean border in late October 1979, it was anticipated that these people would have a malaria problem.

Thai provincial health officers and the Thai Malaria Eradication Program provided valuable information concerning the epidemiology of malaria in Thailand and in the specific regions in which the refugee camps were located. *P. falciparum* and *P. vivax* are widespread in both Thailand and Kampuchea, varying in intensity from low endemicity in the plains to high endemicity in the forested foothills. *P. malariae* rarely causes human disease in Thailand and Kampuchea.

P. falciparum malaria causes substantial mortality. Prompt and effective treatment is essential to prevent death from its common complications including cerebral malaria, disseminated intravascular coagulation, hemolysis and severe anemia, renal failure, and pulmonary edema. Patients who receive partial treatment or who are semi-immune may have recurring clinical symptoms and/or parasitemia. Such a recurrence is usually less severe than the primary infection but may still be life-threatening.

Widespread resistance of *P. falciparum* malaria to cholorquine (for many years, the drug of choice) has existed for a number of years in most countries in Southeast Asia, including Kampuchea and Thailand. In recent years, alternative drugs for prophylaxis and treatment—usually combinations of pyrimethamine and a sulfa drug—have been introduced. The most commonly used therapeutic is a fixed combination of pyrimethamine and sulfadoxine (Fansidar).

P. vivax malaria is a serious disease, although not usually a life-threatening disease. Clinical symptoms and parasitemia may recur periodically for several years following the initial *P. vivax* infection.

The peak period for malaria transmission in Thailand and Kampuchea is the rainy season (June through November). No mosquito species capable of transmitting malaria were identified at Sakaeo in studies conducted by Thai officials in November 1979, which supports the thesis that little or no dry-season malaria transmission occurs in the areas in which Sakaeo and Khao I-Dang are located. However, at Kamput one of the primary mosquito vectors (*Anopheles minimus*) is present—and presumed to cause infection—throughout the year.

Case Definition and Data Sources

A diagnostic category of "fever/malaria" was used in surveillance efforts to include febrile patients with clinically suspected or smear-confirmed malaria. Because of limited personnel and diagnostic equipment (including microscopes), blood-smear confirmation of malaria infection could not be obtained for all patients with fever/malaria. Blood-smear surveys were conducted to determine the prevalence of various malaria species and to develop specific recommendations for prophylaxis and treatment of hospital and clinic patients and the general refugee population. Data from hospital and out-patient department surveillance were used to assess and monitor malaria-related illness and death among refugees in each camp.

Initial Assessment. Initial assessment efforts in all three camps focused on defining the incidence of malaria-related morbidity and mortality using available surveillance data and determining the parasitemia rate and species prevalence of malaria in the general population.

At Sakaeo and Kamput, hospital-based surveillance data documented fever/malaria as the leading cause of illness (as measured by rates of hospitalization) and death. At Khao I-Dang, few deaths or hospitalizations were attributed to fever/malaria throughout the reporting period.

Blood-smear surveys demonstrated a high parasitemia rate among randomly selected people at Sakaeo, where 25% (±10%) of those tested had evidence of *P. falciparum* infection, and at Kamput, where 49% (±5%) of those tested had evidence of such infection (Table 9). In contrast, at Khao I-Dang, initial screening detected only four *P. falciparum* infections and four *P. vivax* infections among 100 persons tested.

TABLE 9. Results of initial malaria parasitemia surveys, Sakaeo, Kamput, and Khao I-Dang, November 1979

Camp	Number tested	Number positive* P.f.†	Number positive* P.v.§	Percentage positive* P.f.†	Percentage positive* P.v.§	Confidence limits
Sakaeo Nov. 9	80	20	0 (±9.5)	25	0	(15.5-34.5)
Kamput Nov. 23-30	371	182	0 (±5.3)	49	0	(44.0-54.1)
Khao I-Dang Nov. 25	100	4	4 (±3.8)	4	4	(0.2-7.84)

*Ring forms present. †*P. falciparum*. §*P. vivax*.

At Kamput, all resident refugees and new arrivals were given Fansidar in a mass treatment campaign. This was logistically possible because of the small size of this camp (approximately 2,200 people) and because it had been fully staffed since shortly after it opened. At Sakaeo, a camp of 28,000, initial efforts focused on identification and hospitalization of patients thought to have malaria, rather than on any mass treatment campaign. Because of the apparent low rate of illness and death from malaria at Khao I-Dang, no major efforts were focused on malaria management there. Refugees with suspected malaria were treated routinely in the out-patient department or the hospital as they sought medical attention through these established channels.

Out-Patient Department Malaria Survey (Sakaeo). Approximately 6 weeks after Sakaeo opened, a survey in two of its out-patient departments established that more than 80% of the patients seen each day (representing 5%-10% of the total camp population) had clinical symptoms consistent with malaria. Malaria smears from 92 consecutive patients with fever (temperature of ≥38°C) or with a recent history of fever were examined (Table 10). Eighty-nine percent of these smears were positive, compared with approximately 25% of those from an earlier random sample of the population. This survey was interpreted to mean that fever alone was a useful screen for malaria infection among out-patients at Sakaeo.* A recommendation was made to treat for malaria all febrile patients or patients complaining of fever.

TABLE 10. Out-patient department smear survey for malaria, Sakaeo, December 1979

Smears	Number (%)
Positive results	
P. falciparum	67 (73)
P. vivax	5 (5)
P. malariae	2 (2)
Mixed results	
P. falciparum and *P. vivax*	7 (8)
P. vivax and *P. malariae*	1 (1)
Negative results	10 (11)
Total patients	92 (100)

Ongoing Monitoring of Malaria

Surveillance. The number of deaths attributable to malaria declined at Kamput and Sakaeo in the first several weeks the camps were open, paralleling an observed decline in overall mortality. However, fever/malaria remained a significant problem at both camps during this period, since malaria-related hospital admissions did not decrease as did admissions for other causes. At Sakaeo, there was no decline in daily out-patient visits for malaria or suspected malaria during this period.

*Editorial Note: This conclusion may have been unwarranted. A control group of out-patients without fever could have been surveyed for parasitemia to determine whether the group with fever had malaria more often than those without fever. In this instance, fever was probably a sensitive but not very specific indicator of parasitemia. Whether malaria was the cause of fever is not known.

Follow-Up Surveys. At Sakaeo in early December 1979, 40 non-ill persons attending a supplementary-feeding center had blood smears; 12 (30%) had *P. falciparum* parasitemia, and six (15%) had *P. vivax* parasitemia. A similar rate (35%) for *P. falciparum* was also found in a study of 135 Khmer teenage girls that was conducted by the Thai malaria team. Between December 19 and 23, in a random community survey of 286 refugees who were being resettled in a new area of Sakaeo, 53 (19%) had smears positive for *P. falciparum*; no *P. vivax* infections were identified.

At Kamput, a survey of 1,299 refugees conducted by the Thai malaria team in December showed that 23% (±2.3%) had *P. falciparum* parasitemia. All refugees at Kamput received a second dose of Fansidar in mid-December after this survey.

At both Sakaeo and Kamput, a large number of patients treated for malaria had recurring fever 1-2 weeks after treatment, some patients continued to have fever despite therapy, and smears obtained from some treated patients remained positive for *P. falciparum*.

Studies of Drug Efficacy. A series of patients who were seen at the Sakaeo outpatient department with fever and were subsequently shown to have *P. falciparum* parasitemia on blood-smear examination were studied for drug efficacy. Patients were given Fansidar under medical observation and were hospitalized for 7 days; during this time blood-smear examinations were conducted twice each day. The study was terminated after only nine patients were entered, because Fansidar did not cure any of them. This indicated that resistance to Fansidar was present at Sakaeo, prompting additional studies there and at Kamput (where resistance was also documented) to determine drug regimens that would be effective against Fansidar-resistant strains of *P. falciparum*. These studies led to the documentation of apparently widespread Fansidar resistance, which had not previously been observed in Southeast Asia.

Studies were conducted to compare the efficacy of drug combinations in curing *P. falciparum* infections at Kamput 12 months after Khmer refugees initially entered Thailand. Quinine, administered for 7 or 10 days, produced initial clearance of parasitemia in over 90% of patients, but did not permit recrudescence of parasitemia in 30% of patients. When quinine was combined with Fansidar or tetracycline, the cure rate improved. Approximately 20% of patients given only Fansidar experienced a recrudescence. The tetracycline combination, however, cured 100% of 54 treated patients.*

These results identified a highly effective therapeutic regimen for *P. falciparum* malaria among Khmer refugees: quinine and tetracycline administered over a 7-day period. Implementation of this regimen met with obstaeles, particularly poor compliance associated with a number of adverse reactions to quinine.

*Editorial Note: Ineffective therapy, e.g., Fansidar alone, may well limit malaria mortality without affecting morbidity or parasitemia rates.

Malaria incidence at Sakaeo decreased to very low levels during the 1980 rainy season; no transmission of malaria was documented. Despite an effective drug regimen, transmission of both *P. falciparum* and *P. vivax* malaria reached epidemic levels at Kamput in the period September-November 1980.

Discussion

The high prevalence of malaria and associated illness and death among refugees at Sakaeo and Kamput was thought to result from these persons being exposed to malaria while fleeing to the border. The Khmer brought to all three camps originally lived in or near the central valley of Kampuchea, where malaria is hypo-endemic (i.e., there is little or no malaria transmission year-round). Therefore, most were probably susceptible to malaria when they left this area. The refugees who came to Khao I-Dang took a northerly route, remaining in the hypo-endemic central valley; malaria was a relatively minor problem in this group. In contrast, the refugees at Sakaeo and Kamput had traveled from the central valley through the southeastern mountain regions of Kampuchea, where malaria is hyper-endemic (i.e., a high level of malaria transmission occurs year-round). Thus the migration of these susceptible persons through a hyper-endemic area (only a few dozen kilometers from the hypo-endemic area) probably led to the observed malaria epidemic involving large numbers of cases of malaria-related illness and death.

Chapter 10

Measles Outbreak, Khao I-Dang Refugee Camp, Thailand

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Measles Outbreak, Khao I-Dang Refugee Camp, Thailand

In mid-January 1980, health workers in the Khao I-Dang refugee camp reported children with measles in out-patient clinics. A review of hospital admission records at that time revealed that a low number of measles cases had been occurring since early December; a sharp increase in numbers of hospital admissions for patients with measles complications began the third week of January (Figure 3).

A measles vaccination program had been begun shortly after the camp opened in November 1979 as part of the initial health screening. However, only 3,631 of the estimated 13,000 children in the high-risk group (i.e., 6 months-5 years of age) were vaccinated for measles because of an initial shortage of vaccine and an emphasis on other priorities during the early emergency phase of the operation.

Description of Outbreak. In the period December 1, 1979-March 7, 1980, 658 children were hospitalized with complications of measles. Fifteen died—12 primarily as a result of severe pneumonia; three as a result of encephalitis (1), dehydration (1), or diffuse exfoliative dermatitis (1). Eleven of the 15 who died were < 5 years of age.

Age Distribution. Nearly 50% of the children hospitalized with measles were < 5 years of age (Table 11). The highest hospitalization rate by age (i.e., the number of cases/1,000 refugees in each age group) was 29/1,000 for refugees < 5 years of age; this contrasts with a rate of 0.3/1,000 for refugees ≥ 15 years of age.

Management of Outbreak. When the measles outbreak was first noted, patients were identified by section and group. These rough data showed that the outbreak was widely distributed throughout the camp. An initial analysis was done to determine whether the persons with measles had come from a particular area along the Thai-Kampuchean border or from the interior of Kampuchea. However, the percentage of cases from each border area corresponded exactly

to the percentage of the camp's population from those areas. Further questioning showed that many of the refugees with measles had been in the Khao I-Dang refugee camp for several weeks before becoming ill. There had been isolated cases of measles reported from border staging areas before the outbreak

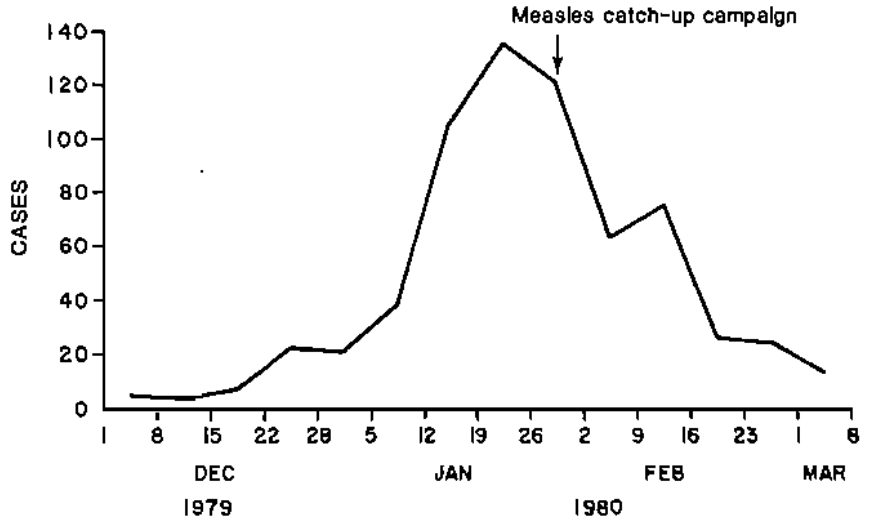

FIGURE 3. Chart of hospital admissions for measles complications, by week, December 1979-March 1980

TABLE 11. Hospitalized measles patients, by age, Khao I-Dang, December 1, 1979-March 7, 1980

Age (years)	Percentage of cases	Estimated distribution*	Attack rate†
< 5	318	48.7	29.0
5-9	244	37.4	9.8
10-14	69	10.6	
15-19	6	0.9	0.3
≥ 20	16	2.5	
Unknown	5	NA§	NA
Total	**658**	**100.1**	**5.9**

*Based on 653 patients of known age.

† Number of cases/1,000 refugees, using population data defined in random surveys.

§Not applicable.

at Khao I-Dang, and one or more of these were probably imported into the camp. The outbreak was explosive, and by the time it was discovered and control measures were implemented, the disease was being actively transmitted throughout the camp and not just among the new arrivals.

During the measles outbreak, each of the out-patient departments was asked to report the number of new cases of measles diagnosed each day. The highest number of cases reported in a given day was 135; 23 (17%) of these persons were hospitalized with complications. This pattern supported the impression that persons with cases of measles complications requiring hospital admission actually were actually only a small proportion of the total cases of measles occurring in the camp.

As shown in Table 12, pneumonia was the complication most frequently leading to hospital admission (58.3% of all such admissions). Diarrhea, occasionally bloody, was the next most frequent complication and often occurred in combination with pneumonia.

Objective clinical data regarding nutrition were available for only 16 patients admitted to the hospital; seven of these were <80% of the standard weight-for-height ratio, i.e., a level consistent with undernutrition. One of these was <70%, i.e., a level consistent with severe undernutrition. Thus, seven (43.8%) of a small non-random sample of 16 refugee children admitted to the hospital with measles had objective evidence of undernutrition. This compares with 4%-7% of the entire pediatric population reported to be <80% in earlier surveys. These data support other observations that measles can be an extremely serious disease for undernourished individuals.

TABLE 12. Complications of measles among a random sample of 60 hospitalized measles patients at Khao I-Dang refugee camp, January 1980

	Complication	Number of patients	Percentage of all hospitalized patients
1.	Pneumonia	35	58.3
2.	Diarrhea (Bloody diarrhea)	30 (7)	50.0 (11.8)
3.	Otitis	10	16.7
4.	Bronchitis	3	5.0
5.	Encephalitis	1	1.7
6.	Thrush	1	1.7
7.	No specific complication noted*	6	10.0

*Patients severely ill; admitted for observation.

Control Measures

Vaccination Campaign. It was often impossible to get an accurate history of measles vaccination for children brought to the hospital with measles. Some parents stated that their children had been vaccinated for measles after arriving at the camp, but many could not remember exactly when the vaccine had been given. With such sparse data, it was impossible to calculate true vaccine efficacy to determine whether the initial vaccination campaign in the screening area had played a role in limiting the spread of measles.

Although only approximately 20 children with measles were admitted to the hospital in the 5 days before the measles surveillance program was established, information from the out-patient clinics suggested that a major measles epidemic was occurring in the camp. At this point, a decision was made to complete the mass measles vaccination campaign for all susceptible children in the high-risk group (6 months-5 years of age). This effort was undertaken despite the recognition that much transmission probably had already occurred and therefore many of the susceptible persons to be vaccinated probably were already incubating the disease.

Vaccinating these persons more than 48-72 hours after they were exposed probably would not alter the course of their disease. However, a mass vaccination campaign seemed to be an appropriate intervention measure because: a) a large number of measles cases among these undernourished refugees were associated with complications; b) a limited and accessible number of high-risk susceptible persons remained in the camp; and c) an adequate supply of vaccine was available at the time.

Over a 1-week period, 9,010 doses of measles vaccine were administered in the camp. All children in the hospital pediatric wards and all children in the camp 6 months-5 years of age were given vaccine with Pedijet injectors. Children in each of the nine sections in the camp were vaccinated in turn, with the supplementary-feeding centers or the section headquarters used as vaccination centers.

The refugees' own administrative structure was used to disseminate information about the campaign. Posters were distributed to advertise the campaign, and volunteers in each section assembled members of the targeted age group for vaccination. Large numbers of refugee workers were used at each vaccination center (as many as 20-30 at some sites). Roped-off waiting areas were set up to facilitate an orderly flow of refugees, and shady areas were provided to encourage participation. The following procedure was used:

- All children ≤5 years of age were registered and given a "Road to Health Chart" filled out in their own language. This chart is a widely accepted standard form on which to record identification information, growth curves, and vaccination information. Each chart was placed in a plastic bag containing the refugee's other identification papers; the importance of keeping this card was explained to the child's parent(s).
- The parent(s) of each child was (were) asked if the child had received measles vaccine in the screening area upon arriving at camp. If the answer was "yes," no vaccine was given. If the answer was "no," or if the parent(s) could not remember, the child was vaccinated.
- The sex and age of each vaccinated child were recorded so that an accurate tabulation could be made at the end of each day.
- The only contraindications to vaccination were: a) if a child had a serious medical condition and the examining staff member thought even a mild reaction to the vaccine might be dangerous or that such a reaction might confuse a complicated diagnostic problem, or b) if a child had clear-cut symptoms and signs of incipient measles, e.g., fever with conjunctivitis, cough, or coryzea.
- A nurse and, when possible, a physician were in attendance to make individual recommendations for specific patients, to answer questions, to deal with vaccine reactions, and to provide health screening for children to be vaccinated. Sick children brought for vaccination were evaluated by a nurse or doctor and referred either to an out-patient clinic or to the hospital admission area.

The number of hospital admissions dropped dramatically about 2 weeks after the mass vaccination campaign was completed. Whether this pattern reflected the success of the mass vaccination campaign or simply the fact that the susceptible people in the camp had all been infected could not be determined.

The Measles Ward. Initially, patients with measles were isolated in a separate tent area outside one of the pediatric wards. When this area became overcrowded, an entire 100-bed ward was devoted to the care of patients with measles complications. Grouping all measles patients in one ward proved to be an effective strategy. Not only did it allow for ready access to data concerning the measles outbreak and the hospitalized patients, it also allowed the staff in that area to gain expertise rapidly in dealing with measles and related complications. For example, protocols were designed to handle specific complications of measles:

- Respiratory insufficiency—Oxygen was not always available, but when it was, it was used for short courses of therapy for patients with severe pneumonia and obvious respiratory insufficiency. Empirical evidence indicated that if severely ill children with measles-associated pneumonia could be kept alive over a crucial 2- or 3-day period with oxygen therapy, they generally recovered completely.
- Feeding problems—One of the main problems dealt with on the ward involved feeding patients with buccal mucosal lesions associated with measles. Difficulties in eating and in having fever often led to dehydration. Plastic bottles with a measured amount of fluid were left at the foot of each bed. If a certain amount had not been taken in an 8-hour period, efforts were made to encourage oral intake so that patients would not become dehydrated. If after strenuous efforts, oral intake was not adequate, intravenous fluids were given.
- Antibiotic therapy—In order to treat possible bacterial superinfections, a standard course of penicillin was given to all children with measles-

associated pneumonia if they did not improve after 48-72 hours of close monitoring.

Measles and Khmer Traditional Beliefs

Two traditional teachings adhered to by some members of the Khmer community could have been detrimental to the care of patients with measles. The first was that persons with measles should have their food and water intake limited until they recover. Since many of the patients with measles were young children with high fever, dehydration was a major problem—particularly for those who had buccal mucosal lesions that made it painful for them to take fluids orally. The second tradition held that being near a woman who was having her menstrual period would cause a case of measles to be unnecessarily severe. Some of the parents whose children had measles were reluctant to bring them to an out-patient clinic because they were afraid that in going to the clinic their child might have such contact. There were other cultural traditions about measles, but they were not potentially dangerous to patients. In fact, it was the policy in the camp to work within the cultural framework of the refugees and to respect and encourage traditional beliefs. However, because the two beliefs mentioned above could create an unnecessary hazard for persons with measles, Khmer public health nurses and the administrative framework of the Khmer community cooperated in disseminating accurate medical information. Parents were advised to encourage fluid intake for children with measles and to bring them to the out-patient departments if they were seriously ill. This information campaign was successful, possibly because these traditional beliefs were not strictly adhered to by this group of Khmer and because medical information to the contrary came from members of the refugee community rather than from foreigners working through refugee translators.

Conclusions

Several conclusions can be drawn on the basis of the experienees in this outbreak.

- As previously reported, measles is a much greater hazard for an undernourished than for a well-nourished population. Measles vaccination programs should therefore probably be given high priority in refugee settlements. Vaccination of at least high-risk persons as they enter the camp is strongly recommended. Undernutrition is *not* a contraindication to measles vaceination. Studies have shown that undernourished children have a normal immunologic response to measles vaeeine. Because they have an added risk of serious complications and of death, undernourished children should have high priority in a measles vaccination campaign.
- The crowding in refugee camps provides an ideal situation for the rapid transmission of communicable diseases such as measles.
- Severe measles can be assoeiated with lesions on the buccal and gastrointestinal mucosa, with the buccal mueosal lesions causing feeding problems and the gastrointestinal lesions causing bloody diarrhea.
- Measles vaccine may help stop an outbreak—but not immediately. Persons exposed to measles more than 48-72 hours before they are vaccinated will probably still have clinical measles. Since measles has an incubation period of 10-14 days, the effectiveness of a vaccination program cannot be assessed until 2 weeks after its completion. A drop in the number of measles cases > 2 weeks after the vaccination campaign may indieate either that all susceptible persons have already been infected or that the vaccine has been effective in halting the outbreak.

Chapter 11

Cholera in Two Kampuchean Refugee Camps

Susan E. Holck, Stephen R. Preblud, Bruno John

In the period March 25-May 7, 1980, 335 clinical cases of cholera, six of which were fatal, were reported in Nong Samet and Nong Chan, two refugee camps located along the Thai-Kampuchean border, about 15 km from Khao I-Dang. A daily reporting system, early laboratory confirmation by isolating the organism in cultures, and the collection of information on selected case characteristics permitted the epidemiologists and clinicians to develop a hypothesis about the source quickly, to institute control measures, and to monitor the progress of the epidemic.

When the initial cases were reported, epidemiologic investigation was begun. A clinical case definition was established, i.e., all patients with profuse, watery diarrhea were regarded as having cholera. All new cases meeting this definition were reported daily to the epidemiology unit. A questionnaire to obtain information on clinical history, age, sex, location within the camp, sources of food and drinking water, and household contacts was completed for each patient. Stool cultures were analyzed to confirm the diagnosis and identify the biotype and serotype of the organism. Data compiled on the first 108 cases are dicussed below.

The Outbreak

The first report of a possible case was made on March 25 from Nong Chan, where approximately 50,000 travelers had come from interior Kampuchea for the periodic rice distribution. On March 29, a case of cholera was reported from the town of Samet (population 50,000-75,000), several kilometers north of Nong Chan. The number of reported cases rose quickly during the next 2 weeks, peaking at 20 new cases on April 8 (Figure 4). Thereafter, the number of cases reported each day ranged from six to 17 until the beginning of May. Most of the cases, i.e., 275 (82%), occurred at Nong Chan. The outbreaks in these two camps were concurrent with the yearly seasonal peak of cholera throughout Thailand.

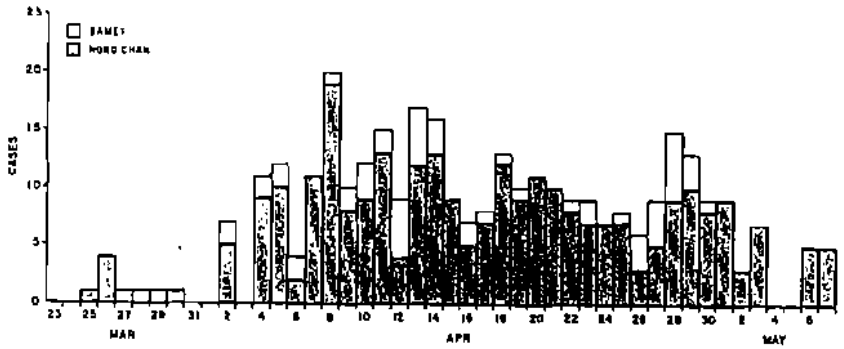

FIGURE 4. Cholera cases, Nong Chan and Samet, Thai-Kampuchean border, March 23-May 7, 1980

Cases were distributed throughout the camps without clustering by residence. Patients ranged in age from 6 months to 75 years; most (52%) were between 15 and 44 years old. Slightly more males than females were reported to have cholera—a male-to-female ratio of 1.2:1.

In both Nong Chan and Samet, most of the refugees with cholera had lived in the camp for at least 2 weeks. However, seven of the 18 Samet patients and nine of the 85 Nong Chan patients had arrived in the camp within 3 days before becoming ill.

Most of the patients had obtained their food from more than one source, and the vast majority had obtained their water from one or more of the hundreds of hand-dug wells located throughout both camps.

With the assistance of the Thai public health authorities, *Vibrio cholerae* 01 was isolated from 64 stool specimens. All were El Tor biotype, and all but one were Ogawa serotype. Cultures of water samples from relief organization tanks, from several of the suspected wells, and from ice sold in the market failed to grow *V. cholerae* 01.

Because the incubation period of cholera is 1-5 days, the time in the camps before onset of illness suggested at least two sources of cholera. Persons arriving from Kampuchea 1-5 days before becoming ill could have already been infected, while persons arriving >5 days before onset must have been infected after arrival. Multiple sources within the camps were suggested by the lack of clustering by residence and the variety of food and drinking water sources used by the patients.

The market in Nong Chan camp was considered one probable site of cholera transmission. Located in a section without latrines, it was a common gathering place for people from all parts of the camp. Drinking water from the wells and other beverages and food were sold in the market. Food and ice brought into both camps by Thai vendors seemed an unlikely primary source of cholera because of the absence of reported cholera cases in the neighboring Thai villages.

Following discussions with Thai public health officials, several control measures were instituted. Initially, wells suspected of being a source of cholera were closed. However, because of the severe water shortage in the area, the suspected wells were then treated with chlorine. But because the chlorine additives were inactivated by organic material in the wells, adequate chlorination was not usually achieved. Consequently, camp residents were encouraged to build up the sides of the wells to prevent contaminated surface water from washing into the water supply.

Loudspeakers were used at the rice distribution site, at the market, and at other common gathering places to inform camp residents of the widespread presence of cholera, of its probable causes, and of prevention measures. The use of latrines, where available, was encouraged, and refugees were advised to boil all drinking water, to cook food thoroughly, and to go promptly to the hospital if they had onset of diarrhea.

Logistical problems limited the effectiveness of control measures in the camps. The continuing arrival of infected travelers from Kampuchea apparently provided an ongoing source of cholera. The lack of sufficient personnel to construct latrines for the travelers in Nong Chan probably contributed to continued cholera transmission in that camp. Since a river separated the travelers' area from the rest of the camp and the road, vehicles could not transport safe drinking water in quantities adequate for the travelers. Although camp residents were encouraged to boil their drinking water, the continuous turnover of the travelers precluded supplying enough cooking vessels to allow this practice to be universally followed.

By the beginning of May, the number of new cholera cases had begun to decline. The sporadic rains provided a limited source of safer drinking water.

Vigorous treatment of hospitalized patients with oral and intravenous fluids and, selectively, with antibiotics, probably helped prevent some deaths. Providing the Khmer with information about the characteristic features and mode of transmission of cholera, the importance of early recognition and of adequate fluids in the treatment for cholera, and approaches to prevention were the most important measures for averting deaths.

Editorial Commentary

The problems encountered in this outbreak in terms of data collection and in institution of control measures illustrate some of the difficulties of practicing public health in an unstable situation among a highly mobile population. Nevertheless, despite the failure to document a specific source or sources for the outbreak, knowledge of cholera transmission mechanisms allowed rational recommendations for disease prevention (e.g., boiling of water) to be provided to the refugees.

A cholera vaccination program was not recommended for several reasons. With an unstable and mobile population, providing the two doses necessary for

the minimal protective effect is usually not feasible. In addition, the vaccine has no effect on disease transmission; vaccinees can still transmit the organism in feces. A cholera vaccination program was thus not felt to be an efficient use of scarce resources (see Chapter 26).

Chapter 12

Tuberculosis Control Programs, Sakaeo and Khao I-Dang

Cornelia E. Davis, Donald T. Allegra, Michael Buhrer

Medical programs applied in disaster or refugee situations are often concerned initially only with the management of acute problems. Decisions on long-term health problems are often appropriately delayed. However, some problems have both immediate and long-term aspects, and health planners often do not have the luxury of delaying the institution of control measures. Such was the case when large numbers of infectious pulmonary tuberculosis (TB) cases were found among Khmer refugees in the Sakaeo and Khao I-Dang camps. There was a great deal of discussion among health workers about the advisability of setting up a TB control program. Those who were against such a program argued that long-term health programs such as those for TB are not part of the emergency phase of a refugee-assistance program and that, while at least 9 months of supervised drug therapy was felt to be necessary for high-cure rates, ensuring treatment for that length of time in unstable conditions was not possible. Furthermore, an adverse effect of the premature ending of a control program could be the induction of drug-resistant organisms in the patients who were "partially treated."

Those who favored a TB control program urged that such an effort be given high priority because 1) TB was prevalent among the refugees, 2) the undernourished and crowded refugees were at high risk of further rapid spread of TB, 3) large numbers of patients with TB were being identified and something had to be done for them, and 4) the uncertainty surrounding the future of the refugees meant that they might spend many months or years in the same place. Finally, it was pointed out that there is no good evidence to show that resistance to anti-tuberculosis drugs develops as long as patients are given appropriate combinations of drugs and are treated with more than one drug.

Sakaeo

Health workers at Sakaeo were confronted with a population of about 28,000, many of whom had chronic cough, weight loss, and fever. The first step

was identifying infeetious symptomatic pulmonary TB cases. Microscopy became available 3 weeks after the camp opened, and sputum examination initially was done on symptomatie hospital patients with fever, cough for >4 weeks, and/or hemoptysis.

As laboratory capabilities expanded, TB case finding was extended to family contacts of hospitalized TB patients and to symptomatic out-patients. Mass sputum screening proved largely unproductive (one positive case from 300 smears) and was stopped. Mass radiography using mobile x-ray units was deemed ineffective, unproductive, and expensive; it was not attempted.

During the first 2 months of the camp's existence, acid-fast bacilli (AFB) were isolated from the sputum of 126 of 4,999 in-patients, representing a prevalence of 25/1,000 (2.5%). With a sizable number of active pulmonary TB cases thus identified, a decision was made to begin a TB control program modeled after the Thai TB control program (an initial 8-week, intensive three-drug, daily combination, followed by a maintenance phase, i.e., two-drug, twice weekly therapy for 10 more months).

Once identified, a TB patient was hospitalized for at least 10 days for registration, health assessment, and an intensive educational program. Depending on the initial health status of the patients, they continued to be cared for as in-patients or came for daily medication to one of the out-patient clinics. Patients who did not come for treatment were sought and brought to the clinic by a Khmer TB aide who had undergone an intensive 1-week training course.

For case-finding purposes, a diagnosis of TB was made only on the basis of positive AFB tests with early-morning sputum specimens. Patients were referred from the hospital wards and the out-patient department. Patients thought to have TB who also had negative sputum tests and had not responded to a full course of antibiotic treatment were referred for an X ray when this service became available. Patients with extrapulmonary TB (most of whom were children) were individually evaluated.

Treatment consisted of daily streptomycin, isoniazid (INH), and ethambutol for an 8-week intensive phase, followed by a planned 10 months of INH and ethambutol twice a week. Pyridoxine (vitamin B_6) was also given throughout the course of treatment.

Sputum was checked again at 6 months, at the end of therapy, and at other times if warranted by the patient's condition. Treatment was re-evaluated if the patient continued to be ill enough to require hospitalization, if the sputum remained positive, or if a clinical relapse occurred. Rifampin was reserved for patients who did not respond to or could not tolerate the standard (streptomycin) treatment.

Supplementary food was given to TB patients and their families. Contacts who were <5 years of age received INH for 6 months. Symptomatic contacts with positive PPD's (a TB skin test) had sputum specimens tested for AFB and had a chest Xray.

Khao I-Dang

On the basis of the experience at Sakaeo, it was suspected that TB might be a major problem at Khao I-Dang camp. Plans to start a TB-control program began early. A ward of 75 beds, devoted entirely to TB patients, opened about 3 weeks after the camp was established. An out-patient TB department began functioning 1 month later. The laboratory gradually increased its capacity to process sputum smears for AFB. By February 3, 1980, about 2 months after the camp was established, 314 (13.4%) of 2,349 individual sputum smears examined for AFB were positive. In the first month of the laboratory operation, 119 (26%) of 457 sputum smears from individual patients were positive. Later the positivity rate fell to 6.7%. Eventually, examination was being requested for about 500 refugees/week, and the laboratory was being overwhelmed. A chart survey of symptoms of hospitalized patients for whom TB smears had been requested concluded that many AFB smears were being ordered on patients who had a low probability (no fever, chronic cough, or hemoptysis) of having TB. The results of this survey were distributed widely in the camp and resulted in a moderate drop in the number of requests for AFB smears.

Because of the large number of patients with symptoms suggestive of TB, it was necessary to limit admissions to the TB ward to persons with laboratory-confirmed or strongly suspected TB. This usually included, for persons >5 years of age, a positive AFB smear of sputum, body fluid, or biopsy material; and for those <5 years of age, a positive TB skin test and clinical symptoms consistent with TB. If a child had a negative skin test, or a negative AFB smear, or both, but had a history or symptoms highly suggestive of TB, consultation was obtained from physicians staffing the TB ward. The decision of whether to admit was made on an individual basis.

Treatment

Initial treatment consisted of: 1) INH, rifampin, and ethambutol each day for 1 month or 2) INH, ethambutol, and streptomycin each day for 2 months—with either regimen followed by INH and ethambutol for the remainder of the treatment course. Because crowding in the camp increased the risk of transmitting TB, treatment of identified symptomatic patients was given the highest priority. Once patients with active disease were stable and had been educated about their disease, the next step was to establish out-patient maintenance therapy. The third step was to follow up on the family contacts, particularly those <5 years of age.

As might be expected, children, especially those <5 years old, often could not provide a sputum specimen, and no definite diagnosis of TB could be made.

Since TB was a major problem in the camp, it was decided that children <5 years old and newborns would receive BCG as part of the childhood vaccination program. The BCG vaccination program was given a relatively low priority, however, and was only begun after patients with active cases had been treated and other goals had been reached.

The routine use of rifampin at Khao I-Dang was controversial. It was not part of the TB regimen in the national program in Thailand and had to be obtained from outside the country. It costs more per unit than ethambutol, but this is partially eompensated by the shorter treatment course necessary with INH and rifampin. Rifampin is an excellent tuberculocidal drug, and together with INH it sterilizes the sputum of infected persons in a shorter period of time than do other eombinations of antituberculous drugs. In crowded refugee camps, this might be important in preventing the spread of TB.

Although there have been several reports of the effectiveness of short (<9-month) treatment regimens (e.g., INH, rifampin, and pyrazinamide for 2 months, followed by INH and rifampin for 4 more months), it must be emphasized that short regimens such as those used at Sakaeo and Khao I-Dang have not been fully evaluated. They were adopted because they represented what was felt to be practical and what could be accomplished during the initial emergency phase of the operation. However, current recommendations include: INH and rifampin—for 9 months; or INH, ethambutol, and/or streptomycin—for 18 months.

Editorial Commentary

Tuberculosis ean represent a significant public health threat in crowded refugee camps. Although TB has not previously been considered of high priority in refugee-relief operations, it can be a prevalent disease that carries a high risk of significant illness and dcath. There may be a tendency to avoid treating persons with TB beeause of the feeling that the prolonged treatment course may not be completed. However, refugee camps often exist longer than expected, and, as seen in Thailand, a significant number of these patients will have completed therapy before leaving camp. Further details of the evolution of the TB treatment program are given in the Epilogue.

Chapter 13

Meningoccal Disease among Khmer Refugees in Thailanc

Stephen R. Preblud, John M. Horan, Cornelia E. Davis

Detecting meningococcal disease in a community is usually not difficult. Meningococcemia can often be diagnosed clinically, and meningococcal meningitis can be detected with Gram stains of cerebrospinal fluid (CSF). Penicillin, the treatment of choice, is usually available. Preventing additional cases may involve antimicrobial prophylaxis or vaccination, but situations must be assessed individually.

Sakaeo Outbreak

In the period November 8, 1979-March 2, 1980, 32 cases of meningococcal meningitis (clinical illness plus a positive CSF culture or characteristic Gram stain) and/or meningococcemia (fever, prostration, and typical purpuric skin lesions) were reported to the medical coordinator at Sakaeo. The outbreak peaked within a week. Case finding and active surveillance were initiated after the first few cases were identified. Patients were isolated for the first 24 hours of intravenous penicillin therapy.

The overall attack rate during the outbreak was 1.3 cases/1,000 refugees over the 4-month period (Table 13), which is equivalent to an annual rate of 3.9 cases/1,000 persons. Patients ranged in age from 2 months to 37 years; 21 were male. Nine persons died. These deaths represented approximately 4% of all deaths at the holding center in this period. Individuals >14 years of age accounted for 41% of all cases but for only one death. Children <5 years old accounted for approximately 40% of the cases, but were about 10 times as likely to acquire disease as were persons >14 years of age. The former group also accounted for six of the nine deaths, for a death-to-case ratio of 50%. These six deaths represented about 12% of all reported deaths of children <5 years of age in the holding center in this 4-month period.

Patients with meningococcal meningitis accounted for 34% of cases of bacterial meningitis (clinical signs of meningitis plus ≥15 polymorphonuclear cells in CSF, a positive CSF Gram stain for bacteria, or a positive CSF culture) and 61% of the bacterial meningitis-associated deaths reported in the same period.

TABLE 13. Morbidity and mortality associated with meningococcal disease, by age group, Sakaeo and Khao I-Dang, November 1979-March 1980

Age (years)	Sakaeo (8 Nov 1979-2 Mar 1980) Cases (%)*	Attack rate†	Relative risk by age§	Deaths	Death-to-case rate (%)	Khao I-Dang (13 Jan-15 Mar 1980) Cases (%)*	Attack rate†	Relative risk by age§	Deaths	Death-to-case rate (%)
<1	6 (18.8)	8.1	11.6	2	33.3	13 (18.2)	4.0	13.3	4	30.8
1-4	6 (18.8)	6.1	8.7	4	66.7	6 (7.5)	0.9	3.0	1	14.3
5-14	7 (21.9)	1.5	2.1	2	28.6	38 (47.5)	1.2	4.0	1	2.6
≥15	13 (40.6)	0.7	1.0	1	7.7	23 (28.8)	0.3	1.0	2	8.7
Unknown	0 (0.0)	0.0	—	0	—	2 (0.0)	—	—	0	0.0
All	32 (100.1)	1.3	—	9	28.1	82 (100.0)	0.8	—	8	9.8

*Percentage of all cases in each camp.
†Number of cases/1,000 refugees in each age group.
§Risk of disease for each age group compared with risk for persons ≥15 years in each camp.

When the first cases were identified, persons who lived in sections of the camp from which cases had been identified were given prophylactic sulfadiazine, although the degree to which the causative organism was sensitive to sulfonamide was not known. Prophylaxis for medical personnel was offered only in the event of intimate (i.e., mouth-to-mouth) contact with a patient. Later, sulfadiazine was distributed only to family members and other close contacts (i.e., those in the four-six tents nearest that of the affected family). Intensive surveillance for secondary cases (defined as disease among close contacts within 30 days after onset of the index case) revealed no secondary spread. No clusters of cases were seen in any area of the camp, and there were no known cases among persons who had received prophylaxis.

Khao I-Dang Outbreak

As in Sakaeo, active case finding and surveillance were quickly initiated after the first cases of meningococcal disease were identified. In the period January 13-March 15, 1980, 46 cases of meningococcal disease (same case definition as at Sakaeo) with five associated deaths were reported to health officials at Khao I-Dang. The outbreak peaked in mid-February. In addition, 36 other cases of meningitis thought to be meningococcal in origin (purulent CSF with no bacteria seen on Gram stain) resulted in three additional deaths, for an overall attack rate in the 2-month period of 0.8 cases/1,000 refugees (equivalent to an annual rate of 4.8 cases/1,000 persons) and a death-to-case rate of 10% (Table 13). The eight deaths represented approximately 11% of all deaths in the camp during the same period. Five persons who died were children <5 years of age; their deaths represented 11% of all reported deaths among members of this age group in the 2-month period.

Treatment and isolation techniques were the same as those used at Sakaeo.

The 82 patients with meningitis at Khao I-Dang ranged in age from 2 months to 65 years. As in Sakaeo, a relatively large proportion of patients (30%) were ≥15 years of age (Table 13). One-quarter of the patients were <5 years of age. As in Sakaeo, children <5 years old (especially those <1 year old) were at greatest risk of acquiring disease. Children in the 5- to 14-year-old group at Khao I-Dang accounted for twice as many cases and were twice as likely to acquire infection as children the same age at Sakaeo. These relative differences and similarities between the two camps were still apparent even when the 36 unconfirmed cases at Khao I-Dang were deleted from the analysis.

Since there was no apparent clustering of cases in any particular area at Khao I-Dang, antibiotic prophylaxis was given to only one person—who had had mouth-to-mouth contact with patients. Household contacts were not given prophylaxis. Rifampin was used because it was readily available and because very few people had had very close contact with the patients. Even with active surveillance, no secondary cases were detected.

Discussion

Meningococcal disease occurs worldwide. Endemic activity is seasonal, and occasional cyclical epidemic activity occurs. Infants and young children are usually at greatest risk in the general population, but the epidemiology of disease differs in crowded situations such as refugee or military training camps. Adolescents are at higher risk than adults of acquiring the disease. Although the risk of disease is usually increased up to 1,000-fold for household contacts of patients, no secondary spread (to the contacts) was detected at either camp.

The age-specific characteristics of the Khao I-Dang outbreak were more typical of those usually associated with meningococcal disease than were those observed at Sakaeo. At Khao I-Dang, young children were at highest risk, followed by adolescents, followed by adults. The low relative risk of disease for adolescents at Sakaeo may have resulted from the small number of adolescents (hence a decreased opportunity for carriage and spread) at that camp.

Generally recommended treatment and isolation procedures were followed in these outbreaks. At the beginning of any such outbreak, decisions about using drug prophylaxis are difficult to make. However, there were no secondary cases in these two camps, with or without "household"-contact prophylaxis. When sensitivity testing of recently isolated organisms is not available, as was the case in these camps, local health authorities should be asked about any trends in antibiotic resistance of meningococci in their area.

For initial prophylaxis, a choice often has to be made between sulfadiazine (or other sulfa drugs) and rifampin. Unfortunately this choice may not be clear-cut, and, in refugee situations, neither background resistance rates nor laboratory facilities adequate to determine resistance are likely to be available. Sulfadiazine is less expensive and more readily obtainable than rifampin in most developing countries. However, resistance to sulfadiazine is widespread, and high levels of resistance are not uncommon. On the other hand, rifampin is more expensive, and concerns have been raised that its use—especially for other than well-supervised short courses—may hasten the development of rifampin resistance. Prophylactic antibiotics should be given only to household contacts and to medical personnel who have had intimate contact with a patient with meningococcal disease. (In certain refugee settings, a "household unit" may have to be redefined because of overcrowded conditions.)

It is apparent that children <5 years of age, and especially those <1 year of age, are at greatest risk of having meningococcal disease and should be given first priority in any vaccination program against meningococcal disease. Vaccine availability and surveillance data should be assessed to determine whether older children, adolescents, and young adults should receive vaccine. Surveillance can also be used to identify other high-risk age groups in a particular situation.

However, several factors should be considered before a vaccination program against meningococcal disease is instituted. The currently available meningococcal vaccines are effective only against serogroups A and C. Vaccine should not be given unless serologic test results indicate that the causative organism is one against which vaccine is effective. A single dose of vaccine does not provide protection against serogroup A organisms for infants <1 year of age or against serogroup C organisms for children <2 years of age. The group at highest risk (i.e., infants <1 year of age) are not conferred protection by the vaccine.

Editorial Commentary

Based on experience with these outbreaks, a number of recommendations were formulated:

- To allow for rational decision-making on chemoprophylaxis and use of vaccine, it is important to obtain speciments for culture, serogrouping, and antibiotic sensitivity testing. Extra effort spent here can be of great benefit.
- Cases should be defined by positive Gram stain or culture for accurate epidemiologic analyses. Meningitis cases without such documentation can be studied as a separate category, but the possibility that these do not represent meningococcal disease should not be overlooked.
- Decisions regarding drug prophylaxis should involve and be agreed upon by representatives of all groups concerned (and should remain consistent).
- Secondary attack rates can be monitored to assess efficacy of chemoprophylaxis. However, as most reported secondary attack rates range from 3-15 cases/1,000 household contacts, large numbers of contacts may need to be followed to observe an effect.
- Careful records should be kept of all patients with meningococcal infections, including the length of time they have been in the camp. (These data can help determine which refugees—new arrivals or household contacts—are at highest risk.)
- At the time these other considerations are being evaluated, vaccination should probably not be considered unless the following criteria are met.
  a) The presence of meningococcal disease is laboratory confirmed.
  b) Serogrouping indicates the presence of group A or group C organisms.
  c) The disease is affecting children <1 year (for group A) or ≥ 2 years (for group C).
  d) A vaccine "cold chain" is already set up.
- In any vaccination program, groups shown by collected data to be at highest risk shold have top priority.
- Proper transport, storage, handling, and administration of vaccine (i.c., an effective "cold chain") are of utmost importance.
- Careful assessment, documentation, and publication of the information on outbreaks of meningococcal disease in refugee camps and the effect of control programs are important for future planning efforts.

Chapter 14

Poliomyelitis in the Khao I-Dang Holding Center, February-March 1980

John M. Horan ,Stephen R. Preblud

Clinical illness associated with poliovirus varies widely in severity, from subclinical (inapparent) infection to nonparalytic clinical illness and paralytic disease. Most poliovirus infections are inapparent. When poliovirus spreads in a susceptible population, there is evidence that 50-1,000 inapparent or nonparalytic infections occur for each case of paralytic disease.

Unvaccinated adults and older children living in areas with poor sanitation generally have a high prevalence of natural immunity acquired at an early age. The usual visible effect of previous paralytic disease is some degree of residual lameness or other asymmetric muscle wastage. In such situations, the persons were usually affected as infants and young children—a reflection of high communicability in an unsanitary environment.

Description of an Outbreak

On February 16, 1980, a 9-month-old boy was admitted to a pediatric ward at Khao I-Dang with left leg weakness following a recent febrile illness. The clinical diagnosis was possible poliomyelitis. Over the next 3 weeks, seven more children from Khao I-Dang and one child from Mak Mun (a camp located 15 km away) were admitted with the same clinical diagnosis (Table 14).

The five boys and four girls ranged in age from 4 months to 3 years. All had had a febrile illness, and several had apparently had parenteral injections (therapeutic drugs or vaccine) in their affected limbs immediately preceding neurologic symptoms. None had received poliovirus vaccine. The temporal pattern of admissions (Table 14) suggested an epidemic rather than an endemic pattern, but demographic data did not indicate a focus of infection in Khao I-Dang. None of the children died or had impaired respiratory function.

Laboratory specimens were tested to verify the clinical diagnosis of poliomyelitis. Poliovirus type 3 was cultured from one stool specimen. Two acute-phase serum specimens, including one from the patient with poliovirus type 3

TABLE 14. Cases of clinical poliomyelitis,* Khao I-Dang and Mak Mun, February 16-March 7, 1980

Patient number†	Age	Sex	Date of admission	Clinical picture
1	9 mo	M	2/16/80	Weakness, left leg
2	10 mo	M	2/22/80	Flaccid paralysis, right leg
3	4 mo	F	2/23/80	Flaccid paralysis, right leg
4	3 yr	M	2/23/60	Flaccid paralysis, right leg
5	1 yr	F	2/24/80	Weakness, lower trunk & both legs
6	9 mo	F	2/26/80	Flaccid paralysis, both arms
7	1 yr	F	3/3/60	Diminished muscle tone, left leg
8	18 mo	M	3/7/80	Weakness, left hip
9	1 yr	M	3/6/80	Flaccid paralysis, left arm

*Clinical diagnosis.
†Patients 1-8 at Khao I-Dang and Patient 9 at Mak Mun

in the stool, had neutralizing antibody titers only to poliovirus type 2. No convalescent-phase serum specimens were collected.

Since the isolation ward was already in use for patients with meningococcal meningitis, the patients with poliomyelitis were hospitalized in a separate section of a pediatric ward. Hospitalization facilitated bed rest, and, later, regular physical therapy and instruction of parents in appropriate physical therapy techniques.

Trivalent oral poliomyelitis vaccine (TOPV) was subsequently used in a vaccination program for all Khao I-Dang children <5 years old. In addition, parenteral vaccination and non-emergency dental extraction for children <5 years old were suspended until each child had been given at least one dose of TOPV. The poliomyelitis vaccination history of all expatriates was reviewed, and TOPV was given to about 250 who had not updated their poliomyelitis vaccinations before arrival.

Continued surveillance for paralytic disease was maintained through outpatient departments and Khmer public health workers, who checked the patients' families for symptoms during their home visits. No other poliomyelitis cases were found. The interrupted parenteral vaccination programs were resumed about 3 weeks after the last case of poliomyelitis was found.

Conclusions

This outbreak was probably poliomyelitis. A crowded and stressed refugee population unlikely to have been previously vaccinated and a small cluster of paralytic disease cases immediately following non-specific febrile episodes among very young children are consistent with poliomyelitis. The camp medical establishment was alert to such a possibility and responded appropriately by organizing a vaccination campaign.

The temporary suspension of all parenteral vaccinations was one aspect of the management of this particular outbreak that may have been overemphasized. While some association with injection is likely in a few instances, the vast majority of paralytic poliomyelitis cases affect persons without a history of recent vaccination. Stopping other vaccines (e.g., diphtheria-tetanus-pertussis and measles) may in fact impose additional risk. The possible benefit of stopping vaccination must be weighed in each situation against the risks of other vaccine-preventable diseases and their sequelae. This whole problem could be avoided by giving TOPV routinely to susceptible persons when they enter a camp.

Due to limited resources, staff were unable to obtain laboratory confirmation that the outbreak described was, indeed, of poliomyelitis. It would have been helpful to know whether the poliovirus type 3 that was isolated had vaccine-strain or wild virus characteristics and whether a convalescent-phase serum specimen would have shown a diagnostic rise in titer. However, such confirmatory evidence often cannot be obtained during an outbreak, and waiting for final laboratory confirmation before vaccinating the at-risk population might allow more cases to occur.

Chapter 15

Nutritional Assessment and Feeding Programs in Refugee Centers: The Thailand Experience

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Supplementary Feeding:
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General Principles for Feeding Programs in Refugee Centers

One of the most expensive items in a refugee-assistance program is food. Procuring, transporting, storing, and distributing large quantities of food on a regular basis is an enormous undertaking. After first providing for maintenance-food requirements, refugee-assistance operations in developing countries must grapple with the problems of nutritional "rehabilitation" of an undernourished population. These latter efforts include programs of supplemental feeding of high-risk or vulnerable groups, such as children < 5 years of age and pregnant or lactating women, as well as therapeutic feeding for the severely undernourished.

The importance of providing adequate nutrients to an undernourished refugee group cannot be overemphasized. Undernutrition can be associated with numerous infectious and non-infectious health problems (e.g., pneumonia and blindness resulting from vitamin A deficiency).* One aim of this report is to illustrate some of the tools available to monitor the nutritional status of refugees and to describe the effect of supplementary and therapeutic (intensive) feeding operations among the refugee camps in Thailand.

*Editorial Note: Blindness related to xerophthalmia in undernourished children is easily prevented by adequate doses of vitamin A. Logistic problems prevented our obtaining appropriate-dose vitamin A (200,000 International Units) capsules quickly, but no significant problems were associated with the delay. In future refugee-assistance efforts, early administration of preventive doses of Vitamin A, inexpensively available from UNICEF, should be of highest priority in feeding programs. The amount of vitamin A in most multivitamins (2,000-10,000 International Units) is clearly inadequate for either treatment or intermittent prophylaxis of vitamin A deficiency.

Distribution. Methods for distributing food and types of feeding programs implemented varied among refugee centers inside Thailand and in the camps along the Thai-Kampuchean border. In the border area, bulk foods were delivered by ICRC in cooperation with UNICEF and were distributed either directly to the Kampuchean people (e.g., in Nong Chan and the area south of Aranyaprathet) or to the camp administration (e.g., in the Khmer Serai settlements at Non Mak Mun and Samet).

Administration. In the refugee camps at Sakaeo and Khao I-Dang, general feeding programs were administered through UNHCR and the Government of Thailand. Responsibility for selective feeding programs (supplementary and therapeutic) was assigned to different agencies. Supplementary feeding, a general camp activity, remained under the control of UNHCR, which in turn delegated responsibility to the various voluntary agencies. Therapeutic feeding, considered a part of medical services, was the responsibility of the Red Cross, whose nutritionists were given overall responsibility for coordinating the various therapeutic feeding programs and were asked to give technical guidance on all matters pertaining to food and feeding programs. UNHCR had the authority to determine the minimum standard of care in the feeding programs that were monitored by the nutrition coordinators assigned to each refugee center.

A degree of consistency in feeding programs was eventually achieved through circulating written UNHCR standards. These standards were a result of cooperation between UNHCR, the Red Cross, and several volunteer agencies that worked together to develop a realistic guide for the implementation of all types of food and feeding programs.

Nutritional-Status Monitoring. Since food and personnel resources are limited in refugee operations, it is important to use them in the most cost-effective manner. To evaluate the effectiveness of the food programs, to improve efficiency, and to provide accurate reports to major food donors, the nutritional impact of the program must be assessed and analyzed using objective measures. An assortment of simple measurements that can provide useful information include: clinical observation, anthropometry, laboratory tests, and hospital records.

Supplementary Feeding

Supplementary-Feeding Activities. In Sakaeo, 28,000 refugees arrived within 8 days and were living in extremely crowded conditions. The camp hospital housed more than 1,000 sick and undernourished patients, many of whom had to be spoon-fed because they were too weak to feed themselves. The lack of space made "on-the-spot" feeding centers impractical for all except the hospital patients, so a "take-away" dry-ration system was set up by the Save the Children Fund. This involved searching out those most in need by visiting each family unit, registering eligible persons, and giving them a ration of dry food twice a week. Approximately 4,000 people, mostly children and pregnant and lactating women, were given supplemental food and simple medical care; their nutritional status was evaluated and recorded at regular intervals. As the area of the camp was extended, the program expanded until the more conventional on-the-spot feeding program could be set up.

The camp at Khao I-Dang was better organized, because more space was available and the refugees arrived over a 2-month period of time. The camp was divided into sections of 10,000-12,000 people. Each section had space allocated for reasonable housing and for necessary services including supplementary feeding. Building materials, water, and food were provided, and volunteer agencies were assigned responsibility for running one or more feeding kitchens according to their resources. Persons eligible for supplementary feeding were registered individually on a specially designed card. They usually received a rice-based porridge or thick soup twice a day. Regular weighing and measuring was not started initially because of lack of suitable equipment; however, after a month anthropometry became a regular activity. Weight changes were recorded once a month on individual registration cards and in the section register.

By February 1980, the Khao I-Dang camp housed approximately 130,000 refugees and operated nine supplementary-feeding centers. Eighty-five percent of the children <5 years of age, lactating mothers, and approximately 50% of the pregnant women attended one of these centers. The number of persons attending varied according to how well the centers were organized, the menus, and the actual market situation in the camp.

In the smaller Khmer settlements along the border to the south of Aranyaprathet, there was very little organized supplementary feeding. Scattered hospitals, deep in the jungle bush, were sporadically visited by refugee-relief teams and provided with suitable supplementary foods for the in-patients, who were mostly young men and boys. No registration or monitoring was done.

In the larger Khmer Serai camps north of Aranyaprathet (Samet, Nong Chan, and Nong Mak-Mun), several attempts were made to set up supplementary-feeding centers similar to those at Khao I-Dang. This was not entirely successful, although some individuals certainly benefitted. Attendance was generally poor, partly because of lack of cooperation by the Khmer administration, which did not recognize supplementary feeding as a priority. From time to time, centers were abandoned or destroyed during fighting in the area. Thus, water and food supplies were always more of a problem in the border region than in the more stable refugee camps inside Thailand. Khmer feeding-center staff trained at border camps tended to leave for Khao I-Dang, so replacement of personnel was a continuing problem.

By December 1979 volunteer agencies were permitted to work in the border area where formerly only the Red Cross and UNICEF had responsibility. With good cooperation, more feeding centers were established, and better registration and monitoring carried out; nevertheless, problems still remained.

- Attendance—At Khao I-Dang, and later at Sakaeo, considerable emphasis was placed on following up those persons who were registered for supplementary feeding but who did not attend for 2 consecutive days. Scouts functioned in each section of the camp and were responsible for visiting the shelters at supplementary-feeding times to encourage attendance and to assist sick people to the out-patient departments if necessary.

In the border camps similar efforts were made, but because much of the population was transient, attendance was not consistent. Experience indicated that to get maximum benefit from supplementary feeding, participants needed to attend regularly. Poor attendance was common even among individuals in serious need of supplementary rations. Many factors were associated with poor attendance, but certainly the scout system, when well organized, was of great value in dealing with this problem.

•The supplementary ration—A minimum content of 15 gm of protein and 350 kilocalories (kcals) was set for an average meal portion. Initially milk products, fish protein concentrate, corn-soya-milk, and other non-traditional foods were used in the supplementary-feeding program; but after a few weeks, efforts were made to provide more traditional foods. Milk products, for example, were used only as ingredients in porridge. If good attendance at the supplementary-feeding centers was to be maintained, traditional food habits had to be respected. Thus, the basic diet was usually rice supplemented with beans, vegetables, meat, and/or fish to add variety in taste and nutrient content.

Distribution of supplementary vitamins and iron created confusion. Groups receiving daily vitamin and iron supplements were not well-defined and were not always those clearly in need of vitamin or iron therapy. In fact, iron and multivitamins were freely given at all feeding centers, at maternal and child clinics, and at out-patient departments. Eventually, to avoid wastage and incorrect dosage, guidelines were established for daily distribution of supplementary iron and vitamins only at the feeding centers and at maternal and child clinics. Supplementary vitamins and iron were dispensed in hospitals and out-patient departments only when requirements were increased by specific diseases and/or use of special medications.

•Restimulation of lactation—Because of the poor medical/nutritional status of women, particularly in Sakaeo camp in the early days, partial or complete failure to lactate was a common problem. Some medical personnel responded by supplying infant formula and feeding bottles. This was obviously not a satisfactory solution, since overcrowding, lack of clean water, and inadequate sanitation facilities increased the hazards of feeding infants formula. Although bottle feeding was discontinued, the original problem remained—what to do about inadequate lactation?

As lactating women were already attending the supplementary-feeding centers, it was decided to make a special effort to help this high-risk group. Through sympathetic counseling by trained Khmer helpers, women were encouraged to participate regularly in supplementary-feeding programs. They were encouraged to eat their fill and advised to maintain a good fluid intake. Each infant was put to the breast at least every 2-3 hours and encouraged to suck. Prepared infant formula was available only at supplementary-feeding centers and was given only after the infant had been put to the breast. Additional soft porridge mixtures were given to infants >4 months old.

Although data are not available, the impression among workers at Khao I-Dang was that most women re-established adequate lactation within 10 days after entering this program. One or two early successes quickly encouraged other mothers. This relactation program was one of the most useful achievements in the supplementary-feeding centers in the Khmer camps in Thailand.

Supplementary-Feeding Centers and Preventive Medicine. Because young children, pregnant and lactating women, and the weak and undernourished attended supplementary-feeding centers, these locations were a logical focal point for other preventive medical activities. These centers at the refugee camps in Thailand were all associated with the out-patient centers. Both types of centers worked in close cooperation with health education and vaccination programs, health/nutritional scouts (used for case-finding), and other areas of mutual interest. Vitamin or iron therapy was provided at supplementary-feeding centers to avoid unnecessary congestion at out-patient departments. Such medications were given only on the recommendation of medical personnel to ensure their efficient use.

Written Guidelines or "Standards." In the Khmer refugee centers in Thailand, nearly a dozen different agencies were involved in supplementary feeding. Because the level of prior "feeding" experience of these agencies varied, there was a very real need for supplementary-feeding standards, which were eventually prepared in cooperation with the UNHCR. Standards helped to achieve a degree of consistency, a standardization of approach, and a minimum level of care in all the supplementary-feeding programs.

Therapeutic Feeding

The Therapeutic Feeding Ward at Sakaeo Khmer Camp. At Sakaeo, the therapeutic feeding ward was staffed by five nurses, a pediatrician, a nutritional adviser, five Thai women volunteers, and 10 Khmer refugee assistants. Within a few weeks, as the number of patients rose to >150, the permanent staff was strengthened by five additional volunteer nurses, one Khmer pediatrician, and 50 Khmer volunteers. Several visiting physicians and nurses were incorporated into the staff for short periods of time. Working languages were Khmer, Thai, French, Finnish, Danish, and English.

Patients were accommodated in four 60-square-meter tents on plank beds placed on gravel. Approximately 24 beds were in each tent, with two children assigned to each bed. Each patient was given two woolen blankets and a straw mat. Another tent functioned as a storeroom and dietary kitchen. Deep trench latrines were located 100 meters away. Enamel chamber pots or wrapping paper was provided for patients too weak to use the latrines. Routine hand washing was done in buckets of 1% Chloramine-T solution, which was changed daily. Feeding tubes, plastic and glass syringes, and steel instruments were boiled. Polyethylene plates, cups, and spoons were washed in hot water and detergent after each meal.

Each tent operated as an independent unit with a nursing station equipped with weighing scales, tape measures, height measuring sticks, medicines, and other medical equipment. Insofar as possible, the most severely ill patients were kept in one tent. Each unit took care of 20-40 patients and their accom-

panying relatives. Ward rounds and a coordinating meeting were held each morning. With time and supervised instruction, the Khmer staff was able to assume the responsibility of patient registration, the feeding program, and the administration of medicines.

Locally made record cards were plaeed by the beds of the patients. On admission, the name, age, clinical status, and height and weight were recorded. Every morning body temperature, weight, diagnoses, prescriptions, and laboratory results were added to the record. The quantity of food consumed was recorded after each meal.

•Admission and discharge criteria—All patients (mainly children) referred from out-patient departments or other wards with clinical marasmus or kwashiorkor were admitted and kept until the following criteria were met: loss of edema; substantial weight gain (usually to >80% of median weight for height); alert and active state, with good appetite; hematocrit >20%; and one relatively healthy family member to care for patients on discharge.

Many patients appeared to have severe anemia on admission, but hematocrit determination was not possible during the first 2 weeks. When transfusion became an option 2 weeks after the ward opened, the death rate dropped sharply. This might have been coincidental since most of the severely ill might have already died. However, it might also reflect the success of transfusion therapy or the synergistic effects of the feeding program with seleeted use of transfusions. Later, of the 225 patients whose hematocrits were measured at admission, 89 had values <30%, and 25 had values <15%. A hematocrit of 15% was chosen as the threshold for blood transfusion.

Although the specific causes for anemia were often not known, blood transfusion facilities played an important role in the emergency therapeutic feeding unit and probably saved many lives.

•Diet—From the time of admission, all patients received a high-protein, high-calorie diet eonsisting of liquid K-Mix-II (a standard UNICEF formula) mixed according to directions on the package with vegetable oil (50% rice brand oil and 50% cottonseed oil, both containing around 70% unsaturated fatty acids). This mixture, eontaining nearly 1 kcal/ml, was prescribed in quantities of 150-180 kcal/kg/body weight/day divided into six portions. It was prepared by speeially trained refugee workers. Initially the oily K-Mix-II was not readily accepted by mothers, the Khmer staff, and some of the children. However, they began to aceept the mixture better with continued use, and after further explanations to mothers and staff about the importance of the special feeding mixture.*

Patients who could not drink were fed by nasogastric tube and a 50-ml plastic syringe. Vomiting patients and those with severe diarrhea were given intravenous fluid therapy only if oral rehydration or diluted milk was not effective (low-strength pediatric solutions and infusion sets often were not available). Oral ferrous sulfate, folic acid, thiamine, and vitamins A and D were added to the diet in varying quantities according to the supplies available.

*Editorial Note: Generally K-Mix-II should be used only to initiate therapy because it is expensive.

A mixed (semi-solid) diet composed of fried rice mixed with egg or chopped meat was offered to patients as soon as they were able to eat. Parents and siblings of the patients, often also undernourished, were also offered K-Mix-II, but otherwise took their regular meals from the hospital kitchen. Relatives ate meals outside the therapeutie feeding wards at different times from patients' mealtimes so that the supplementary-feeding program was not undermined by relatives feeding bulky and poorly tolerated camp rations to the patients. Motherless, premature, and newborn infants received cow's milk formula by cup and spoon feeding.

After discharge, patients were asked to return to the ward once or twice a week to have a nutritional check-up and to receive supplementary high-energy, high-protein meals. Eventually, home visits were made to follow up patients discharged earlier. These visits were eombined with lessons in basic dietetic principles given to parents and older patients.

Summary of Experience

Through early survey work at Sakaeo camp and initial screening of arriving refugees at Khao I-Dang camp, useful information about numbers of potential supplementary-feeding recipients was gained and specific problems among high-risk groups identified. Experience has shown that nutritional surveys and surveillance aetivities can take place in conjunction with other health-related operations such as initial health screening and vaccination programs. At Khao I-Dang and Sakaeo, a variety of nutritional assessment techniques were used. Basic measurements such as heights and weights, together with a surveillance system for nutrition-related illnesses and death, are probably the simplest, least costly, and most useful techniques to employ.

An interesting and potentially very significant experience in one camp was the restimulation of laetation among mothers of infants. Through care, example, and encouragement, the program was estimated to have resulted in reestablishment of lactation in 90% of cases.

The supplementary-feeding centers in Thailand provided, on an out-patient basis, high-energy, high-protein, low-bulk food; they also provided some health and nutrition education in conjunction with preventive medical care to special high-risk groups.

Therapeutie feeding wards provided in-patient eare to severely undernourished refugees on a 24-hour basis. It was deemed that early blood transfusion capability in these wards might have been life saving. It was also shown that with K-Mix-II a limited staff can feed large numbers of severely undernourished patients—if the admission time can generally be kept down to 2-3 weeks for patients without ehronic infections. From the care regimen developed for patients having therapeutic feeding came the observation that a record card for each one should have space for recording initial weight and height and daily weights and changes of symptoms and signs pertinent to acute undernutrition.

A final recommendation is offered: Since health workers from developed countries often have little experienee in recognizing and treating nutritional

deficiencies, guidelines for supplementary and therapeutic operations (including hospital admission, treatment, and discharge of undernourished patients) are needed to provide more uniform patient care.

Assessment and Screening Procedures

Clinical Observation. Clinical observation is one way to identify undernutrition among individuals. Health workers should be able to recognize the clinical appearance of an undernourished person. Physicians and nurses trained in industrialized countries, however, often have little experience with kwashiorkor, marasmus, or specific vitamin deficiencies (e.g., beriberi, scurvy, and eye disease caused by vitamin A deficieney). Therefore, it is essential to set up specific guidelines for admission, treatment, and discharge, and for undernourished patients in intensive-feeding programs. In Khao I-Dang, guidelines were defined by the camp nutritionists and given to all health workers.

Anthropometric Data. The most frequently collected measurements at Khao I-Dang were weight and height. The body weight of pre-pubescent children is extremely sensitive to acute changes in food supply, whereas body length remains relatively constant over the short term.

The weight-for-height index was used in a number of surveys to assess the nutritional status of camp residents:

- Initial screening evaluation—All children < 110 cm in length who had no clinical signs of illness were weighed and measured, when possible, from every eighth vehicle entering the camp. Because the vehicles were coming from different border areas, estimates could be made of the nutritional status of the population in the border staging areas.

As shown in Table 15, among those children coming from Nong Samet, 4% were undernourished as were 7% of those from Nong Mak-Mum. Overall, 5% (11 of 235) of the children from both camps were acutely undernourished. Less than 80% of the reference median was defined as "undernourished" and < 70% as severely undernourished.

- Weight-for-height survey of 200 camp children < 8 years of age—Several weeks after the camp was established, 50 children from each of the four camp sections were weighed and measured as part of a larger survey of family life (i.e., food preferences, prevalence of amenorrhea, size of families).

TABLE 15. Weight-for-height status of newly arrived children < 110 cm high, Khao I-Dang Camp, November 22-26, 1979

Percentage of reference median	From Nong Samet number (%)		From Mak-Mum number (%)		Total number (%)	
<100	37	(21)	5	(8)	42	(18)
90-99	89	(49)	25	(46)	114	(48)
80-89	47	(26)	21	(38)	68	(29)
<80*	7	(4)	4	(7)	11	(5)
Totals	180	(100)	55	(100)	235	(100)

In this survey, 1% (two) of these children were <80% of reference median weight-for-height. In addition, 66% (94) of 143 eligible children, i.e., all those < 5 years of age, were regularly attending the supplementary-feeding centers.

- Systematic weight-for-height survey of children vaccinated for measles—Every fifth child (ages 6 months-6 years) vaccinated during a measles-control campaign was weighed and measured. More than 7% of the vaccinated sample children were undernourished (<80%), and nearly 2% were severely undernourished (<70%) (Table 16).

The anthropometric data showed good reproducibility from one survey to another and indicated that the percentage of undernourished children in the camp who were not in either therapeutic or supplementary-feeding programs was not large. The data also showed that 20%-30% of children examined were between 80%-89% of the reference median, or "borderline" undernourished. For these children, a supplementary-feeding program could be an important prevention tool.

TABLE 16. Weight-for-height survey of children, 6-72 months of age, vaccinated for measles, January 15-22, 1980

Percentage of reference median	Number	(%)
> 90	746	(69.6)
80-89	234	(21.8)
70-79	73	(6.8)
< 70	19	(1.8)
Totals	1,072	(100.0)

Laboratory Tests. Monitoring undernutrition with biochemical tests (e.g. serum albumin, carotene, vitamin A) is rarely practical in a refugee situation. The field laboratory in Thailand was limited to carrying out basic procedures including measuring hematocrit, blood-typing, and analyzing blood smears for malaria.

A survey of hematocrit levels was done on a convenient (but non-random) sample of 111 incoming refugees as part of the initial screening process. Blood was obtained by fingerstick, spun down in a small centrifuge, and immediately read. The highest percentages of anemia (defined in this situation as a hematocrit of <30%) were found among pregnant females (38%), with male orphans being close behind (31%). Anemia was much more prevalent among hospitalized patients as a result of several factors including undernutrition, intestinal parasites, malaria, and other acute and chronic infections. The results indicated only a moderate degree of anemia but did lend added impetus to the routine use of iron and folic acid supplements, particularly for pregnant women.

Hospital Records. Nutritional status reports should include an analysis of illness and death associated primarily with undernutrition. Health teams working in the border settlements often sent the very sick and the wounded to Kha-

I-Dang hospital where additional health serviees could be provided. The initial rapid health screening of all incoming refugees identified additional seriously ill refugees who were immediately referred to the hospital. These emergency referrals bypassed the nutritional surveys done in the screening area and in the camp itself. Therefore, the relatively low prevalence of undernutrition in the camp surveys did not reflect the situation in the hospital wards. Unlike the general camp situation, undernutrition was a serious problem among hospitalized patients. In fact, it was the single most common primary admission diagnosis in the hospital, even exceeding the total of all surgical admissions.

Chapter 16

Surgery during Khmer Refugee-Assistance Efforts in Thailand

Magnus Grabe

Background

From the beginning of the Khmer refugee crisis in 1979, it appeared necessary to put surgical teams in the refugee camps to cope with soldiers and civilians wounded in the military clashes. The first, a Norwegian Red Cross surgical unit was set up at Kamput. At Sakaeo, the initial surgical facilities were in a tent serving as an admission ward. A more complete surgical unit was later installed under a bamboo shelter. By the end of November, when the large influx of refugees into Khao I-Dang had begun, surgical equipment removed from a French hospital ship, *Ile de la Lumiere*, was set up in a tent in that camp. As needs increased, an appropriately equipped surgical unit combining materials from the ship and from the German Red Cross was installed in a bamboo building with adjacent wards.

In the beginning, some parties felt that a large surgical capacity should be provided. This was not in agreement with the views on health-care priorities and general principles of the responsible agencies. Units for major surgery were located in the refugee camps clearly inside Thailand (i.e., not on the border) in areas marked with the Red Cross emblem.

Organization and Planning of Surgical Care

The Khao I-Dang Surgical Unit. The most comprehensive surgical unit was established in Khao I-Dang, approximately 20 km from the border. In 4 weeks it grew to a fully equipped unit (two operating rooms, four operating tables, with triage center, post-operative room, x-ray equipment, blood bank, sterilization equipment, and its own water and electrical supply. It was staffed by three regular surgeons (three-five additional surgeons were available in the camp if needed), two anesthetists, approximately 20 nurses, five technicians, and a large number of local helpers. Approximately 60 beds were available, but this capacity could be increased.

In addition to dealing with surgical emergencies from the camp itself, the Khao I-Dang hospital served as a referral center for casualties and other emergencies from the border area. The border medical teams did only minor surgical procedures such as cleaning and dressing superficial wounds and casting uncomplicated fractures. Patients who needed major surgery were referred to Khao I-Dang. In cooperation with Thai health authorities, provincial hospitals and surgical teams from Bangkok were kept in reserve.

Surgical Policy. There was always at least one surgeon in the camp at night in addition to the medical staff. In the event of an emergeney, the staff was available to work until a final order to evacuate. Only trauma surgery was performed except for a few emergency operations done to relieve severe symptoms such as pain from tumors, serious uterine blecding, or threatened hernia incarceration. Similarly, dental treatment included draining abscesses and extracting of carious teeth.

Management of Emergency Cases Referred from the Border

Elements in the management of sick and wounded refugees referred from the border included: triage, evacuation from the border, pre- and post-operative care, and rehabilitation.

Triage. During the early phase of the crisis, the rate at which refugees would arrive at Khao I-Dang was uncertain. The UNHCR was responsible for the transfer of healthy civilians, and the ICRC was in charge of the sick and wounded. Medical teams at the border separated refugees into three groups: those who needed attention immediately; those who would need attention within 24 hours; and the disabled and the elderly, who were transported for humanitarian reasons.

After 7-10 days there was no need for triage, as the sickest patients had been transferred and effective health screening had been established.

Evacuation from the Border. Small pickup trucks were used for transporting one or two patients. If many patients were to be transported simultaneously, as happened on January 4, 1980, when over 100 wounded were colleeted from destroyed settlements, large trucks containing mattresses were made available.

Radios proved extremely valuable. Medical and surgical teams could be alerted before sick and wounded or any large groups of refugees arrived. Radios also allowed the camp to be alerted to any potentially threatening military activities.

Pre- and Post-Operative Care. When patients could be transferred without risk of life, no medical or surgical attention was given until they arrived at Khao I-Dang. Upon arrival, patients were seen in the admissions ward for rapid diagnosis. They were rehydrated and prepared for surgery when necessary. X rays were done when appropriate, and a small laboratory performed blood grouping and cross matching. Those who had surgery went to a post-operative recovery room and eventually were transferred to a ward. Those who were not surgical candidates went immediately to a general ward.

Rehabilitation. As a consequence of mine injuries and other wounds requiring amputation, planning for rehabilitation involving the making and fitting of prostheses was begun early in the operation. Prosthesis fitting and training eventually became a major activity at Khao I-Dang.

Surgical Activities

In the period November 27, 1979-January 20, 1980, 521 operations were performed at Khao I-Dang. Emergency surgery comprised 80% of the operations; 60% of the patients were male, and 67% were 15-44 years of age.

Table 17 indicates the principal operations done on 162 war casualties. These represent 31% of all operations and 38% of the emergencies. Table 18 shows the principal non-war-related operations. Of all the operations performed, 31.1% were war related. The mean was 9.5 operations/day, with a daily maximum during the first week of January of 16.3.

Discussion

Surgery in refugee camps is considered to be "heroic" and receives a great deal of attention from journalists and visitors. This can bias their view of an entire program of health-related activities. It was sometimes difficult to convince visitors of this fact and to demonstrate the importance of other less spectacular public health programs of equal or greater benefit.

One criticism from some foreign visitors was that, since the casualties were occurring along the border and not in the established refugee camps in Thailand, the surgical units should have been on the border. However, such units must be located in safe and stable places and not be jeopardized by military action. Buildings serving as hospitals and out-patient departments were destroyed by fire during military action at several border settlements.

Although emergencies occurred frequently, there were always surgical teams in reserve. This situation was sometimes frustrating for the staff, especially since much-needed elective surgery had to be postponed. Later, during the relief action, this policy was reconsidered, and with better facilities, more of the existing staff were utilized.

TABLE 17. Surgery related to war injuries, Khao I-Dang, November 27, 1979-January 20, 1980

Operation	Number	(%)
Laparotomy	27	(16.7)
Thoracotomy	10	(6.2)
Amputation	22	(13.6)
Debridement and wound suture	103	(63.6)
Total	162	(100.1)

TABLE 18. Non-war-related surgery, Khao I-Dang, November 27, 1979-January 20, 1980

Operation	Number	(%)
Laparotomy	41	(11.4)
Appendectomy	19	(5.3)
Hernia repair	13	(3.8)
Tumor surgery	18	(5.0)
Abscess incision, suture, dressing	104	(29.0)
Other (not specified)	75	(20.9)
Gynecologic and obstetric operations		
—Caesarean section	13	(3.6)
—Curettage	59	(18.4)
—Hysterectomy	17	(4.7)
Total	**359**	**(99.9)**

PART

Refugee Public Health Considerations

Chapter 17

Refugee Public Health Issues

Magnus Grabe

The study of refugee health-assistance programs is somewhat similar to the study of public health aspects of natural disasters. Medical efforts associated with natural disasters seem to involve a series of problems that are common to each type of disaster (e.g., earthquake, flood). As such, these problems can and should be approached as a system. So, too, public health efforts among refugees can be approached as a system in which successes and failures are assessed and acted upon.

Public Health Issues

Table 19 lists the major components of a public-health approach to a refugee-assistance program. These "preventive medicine" activities need to be implemented early in the program and should eventually supplant "curative" medical care. It is important to recognize that public health interventions (e.g., clean water, sanitation, vaccination, health education) and not high-technology medicine are chiefly responsible for the differences in health status and life expectancy among members of populations of developing and industrialized countries. As such, these interventions have a short-term as well as a long-term effect on the health status of groups of refugees. In addition, the effects of some of these efforts—particularly health education and vaccination—may persist long after the relief effort has ended. Many of these components can be combined in a well-planned clinic for children < 5 years of age.

Social and Psychological Issues

The inclusion of mental health and traditional medicine as public health issues represents an acknowledgment of the increasing appreciation on the part of Western-trained health personnel of the importance of respecting social customs and of recognizing signs of psychological trauma among refugees/migrants. Armed conflict in third world countries tends to affect civilians even more adversely than it does active combatants. In most instances, this leads to disruption of families and displacement of potentially large segments of the

population to areas far from their homeland. Relief agencies should regard the preservation of cultural and social integrity as being equally important to the physical preservation of life. Such efforts have frequently been thwarted in the past by local political processes, military concerns, or personal interests of well-meaning but misdirected individuals or agencies.

There is also an increasing, but still limited, understanding of the role that the refugees themselves need to exercise in assistance efforts. Defining their own basic needs and deciding on use of available resources helps to preserve and strengthen self-reliance. In the sometimes hurried attempt to provide emergency health assistance, the need to respect the culture, traditions, and independence of the refugees must not be forgotten.

TABLE 19. Some components of a public health approach to health care for refugees

Component	Activities/tasks (examples)
Epidemiology	Data collection/analysis for health planning and disease control and post-intervention assessment; investigation of disease outbreaks; investigation and control of disease-related rumors
Traditional healers	Integration of traditional and technical medicine in relief efforts
Mental health	Support for community efforts in treating persons with mental and stress-related problems
Sanitation	Safe water supply; waste disposal
Nutrition	General camp nutrition; nutritional surveillance of children
Disease prevention programs	Vaccinations and other control measures, as indicated, against prevalent diseases
Maternal/child health	Nutrition for infants, children, and pregnant and breast-feeding women; family planning
Health education	Nutritional education for mothers; oral rehydration therapy

Chapter 18

The Evolution of a Regugee-Assistance Operation: Who Is Needed—And When?

Phillip Nieburg, Donald T. Allegra, Magnus Grabe

The discussion and principles that follow were prompted by the realization, when beginning to analyze experiences among Khmer refugees in Thailand, that refugee situations are not only generally similar to each other but also are similar to "natural" disasters in terms of sequences of events (although the duration of or rates of change of phases may vary somewhat). This knowledge of the repetition of phases probably allows for tentative but useful planning well in advance of the beginning of a phase.

Phases of a Refugee-Assistance Operation

As with nearly any crisis, a number of phases of refugee crises can be defined (Table 20). As the health status of refugees in this and other situations may—and did—change over time, the priorities assigned to the important health needs that have to be dealt with will—and did—also change. The phases, with their corresponding responses, can be described as follows.

Warning (or Pre-Impact) Phase. This phase begins at the moment a crisis is anticipated. Ideally, the responsible health agency begins at this time to collect data on the affected population and its health problems and begins to consider what outside resources might be needed for effective assistance. The emphasis in this phase should be the assessment of potential problems, plans for required responses, and identification of individuals and agencies best equipped to assume specific responsibilities should active intervention become necessary.

Impact Phase. This phase begins when a crisis is acknowledged to have arisen. Before undertaking any major relief efforts beyond initial lifesaving first aid, a Ministry of Health or other responsible agency should insist upon a systematic and rapid evaluation of the situation together with an assessment of immediate needs. The health component of such a rapid-assessment team should include people with expertise in the following areas: epidemiology/public health, nutrition, sanitation, pediatrics, general medicine, and surgery, if in

TABLE 20. Importance* of certain health activities in various phases of refugee-assistance operations

Phase	Onset of phase	Major tasks of health agency(ies)	Estimated length of phase	Assessment of data	Curative health care	Prevention: Sanitation	Nutrition	Immunization	Health Education
Warning or pre-impact	Crisis is anticipated	Establish data base on population and resources; begin planning	Varies	4+	1+	1+	1+	0	0
Impact	Crisis is recognized	Send team for rapid assessment; continue planning	2-5 days	4+	1+	1+	1+	0	0
Emergency (rescue)	Health-assistance personnel arrive	Send staff and resources for emergency care; continue planning	2-6 weeks	4+	4+	2+	4+	0	1+
Recovery	Morbidity and mortality rates begin to fall	Send *ONLY* needed personnel and other resources	2-3 months	4+	3+	4+	4+	4+	4+
Rehabilitation development	Socio-political situation stabilizes	Send *ONLY* needed personnel and other resources	Ongoing	2+	1+	4+	4+	2+	4+
Post-operation reassessment	Health agency involvement ends	Extract lessons from operation	Varies	4+	0	0	0	0	0

*Rated on scale of 0-4+; 4+ indicates greatest importance.

a zone of military conflict. The goal of the team should be to obtain information about the approximate number of people affected by the crisis, type and severity of existing or potentially threatening health problems, and any logistical infrastructure in the affected area that might be used to help provide effective assistance. This might include access to the area from an airport, access roads, existing warehouse space, water supply, and local health facilities.

Once the magnitude and severity of the existing health-care needs have been determined, the number and types of additional health professionals required can be estimated. For instance, it was apparent from the beginning of the Khmer relief operation in Thailand that malaria and undernutrition were major problems, especially for young children, and that health personnel experienced in tropical disease, nutritional rehabilitation, and pediatrics were needed most urgently. At the same time, there was relatively little work for surgeons and anestheologists. It was also evident that the relief effort, at least initially, would have to be almost entirely self-supporting since few local resources could be spared for the care of Khmer refugees in Thailand.

Emergency (Rescue) Phase. This phase, which should begin simultaneously with the rapid assessment mentioned above, actually begins as soon as any health workers in the affected population or host community mobilize themselves. As in other disaster situations, the efforts at the beginning of a refugee-assistance intervention may have to include some selection of patients by triage. That is, when available resources are insufficient to treat everyone seeking help, experienced persons must determine who will benefit most from treatment.

During the initial emergency phase, when little more than first aid can be made available, the importance of data gathering and analysis may erroneously be discounted as a luxury. This could be a potentially serious error. Thus, at the Sakaeo camp in Thailand, one problem discovered through simple data collection was that a large number of out-of-hospital deaths were occurring. Awareness of this fact allowed increased emphasis to be placed on daily hut-by-hut searches for ill people in need of—but without access to—hospitalization.

In refugee situations that involve food deprivation, preventive nutrition assumes great importance in the emergency phase; emphasis on providing adequate food early in a relief effort will minimize the number of people who must be nutritionally resuscitated later on. Also, since large numbers of young children are usually most at risk of undernutrition and disease in refugee situations, sufficient health personnel with pediatric experience must be available in the emergeney phase. Assessment (data collection and analysis) personnel continue to be useful in this phase.

If not already involved in the planning and implementation process, sanitarians, experienced trainers of community health workers, and other prevention-oriented people from among the refugees and outside agencies become a valuable asset at this time.

Recovery Phase. This phase begins gradually as the emergency phase ends. One of its foremost objectives should be the restoration of the refugees' autonomy. Mortality (deaths) and morbidity (illness) rates generally decrease from

levels reached in the emergency phase, and the social structure of the refugee population should begin to be reestablished.

At this point, simple but adequate data about the types of problems still to be faced by health-care agencies should be available. The almost total dependence of the refugees on outside help, which has been given until this stage of the program, must not be allowed to continue. Although continued assessment is needed, the training of refugee workers to take over much of the data collection and analysis tasks should be under way.

Since the emergency phase is over, the need for curative health-care is diminishing, and fewer cure-oriented health workers are needed. This is important because there is a tendency for more and more curative health workers to arrive at the scene of a disaster or refugee crisis in this phase (the "convergence reaction"). An excess of workers whose only skills are in curative medicine may be detrimental to the important work of shifting the assistance effort at this time toward prevention, community health, and increasing self-reliance for the refugees.

During the recovery phase, prevention assumes its greatest importance. Greatest emphasis should be placed on programs such as sanitation, supplementary feeding, and immunization. Health education, hopefully begun earlier, must also receive emphasis during this phase if the refugees are to continue their recovery and progress toward self-reliance.

Rehabilitation (Development) Phase. This phase begins after rates of illness and death have returned to pre-crisis levels. At this point, the refugee-assistance effort should become a developmental effort, with primary emphasis placed on preventive health measures. Continued presence of health workers who only practice high-technology curative medicine is counter-productive, as is continued diversion of major resources to curative health-care efforts. As more and more of the health system is taken over by the refugees themselves, volunteer health professionals can gradually be withdrawn.

Post-Operation (Reassessment) Phase. This phase begins as soon as priorities permit a thoughtful analysis by the involved health agencies. An immediate task in this phase is the extraction of as many lessons as possible from the operation so that future efforts can profit from the mistakes and successes of the just-completed effort. This requires not only the analysis of data but also a willingness by all concerned to determine objectively what might have been done more effectively. Such evaluations will ultimately provide a basis for improving agency programs, efforts of individual health workers, and quality of care provided in future refugee-assistance programs.

Personnel Considerations

Health workers trained in industrialized countries to practice sophisticated medicine may have difficulty coping with the problems faced in the early phases. The situation is often in flux, and the uncertainty of recent past events and the unpredictability of future events may lend additional instability. There is a great deal of work to be done (including simple manual labor) and often not enough people to do it. Drugs, bandages, blankets, and other needed materials are in short supply, and diagnostic laboratory facilities are non-existent. Finally, there is the difficulty of working with people from other countries and cultures with varied professional and personal backgrounds. Persons who lack experience working in developing countries or who lack understanding of public health concepts may initially have difficulty constructively resolving the conflicts resulting from placing emphasis on preventive versus curative medicine and agreeing on the appropriate level of technology that should be applied in emergency relief programs.

There was a great need in the Khmer relief effort (and there continues to be in other refugee situations) for people who are generalists and who are flexible enough to take on unaccustomed tasks and roles. Health workers who come with pre-conceived ideas of their roles may fail to see the changing requirements of the situation. The most effective people in such a situation are those who can accept the eventual emphasis on a community and public-health approach to the health problems of the refugees. Personality and motivating factors of health workers also are important. "Soldiers of fortune" out for adventure, political or religious activists seeking to obtain converts, and unhappy individuals trying to escape job or family problems at home are not good candidates to be refugee health workers. Work in refugee camps can be a physically and emotionally draining experience that requires a great deal of personal maturity, congeniality, and flexibility. The behavior of volunteer health workers must be acceptable not only to their colleagues but also to the refugees and the people of the host country.

Conclusions and Recommendations

- Refugee-assistance operations proceed through a characteristic sequence of phases representing changing assistance needs.
- Emphasis during the pre-impact and impact phases should be placed on assessing potential and actual problems and assessing the resources needed and available to respond to these problems.
- The emergency phase, with its emphasis on "rescue" and on curative medicine, is eventually succeeded by phases requiring ever-increasing emphasis on prevention. Staff experienced in various aspects of preventive health care (e.g., nutritionists, sanitarians) must be recruited and put to work at the outset of any assistance effort.
- The recovery and rehabilitation phases are characterized by heavy emphasis on prevention, education, and increasing self-reliance for the refugees.
- The post-operation reassessment phase should be an integral part of refugee-assistance operations. Thorough and objective analysis will benefit programs of participating agencies, efforts of individual health workers, and current and future refugees.
- Careful briefing of health workers on the types of problems to be faced is the responsibility of the participating relief agencies. In addition to specific health issues, this aspect of the program should emphasize the importance of

respecting the culture(s) of the refugees and of the host country. Finally, this briefing should also emphasize that personal goals may have to be set aside in order to achieve the goals of the relief effort and that individuals may find themselves asked—and expected—to fill roles other than those they anticipated. Critical personality characteristics such as flexibility and emotional maturity should be considered when agencies recruit health workers.

Chapter 19

Overall Organization of a Refugee Health-Assistance Program

Magnus Grabe, Donald T. Allegra, Phillip Nieburg

Because conditions vary widely by geographic location, no single set of rules can be used for organizing and managing health-assistance programs for persons uprooted from their homes and displaced to other locations. Creativity and flexibility are necessary, and involving the community itself in planning and managing relief programs will increase the chances for success. Despite inherent differences in types of relief programs, some basic organizational elements should be considered in setting up any refugee-relief operation. This section details an organizational framework that can serve as a guideline for similar operations involving health-care activities among refugees.

General Aspects

Several factors should be considered in the preliminary planning of facilities to be used in a health-assistance system:

- The geographic environment—with special concern given to local resources, housing, and climate.
- The socio-economic background and political status of the refugees.
- The political and military situations and the security factors involved.
- The characteristics of the settlement (e.g., transitional, semi-permanent, permanent).
- The stage at which relief organizations might become involved.
- The health-care personnel available from among the refugees, the host country, and volunteer agencies.
- The financial resources available.

The rapid assessment of the basic requirements for health is of great value in setting priorities and planning for short- as well as long-term goals. This assessment requires the use of epidemiologic techniques for surveillance and flexible response. The methods of applying these techniques in the Khmer relief effort in Thailand are discussed in detail elsewhere in this report (see Chapter 8). Basically, data can be collected by:

- Walking around to get a clear overall impression of the camp.
- Identifying the numbers and causes of deaths.
- Identifying common symptoms and disease patterns in hospitals and out-patient facilities.
- Obtaining birth rates, data on pregnant females, and birth outcomes.
- Conducting surveys to determine population characteristics (census, age and sex distribution of the population, and objective measurements of level of health such as nutritional status).
- Listening to the needs expressed by the refugees themselves (who may be able to identify needs that would not otherwise be obvious), by local authorities, by host-government health authorities, and by the international agencies involved.

Health programs should be based on facts—not on rumors or feelings. The basic information collected will allow more rational planning of hospital space, out-patient departments, nutrition centers, intensive- and supplementary-feeding centers, storage facilities for drugs and other relief goods, logistical support, laboratory and other technical and administrative services, and the most effective allocation of community health workers and other health professionals from the refugee community.

Whenever a large, newly arrived (or arriving) group of refugees is to receive health assistance, the basic procedure for organizing medical services may involve the following:

- Organizing health screening, census recording, simple surveys, a basic needs and risks assessment, and a system for epidemiologic surveillance.
- Providing basic out-patient care, including maternal and child health programs and supplementary-feeding centers.
- If needed, helping the refugees and/or the local government to set up a central administration area that also serves as an emergency room and admission ward.
- Helping to arrange an effective referral system for all specialized care with the local health authorities.
- Providing for regular receipt and storage of drugs and other supplies.
- Establishing a basic laboratory for performing simple diagnostic tests (in keeping with diagnostic standards of the host country and with special health problems of the refugees).
- Providing adequate logistic and administrative support.

Out-Patient Care. Out-patient clinics and community health workers can be distributed throughout the settlement as resources allow and as the needs of the refugees indicate. Because such facilities can include supplementary-feeding and maternal and child health services, they can be major factors in providing both curative and preventive services. Curative services involve treating persons who are ill but can be seen as out-patients, treating severely ill persons until they can be admitted to the hospital, and providing care as needed for patients who have been discharged from the hospital. Preventive services include early identification of ill persons and of high-risk persons who might

become a major problem for the community, close cooperation with the supplementary-feeding and maternal and child health programs, and participation in special programs (e.g., immunization, home visiting, and health education).

Hospital Facilities.

- Admission center—Evaluation in a central admission ward of all patients who may need to be admitted to the hospital can be useful. Such a ward can also be the coordination point should there be a sudden large influx of patients. A record for each patient admitted, including initial diagnosis, will allow ongoing assessment of patterns of illness. Changes in these patterns can then be promptly noted and investigated.
- Wards—From the admission center, in-patients should be transferred to a treatment unit or ward where longer-term care can be provided. In developing areas where undernutrition is a risk, the sudden displacement of large groups of people can lead to widespread undernutrition, particularly among young children. Early emphasis on the need for pediatric units and intensive-feeding centers may help highlight the importance of such facilities. Maternity units with delivery rooms may be needed. The extremely crowded conditions in many refugee camps increase the potential for outbreaks of infectious disease, which may create a need for one or more isolation areas. Except for persons who need to be in pediatric wards, obstetric units, or intensive-feeding areas, most patients should be able to receive adequate care in general wards.
- Surgical unit—Although usually not a priority, surgery may sometimes play a key role when armed conflict is associated with a large number of traumatic injuries. No fixed rules are applicable to all situations. Factors that influence the type of surgical assistance needed include military and political conditions, camp location in relation to areas of conflict, whether patients who need emergency surgery can be referred to local hospitals, and the general health of the population at large. Most minor surgical problems such as superficial wounds, closed fractures, and obstetric/gynecologic problems can be effectively managed with limited equipment and space. However, when multiple war injuries are anticipated or when there are a large number of refugees, problems will arise that will require more sophisticated surgery involving additional equipment and strict attention to aseptic technique. Examples of such problems include caesarean sections, emergency laparatomies, open fractures, and serious gunshot injuries. In the initial phases of a relief operation, only emergency surgery should be done. After general health services are available, limited elective surgery can be considered. This service can be expanded as needed as the situation stabilizes and as additional health resources become available. Collection and analysis of data on surgery can provide a basis for better planning not only for currently operating programs but also for future emergency assistance programs.

Other Facilities. Not to be omitted in the planning are arrangements for food preparation, safe water storage and distribution, washing areas (e.g., laundry), garbage collection and disposal, latrines, warehouse space, and a suitably located morgue.

Food can either be prepared by patients' attendants in a specified area of each ward or in a central kitchen from which the food is distributed. An adequate supply of safe water must be readily available. At least 14 liters/day for each person in the camp is required. For hospitalized patients, much more may be needed.

A fence around the hospital area will help define the area and limit access only to authorized persons. In some situations, security officers may be needed to safeguard hospital, water, food, and drug supplies.

•Pharmacy—Early identification of the most prevalent health problems for which patients need to be hospitalized permits the most efficient selection of needed drugs and supplies—which should be limited to essential items only. In order to have an effective pharmacy unit, the following are needed: a) a closely guarded storage facility; b) a full-time person (pharmacist, if possible) responsible for inventory; and c) lists and prescriptions of drugs written as generic rather than trade names.

•Laboratory—As discussed in another section (see Chapter 29), a basic laboratory is a necessary facility in most field situations. This will improve the accuracy of diagnosis and treatment and thus reduce the risk associated with the empirical use of unneeded drugs. As an additional consequence, costs will be lowered.

Logistic and Administrative Support.

•Referral system—To maintain good relations with the host population and to be efficient, existing health-care facilities accessible to the refugees should not be duplicated. If needed, existing facilities can be strengthened with additional equipment, drugs, supplies, and/or staff. The establishment of an effective referral system for transferring patients with complicated medical or surgical problems who cannot be taken care of in the refugee camp is important.

•Standardized records—In addition to information acquired from surveys, standardized records should be kept on all hospital admissions, discharges, bed occupancy, deaths, and births. The admission center or ward should record the diagnosis of each patient admitted, with the records of patients being kept in their individual wards. Surgical procedures and anesthetic technique used must be clearly described. Reporting can be done on simple standard forms. Card systems for ambulatory and in-patient treatment as well as supplementary feeding should be standardized and, if at all possible, should be available from the very beginning of the relief program. Every child <5 years old (or measuring <110 cm tall) should be issued a UNICEF "Road to Health" or other immunization and growth record card in a plastic cover at the first visit to the maternal and child health center. All such data should be reported at predetermined intervals to the administrative office, where they are compiled, analyzed, and transmitted to the authorities responsible for policy and program planning.

Coordination of Emergency Health-Assistance Programs

No other factor determines the effectiveness of an international emergency-relief effort as much as the degree of coordination of individual efforts achieved among the host government, national and international relief agencies, and the leadership of the refugee community. The Khmer refugee-relief program was effectively served by camp-based medical advisory boards and regional medical coordinators responsible for setting objectives, establishing health-care policies, and determining day-to-day implementation. Ideally, such a medical advisory board should include representatives of the staff from different areas of activity, but with special emphasis placed on public and primary health-care. Its main tasks should be:

- Establishing clearly defined objectives.
- Setting priorities for problems to be solved.
- Working out medical policies, and the level of care to be provided, as well as giving advice on ethical issues.
- Working toward minimizing the variety of drugs used by standardizing treatment schedules.
- Assuring an effective reporting system to include feedback of reliable information to local governmental refugee health authorities, local political and military authorities, the leadership of the refugee community, designated officials of the international and national agencies involved, and individual health workers. Governmental or international agencies should, in turn, provide information to the news media.
- Coordinating the efforts of all agencies in dealing with issues of health, nutritional status, and environment of the camp (all public-health, housing, food, vector-eradication, health-education, and training programs).
- Collecting information on possible abuse, torture, or other violations of human rights and reporting it to the proper authorities.
- Assisting foreign health workers in dealing with problems concerning personal health and security.
- Coordinating the storage and distribution of drugs and supplies.

The advisory board should have regular meetings chaired by the medical coordinator or designated representative. Members of the advisory board should include representatives from the refugee community, the health administration of the host country, and representatives of those international agencies providing health care.

Other Important Issues

Health Care of Foreign Health Workers. Foreign medical personnel who are providing emergency care to a medically indigent population often forget to take even simple precautions to protect their own health. Indicated vaccinations should be given to all staff before they arrive at the camp. Guidelines for personal health-care should also be distributed. The need for strict adherence to these instructions should be reemphasized at regular intervals. The camp epidemiologist or other persons responsible for maintaining disease surveillance sys-

tems should maintain separate registers for health problems reported by refugee, national, and foreign workers. Provisions should be made for adequate rest during work shifts, a supply of safe drinking water, and regular meals for all health-care staff. Maintenance of adequate health and morale among the staff will promote the efficiency of the assistance effort.

Role of the Health-Assistance Program in Unstable Situations. Under unstable circumstances when armed conflict may occur at any time, maintaining an effective health service can be difficult. In such a situation, the expectations and scope of health-care services provided may have to be reduced. Mobile units, small hospital units, and out-patient departments operating during daylight hours are often the only medical services that can be provided. The basic principles, however, are the same as in more stable situations. Although the mobile medical teams can perform many useful tasks, it is even more important under such conditions than in stable situations for them to train and depend on local personnel from the very beginning and to serve as advisers for more complicated issues such as sanitation and immunization. In such situations, the mobile medical teams should try to do the following:

- Establish and maintain a surveillance and data collection system aimed at the identifying and controlling of infectious diseases.
- Regularly visit any in-patient units and provide equipment, drugs, and advice as indicated.
- Encourage the maintenance of an out-patient system and support realistic preventive activities.
- Perform surgery only on an emergency basis and/or when referral is not possible.
- Carefully select a basic emergency supply of drugs and supplies together with simple treatment regimens to enable local health staff to perform as well as possible under existing circumstances.
- Provide training and education that will be of permanent benefit to the local population (e.g., instruction in use of oral rehydration therapy).
- Plan and arrange for evacuation of health workers and refugees if indicated. This plan should be made in collaboration with local authorities and participating international relief agencies.

Summary and Recommendations

The need for rapid and skilled assessment of the needs of the refugee population, for the establishment of priorities, and for a community health-trained medical coordinator to chair an effective medical advisory board cannot be too heavily stressed. When health workers from different countries are involved in a refugee-assistance program, all activities should be carefully integrated to promote clearly defined goals. Finally, from the beginning, the refugees themselves should be incorporated to the fullest extent possible in their own health-assistance programs.

Chapter 20

The Role of Traditional Medicine in Khmer Refugee Camps

Jean-Pierre Hiegel

Traditional medicine is still very popular in Kampuchea and in many other developing countries. Many Krou Khmer (traditional Khmer healers) have fled their homeland and are refugees. Although some outsiders may regard them as ignorant and look upon their work with suspicion and contempt, the Krou Khmers' assistance in Thailand proved invaluable in solving many of the refugees' psychological and medical problems. No one should wish to prevent the Khmer from seeking medical assistance from traditional sources; rather it is crucial that the essence of traditional medicine be respected and allowed to function openly among the Khmer. At the same time, Western medicine can be provided, in cooperation with the Krou Khmer, to attain the mutually desired goal of patients' health and safety.

The traditional medicine centers (TMCs), created through the cooperation of the medical authorities in four Khmer refugee camps in Thailand, attempted to accomplish this goal. The organization and functions of the TMCs, the techniques used by the traditional healers, and the relationship between the TMCs and the camp medical staff are described in this section.

The 30-50 Krou Khmer in each center, including helpers and interpreters, developed for themselves a pyramidal organizational structure. One person was chosen to be responsible for each phase of treatment, and a "supreme head" was chosen from the wisest and oldest. In general, Krou Khmer serve as individual practitioners in their homeland; however, in the context of the centers, the group structure provided more assurance of accurate diagnosis and treatment. Less experienced healers learned from those who were more experienced, and group discussion and consensus contributed to a higher quality of care.

A patient going to a TMC was first registered by a secretary and then consulted the group of most experienced Krou Khmer, who discussed a case as necessary and noted the selected treatment on the patient's card. A record was maintained of all medication distributed, including herbal remedies. A relationship

between the Krou Khmer and the medical staff was based on the respect and esteem necessary for such cooperation.

The basis for traditional medicine is the power the patients attribute to the healers because of their respect for the persons and their ability; the respect, however, must be mutual. A patient's opinions are acknowledged as being important, and the Krou Khmer explains in a comprehensive and reassuring way the origin of the illness and the means for recovery. Because of this mutual respect, traditional healers can, if they trust the foreign staff with whom they work, help dispel many of the refugees' fears of modern medical techniques.

Khmer patients are accustomed to being allowed to judge the efficacy of traditional treatment, usually within 24 to 48 hours. They may then discontinue treatment (if the judgment is that they are well) or request to have the treatment changed if they do not believe the treatment has been effective.

The Krou Khmer approaches illness on two levels. First, he determines its nature through questions about symptoms, feelings, and personal and family history. On a second level, he concerns himself with the origin of the disease—i.e., as being either supernatural or natural. The healers usually inform the patient's Krou Komneut, or spirit, of the plans for treatment, including any injections and all types of vaccinations. The spirit is requested not to feel offended, not to seek revenge, and to allow the treatment to be effective. Without the spirit's approval, it is believed that the patient's illness will become worse.

Traditional medical approaches to healing can be divided into three groups: traditional remedies, physical treatments, and magic treatments. Traditional remedies may be prepared from vegetable, animal, or mineral material; 230 kinds of substances were provided in the centers by the traditional medicine pharmacies. Several different substances were often used in the composition of each remedy. Most were prepared through decoction; some were made by infusion in rice alcohol. These products were reduced to powder, which the patient took as a suspension in warm water. Coconut oil or honey was used as an excipient in preparing pills or tablets. For persons with skin diseases, an ointment was prepared by mixing the powder with beeswax and coconut oil. Suspensions in alcohol or in kerosene were also used for external applications.

The three types of physical treatments used were superficial burns, revulsion, and massage. Treatment by superficial burns may consist of either of two techniques. One involves placing a small ball of bamboo fibers on the skin, which has been coated with sticky clay, and then lighting the bamboo with an incense stick. The other involves burning the skin with a type of cigar made from kapok or from a cotton-like substance produced by a wild areca tree. These burns are usually superficial. This practice is common, and patients, including children, accept the treatment readily. Problems that burns are used to combat include stomach ache, leg edema, scrotal hernia, herpes zoster, splenomegaly, and scalp pyoderma.

Revulsion and cutaneous hematoma are performed in one of two ways, depending on the patient's choice. The healer firmly pinches the epidermis and

the dermis between two fingers while pulling on the skin. The same result is obtained by putting coconut oil or kerosene on the skin and rubbing the area with the edge of a coin. The aim of the treatment is to activate the circulation of "the wind" and thus allow it to leave the body.

Khmer massage is intended to act on the veins rather than on the muscles themselves. According to the Krou Khmer, muscular pains, stomach aches, and headaches are caused by veins that are crossed and must be stimulated in order to be straightened. For headaches, both temporal veins and each adjoining artery are massaged. Three points on the forehead are pressed. The ear lobes are pulled downward. The hair is also pulled, and the upper part of the nose is flicked with the nail of the index finger. The aim of this treatment is to facilitate the blood circulation. Khmer massage may be somewhat painful for persons not accustomed to it, but it may help one feel relaxed.

Magic cures have two aims: to force the spirit to speak through the mouth of the patient and to drive it out of the body in order to free the patient from its influence. Pharmacology and magic are combined when the Krou Khmer chew leaves or roots and spray the sap on lesions while reciting special magic words. However, some traditional healers believe only in the medicinal effect of the plant. Betel leaves and areca nuts are used for sprains, herpes zoster, conjunctivitis, abscesses, and cutaneous infections. Young leaves of avocado pears are preferred for convulsions and epilepsy.

Western medical persons working in a foreign setting may find it all too easy to transpose the relational and therapeutic models familiar to them—in part because they may not ever have questioned them. However, the need to cooperate with traditional healers requires that outsiders respect the beliefs and traditions of the people with whom they work and that they learn to recognize the value of a different knowledge base acquired through tradition rather than university training.

The number of volunteer staff members at the TMCs was held to a minimum. Each day the group met with two or three of the more elderly Krou Khmer to share information and to agree on certain decisions. Demonstrating genuine respect for the chief Krou Khmer was of great importance at these meetings. Asian interpersonal relationships involve many shades of meaning and subtleties that may be difficult for Westerners to understand. Flexibility and adaptability are necessary attributes for Westerners working in TMCs.

It is always essential to respect the requests and needs of each patient. Traditional medicine in Khmer refugee camps was an essential part of an adequate response to the psychological needs of the refugees; it provided them a framework in which their culture and their traditions were accepted and praised. Traditional medicine is not necessarily dangerous; rather, if the skills of traditional healers are used in conjunction with more sophisticated medical practices, greater safety and better health for the patients can be achieved.

Chapter 21

The Role of Khmer Refugees in Their Own Health Care

Margarita Broms

The international community is becoming increasingly aware of the health-care needs of refugees—a seemingly ever-increasing number of people forced to leave their homes and source of sustenance. This has led to the presence of many volunteer health workers providing care to uprooted people around the world. Most of these volunteers are anxious to help but tend not to understand the relative priorities accorded to various needs by the refugees themselves.

A problem of equal importance is that the foreign health worker may not be oriented to a community health-care approach. Such an approach, as mandated by WHO (Alma Ata 1979), is based on the understanding that minimal health care represents a basic communal and personal human need, perhaps even a basic human right. This concept calls for participatory integration of the community in the planning and management of all health-care programs—whether educational, preventive, or curative.

There are many reasons to include the refugees themselves in the various activities of a refugee camp. First, participation in decision making and actual provision of health care will ensure that the role of the refugee community is active rather than passive and will encourage the refugees to accept responsibility for improving their own health status. This will strengthen self-reliance and self-support. It will also speed up emotional and overall social rehabilitation, and it may help establish a climate in which mutual respect and a degree of understanding between foreign workers and refugees can develop. Second, the refugees are the ones who can best identify their own health needs. Their input is essential in the task of integrating traditional medicine with "modern" medical practices. Third, foreign staff are usually short-term workers who are able to provide only temporary support and advice. After they have left, the refugees themselves will again have to provide most of their own health-care services as they did before they were forced to leave their homes.

This discussion includes reports of some of the contributions made by refugees at the Khao I-Dang holding camp in the management and provision of health-care services.

Health Screening and Out-Patient Departments

On the day the camp at Khao I-Dang opened, nearly 5,000 Khmer refugees, including several hundred ill persons, arrived at the hastily prepared settlement. The magnitude of identified health problems was overwhelming, and help was obtained from any English- and French-speaking refugees available. Within a few days, Khmer physicians, nurses, midwives, medical students, pharmacists, and dentists had been registered and integrated into foreign medical teams.

Without the assistance of these Khmer personnel, it would not have been possible for the health-care programs at Khao I-Dang to function. Growing wards with hundreds of ill persons, thousands of daily visits to the out-patient departments, management of a hospital kitchen, and establishment of supplementary-feeding centers required assistance with tasks such as registration, translation, and maintenance of order. The Khmer were also involved with triage (i.e., selecting the most severely ill patients to be seen first), diagnosing illness, prescribing and handling medications, applying dressings, and giving injections. Ante-natal clinics near the screening area where pregnant women were first seen and registered were run by Khmer midwives, as were the two delivery rooms and the maternity wards. Khmer artists painted the posters used to teach basic disease prevention and health maintenance concepts in the supplementary-feeding centers.

Camp Organization and Public Health

The camp was divided into sections containing 10,000-12,000 persons, overseen by local Khmer management committees. These committees were responsible for distributing food, planning the construction of temporary houses and other shelters, and providing essential security measures. They also supervised distribution of water, garbage collection and disposal, cleaning of latrines, and burial of the dead.

Curative Medicine

The Khmer were involved in the entire spectrum of health-care activities—including language translation, health training, and diagnosis and treatment of disease—and Khmer physicians, nurses, medical and nursing students, and helpers performed tasks almost identical to those done by the foreign staff members. Their participation was essential because of their knowledge of the culture, social and religious customs, and the priorities assigned to various needs by the patients themselves. In the kitchen, food for all patients was prepared and distributed by Khmer workers. Khmer also helped staff the laboratory, pharmacy, and warehouse.

One of the pediatric wards at Khao I-Dang illustrates integration of Khmer staff in the provision of health-care services. Several Khmer were directly involved in planning and running the pediatric ward, which had a capacity of 8 patients. On a rotation schedule they staffed the kitchen, served as day an night security guards, and assisted nurses and physicians. Women, often wit prior experience in health-care work, assisted or substituted for nurses an were trained to give injections, distribute drugs, and feed infants. A Khme medical student worked with foreign physicians and learned to perform many c their tasks. At the daily staff meeting of all nursing personnel, the head nurs discussed such subjects as general hygiene, nutrition, breast feeding, simpl diagnoses, and basic therapeutic concepts. Attending mothers of in-patient were taught simple nutritional principles and were responsible for keeping thei children's beds clean. Some tasks such as sewing were also done by thes women. When pediatric patients were discharged, their mothers were instructe when and where to go for follow-up care.

Basic Education, Semi-Professional Training, and Social Activities

Long-term training was of two different types. First, and probably mos important, was the daily work in the wards and in the out-patient departments Second, efforts were made to establish training courses in basic primary healt care for volunteer women working in the different sections of the camp, th supplementary-feeding centers, and the kitchen. These women later served a home visitors to discuss preventive measures and to provide home nursing care. In addition, midwives and medical students were given training in thei areas of specialty. Continued efforts to improve all the training programs ranged from teaching basic primary health care to establishing a nursing school.

The Khmer appeared to regain their former cultural identity rapidly at Khao I-Dang. For example, with support from international organizations, forme teachers organized a school for children 7-12 years of age. Recreational activities (including sports, various games, and traditional dancing) were begun, and the formal observance of Buddhist rites was resumed.

Conclusions

The foregoing outlines examples of cooperation between refugees and foreign relief staff in a large holding camp. Common difficulties encountered by foreigners included avoidance of the temptation to do all the work by themselves, recognition and acceptance of resources that existed among the refugee population, and integration of the refugees into a health-assistance program. The ultimate objective of all emergency assistance should be the regaining of self-reliance on the part of recipients of that assistance. Foreign workers must quickly accept and respect the cultural, social, educational, and economic background of the population being served in order to adapt programs to meet existing needs in accord with available resources and local conditions. As such, foreign staff members should act as advisers (when advice is needed), always remaining aware that their role is that of assistant. Foreign health workers cannot provide health care for refugees indefinitely; therefore, the true success of an assistance program can be measured by the rapidity with which the refugees become integrated in and eventually manage their own health-care system.

Chapter 22

Psychological Needs of Refugees—The Khmer in Thailand

Jean-Pierre Hiegel

Refugee-relief efforts generally seek to provide basic tangible needs—food, shelter, and medicine. Although material needs are usually quickly met, the psychological needs of refugees have all too often been neglected. Their suffering may be looked on as unavoidable, because of past and current trauma and deprivation. This rationalization can allow Western medical staff to satisfy their own causality needs and avoid guilt feelings. Providing food, shelter, medicine, and security might seem to the donor to be sufficient to meet the refugees' physical and psychological needs. When psychological suffering is recognized, foreign staff may be frustrated in attempts to alleviate the problems unless the refugee community and traditional healers are integrally involved in the effort.

The refugees encounter two general types of problems. First, they have to adapt to a new situation and face its consequences—including feelings of insecurity and the loss of identity and self-esteem. These risks exist in any refugee situation but are often increased by the impact of the refugee-assistance program itself. Second, refugees, as all other human beings, must deal with their individual psychological conflicts. Failing to find a solution, some suffer and require special help. This situation is not new; each culture has been obliged to find its own solutions for persons who resorted to insanity, a compromise between their internal reality and the external world. Psychiatric hospitals, chemical treatments, and psychoanalysis are the solutions available in Western culture. Trying to use such models in a foreign culture is usually totally ineffective and can be dangerous.

Dealing with Psychological Problems of the Khmer Refugees

When the problem of psychological conflict cannot be solved, and—even more importantly—when the problem is thought to be reversible, it is always wise to ask the refugees themselves what they would do in such a situation in their homeland. The usual answer is that they would seek the advice and assistance of a traditional healer, witch doctor, shaman, or magic man. The medical

coordinators promoted cooperation with Khmer traditional healers to avoid creating psychiatric wards in refugee camps in Thailand and thus to avoid their consequences: psychological and drug dependency and ostracism of psychotic patients by the family and by the community.

Believing in witchcraft and in spirits that populate a supernatural world is the way the Khmer reduce and solve their internal conflicts, because ego defense mechansims arise from cultural beliefs. Western concepts, which do not include belief in the supernatural, are unacceptable. The Krou Thnam Sangkao, who cures through use of herbal remedies, the Krou Bangbat, who cures through meditation, and the Krou Thmop, who uses magic treatments, are all in the position of satisfying the causality needs of their patients, because they speak a language that is rooted in the same cultural background and therefore is meaningful to the patients. Western doctors are not thought by the Khmer to be able to cure illness. It is therefore prudent to admit that the traditional healers are in a better position than foreign staff to help their own people solve their psychological conflicts.

Although the apparent living conditions of the refugees may improve dramatically during their stay in the camps, they may still not be content because their psychological needs are not met simply by an endless series of gifts. Communities of local residents (non-refugees) may resent—and often do—the seemingly "good life" of the refugee community, perceiving that the refugees have better food, housing, and medical treatment and have nothing to occupy them but procreation. In fact, such a hedonistic micro-society, if it ever existed, would threaten the foundations and the social equilibrium of any society. Jealousy, hostility, and aggressiveness are likely to become expressions of the resident society's fears for their own security and stability.

Refugees often feel that the surrounding world is hostile and that they are endangered by a peril coming from outside or inside the camp. Such fears are based partially on aggressive feelings generated in the surrounding population by the presence of the refugees, but they are also increased by self-projections. When a camp is safe, the Khmer attribute their fears to evil spirits. Although it is necessary to protect the refugees from all real-world dangers, this protection does not alleviate unconscious fears. Khmer women often wear talismans (made out of white thread by a magic man) around the waist, the neck, or the wrist for anxiety, nightmares, and insomnia. Men usually prefer tattoos to protect them against real-world and supernatural dangers.

Many refugees, even those who expect to be resettled in a third country and try to identify with Western culture and religion, often verbally reaffirm their ethnic identity in an effort to resist feeling depersonalized. Since offering a model of identification in which some of them will be captive is unavoidable, persons working in refugee-assistance programs should be aware of the dangers of implicitly urging persons who are dependent on humanitarian help to separate themselves from their own culture in order to submit to the values of the culture from which the donations come.

The problem of identification applies equally to the question of religious belief. Many of the doctors and nurses who treat the refugees belong to organizations with some religious affiliation. In fact, a small minority of Western medical personnel declare their overriding aim to be to save souls. Such an attitude creates the risk of psychological violence and cultural suppression for the refugees these people care for. For example, some Khmer afraid of having offended Buddha came to one of the traditional medical centers (TMCs) and asked a magic man to drive out of them the foreign deity forced into them while they were in a hospital ward.

Cultural Traditions. Two important life events require special attention. Birth and death are marked by ceremonies peculiar to each culture. Many women prefer to have their babies at home or in a TMC, where birth practices are compatible with their traditions. A special talisman, "ambos proleng," is used in the birthing process to release the fears and anxiety of the mother during parturition. Special offerings are given to each child's pre-natal guardian angel, called Krou Komneut, so that this spirit does not seek revenge. For the Khmer, birth circumstances influence the future and are important in determining the origin of some illnesses and consequently the proper method of healing. Therefore, people who do not share these beliefs or understand their importance must not withhold from the mother the facts surrounding the birth period.

Properly conducted funerals are important not only in meeting the spiritual needs of people but also in meeting the psychological needs of both the dying person and his/her relatives. For Buddhists and Hindus, cremation symbolizes the end of physical life, while burial—especially in mass graves—is an indignity both to the dead and their families. A Khmer monk said: "To cremate a body and keep the remains assures the tranquility of the deceased's spirit and the prosperity of their children."

Perceptions of the Refugees. Refugees are in danger of losing not only their identity but also their self-esteem. They are dependent on humanitarian help for survival, they have little or no power over their own destiny, they are unwelcome guests, and their group cannot ensure its own security. Refugees point out that either they were victims of a system they did not believe in, yet could not escape, or that this system directly harmed them because they did not associate with it. Victims must face guilt feelings when surviving requires compromises that they later find unacceptable. The ego strengths of the refugees can be sustained through sympathy, esteem, and interest and also through praise from their own culture. People are not respected as individuals if their culture is not also respected.

Many refugees feel themselves to be in a dead-end situation. Either they expect to go back to their homeland some day or they are given false expectation of being resettled. Pagodas and TMCs, in which the spiritual needs, the beliefs, and the culture of the Khmer can be respected and honored, help counterbalance the negative impact of the Western culture by preventing a loss of cultural identity and self-esteem.

Discussion

Individual suffering, common to all persons, is a major aspect of the psychological care required by refugees. In trans-cultural psychiatry, one has to be

very careful in referring to Western nosology. Symptoms, attitudes, and behavior of people are to some extent relevant to social codes that differ from one culture to another.

The Khmer distinguish between possession, insanity, and retaliation by an offended spirit. Possession as a result of black magic is attested to by the victim, suspected by others in the community, and confirmed by the Krou Thmop, who releases people from the influence of a magic man. Insanity is recognized by the group according to social disruptive criteria. The Krou Khmer determines whether it derives from heredity, fever, or brain damage. When a spirit has been offended, it seeks revenge and can be responsible for abnormal behavior or for depression.

The behavior of a person who believes that s/he is under the influence of black magic is both the consequence and the proof of being possessed. Such a person is ostracized by others in his/her group because they fear that the spirit might also possess them. A reinforcing situation is created because the feelings of the patient are reflected in the attitude of the group.

Feelings of love and sexual expressions are sometimes regarded as the result of possession by a spirit. Khmer often seek help from traditional healers for conflicts between internal feelings and social rules.

Insanity is distinguished from possession. "Tchkuot," or the criteria for insanity, include the following socially disruptive characteristics: unusual and inappropriate behavior (such as removing one's clothes in public), inability to work properly, violent behavior toward others, destruction of property, and speaking in an incomprehensible way.

Two houses were established near the TMCs for psychotic patients, with several other Khmer living with them to help organize their everyday lives. At the time this report was prepared, this procedure had not been implemented long enough to determine whether it would allow the patients to he fully integrated into the community. During the day they came and stayed in the TMC in order to have social contact with the Krou Khmer, patients, and other Khmer who came to talk together. Allowing a patient to experience a fear of direct human contact is less damaging than having the patient involved in a low-level activity at which s/he is more comfortable and satisfied but that isolates him/her from others.

The relationship between a Krou Khmer and a patient is based on respect rather than power. The first step in treatment is to help the patient identify both the person and his position. Slight signs of respectful fear in the patient indicate that a positive relationship is being established. An effective Krou Khmer does not force this relationship. The patient in a TMC in fact may choose his/her traditional healer while working as part of a group. Some Krou Khmer give an herbal mixture to the patient two or three times. When s/he is slightly intoxicated, the healer gives advice, tries to have the patient correct the delusion, points out what is abnormal in his/her behavior, and asks for a promise to change that behavior. Others use the same direct intervention with only the support of their positive relationship.

The last aspect of psychological suffering relates to the revenge and punish ment by an offended spirit. Spirits are thought to be potentially dangerous bu not to be overtly hostile. This characteristic prevents the Khmer from feelin that they live in a climate of persecution. They are usually aware when the have offended a spirit and what punishment will be meted out.

Summary

In summary, it is necessary to be aware of the dangers of implicitly or deliber ately urging persons who are dependent on humanitarian help to separate them selves from their own culture. All kinds of psychological conflict and sufferin of a neurotic/normal person can be reduced and/or resolved by that person thanks to the spiritual cultural beliefs, but the help of a magic man is necessary When the community is motivated and mobilizes its resources to reintegrate patient, s/he usually manages quickly to behave again in an acceptable manner and generally no drugs are required.

If magic treatments seem strange to the Western mind, the words of a Tibe tan sutta may be appropriate: "It is difficult to have recourse only to absolutel reasonable procedures."

Chapter 23

Environmental Health Issues in Refugee Camps

Richard Swenson

This section focuses on the general rather than technical principles of environmental health. Technical decisions should be made, if at all possible, by qualified sanitarians on the scene. It is difficult if not impossible to effectively protect the health of refugees in fixed or transient camps without the assistance of experienced environmental health personnel acquainted with the camp and the area in which it is located.

Refugee camps are often established during a crisis when there is little time for good planning and preparation for camp design and construction. During the acute phase of the emergency situation, large numbers of medical personnel and large amounts of equipment are introduced into the camp, but little attention may be given to such basics as waste disposal, drinking-water supply, drainage, mosquito control, and garbage collection and removal. Adequate environmental health planning and design during the initial stages of setting up a camp can help reduce the incidence of disease later; the expensive curative approach generally provided in camps throughout the world today could probably be avoided if camps were properly planned and operated from the beginning.

Selecting Camp Site

No other single factor can have as great an impact on the health of people driven from their homes and their source of sustenance on short notice as the quality and quantity of drinking water provided at rest points or stationary camps. A reasonable minimal supply for a tropical climate is at least 14 liters/person/day.

Next to source and volume of water availability, the type of soil is an important factor for determining where to set up a larger camp. Details can be found in sanitary field manuals. First of all, it is important to determine soil conditions and fluctuations in the water table.

The camp should be located on a site that allows for adequate drainage and flood control. Only then can inexpensive water and sewage systems be constructed and any swampy areas be drained. Building camps in rice paddies or on

flood plains is not wise; in areas that have annual monsoon seasons, for example, such camps will eventually have to be relocated. Other factors to be kept in mind when setting up sanitation for a refugee camp include: 1) space for common use; 2) housing, which is related to the customary style of living of the people to be housed and which must be sturdy enough to withstand adverse weather; 3) suitable location of water supply and waste disposal; 4) access to existing transport and communication systems; 5) rainfall, wind direction, and temperature; and 6) availability of electrical power.

The Sanitarian

By helping to provide safe drinking water and appropriate waste disposal, the sanitarian becomes an important component of the health team. At the same time, refugees must be integrated insofar as possible into the environmental health programs. The roles(s) of a refugee camp sanitarian may include:

- Selecting a number of helpers and potential substitutes for them; they should work and travel with the sanitarian to observe, assist, and learn.
- Monitoring the water-supply system to assure an adequate supply of safe water and attending to maintenance requirements as indicated.
- Implementing and directing vector-control measures in and around the camp.
- Assuring that food supplies are stored out of the reach of rodents and insects and protecting the food against rain, mildew, and pilferage.
- Supervising construction and maintaining toilet facilities in order to provide individual privacy according to local cultural and religious practices. Persons in the refugee community should be designated to be responsible for cleaning and repairs.
- Assisting in epidemiologic disease outbreak investigations, surveillance, and control as indicated.

Administering an Environmental Health Program

Environmental health must be stressed in all camp operations. A sanitation budget for the camp should be agreed upon, and the sanitarian must be consulted on how the money is to be spent. The sanitarian should be a member of the administrative council of the camp and should report directly to the camp coordinator.

Summary

Refugee camps should be designed and constructed with environmental health issues in mind. If such a plan is followed, there should be fewer problems later in maintaining sewage, water, and garbage disposal systems. Such systems must be viewed in the manner in which they relate to one another so that, for example, drinking water is neither located in bathing areas nor near the sewage disposal system. Waste disposal systems should be near roads if collection tanks are used so that the units are accessible for pumping. The early involvement of a qualified sanitarian in the planning for a camp and emphasis on the importance of sanitation programs will help prevent unnecessary illness at minimal cost.

Chapter 24

Nutritional Aspects of Refugee Assistance

Susan Peel

The provision of suitable foods is an essential service in most relief programs. Top priority should be given to assisting refugees separated from their usual food supply. The extent and types of feeding programs required for a refugee group will depend on answers to such questions as:

- Are the refugees totally dependent on food provided? Do they have some food stocks with them? Do they have access to limited supplies through trading or production?
- What is the health and nutritional status of the refugees? Are they in need of maintenance or rehabilitation?
- What resources are available in terms of food, transport, and personnel to administer the food assistance?

Emergency feeding programs are classified as follows: general, supplementary, and therapeutic. The general feeding program is the most important and provides basic food rations for all the refugees whose normal trading or food production has been disrupted. In addition to providing basic rations, a supplementary-feeding program is sometimes required for segments of the population who—because of their age, physical state, or hazardous living conditions—are particularly vulnerable to undernutrition. A therapeutic (or intensive) feeding program may be required for refugees who are severely undernourished and who are unlikely to survive on the general and supplementary rations alone. In addition to having a regular and adequate supply of suitable foods, successful feeding programs depend on an effective distribution system.

Logistics

An effective logistics system is necessary in any food assistance program. Although food may be available locally (i.e., within the host country) or from neighboring countries, some supplies may need to be imported from greater distances. Local availability of suitable food greatly reduces costs and allows a more rapid response to the emergency; however, it is important to consider the potential danger of inflated prices and potential adverse effects on the local non-refugee population.

Transportation of foodstuffs is usually one of the major expenses of emergency relief operations. Sometimes bulk food supplies cause congestion at docks and airfields because of delays in customs clearance, the absence of a well-organized distribution plan, lack of funds, or a shortage of suitable vehicles or fuel.

The variety of relief commodities should be kept to a minimum to facilitate transportation, storage, and distribution. Packaging is important because of transport and storage limitations. Glass jars, bulky wrappings, and the like should be avoided and commodities packaged to withstand rough handling, poor roads, and changes in temperature. Foods with high water content are heavy and should be avoided. Their relatively low nutritional value may not justify the cost of transportation.

General Feeding Programs

Specifics of each feeding program vary depending on the situation, but all are based on the same principles. The first nutrition priority is to satisfy the energy and protein requirements of the refugees. Certain "rules of thumb" have been devised to guide relief workers in the calculation of energy requirements. These range from an average daily intake of:

- 1,500 kcals/person for the period of emergency subsistence, ideally not more than 1-2 weeks, but often more protracted; to
- 1,800 kcals/person for temporary maintenance, which can be for a period of many months; and
- 2,000 kcals/person or more, and 50 grams of protein, for a long-term refugee population.

It is not possible to make rigid rules for the general ration allocation. Intake will depend on the resources available and local factors such as activity level of the refugees, diet of the non-refugee population, and length of support period.

However, the typical "food basket" has been developed, with obvious regional variations, for use in the course of many relief operations. It consists of a staple food (e.g., cereal, flour, rice), an energy-rich food (e.g., oil), and a protein-rich food (e.g., beans, dry milk).

The bulk of energy and protein requirements are satisfied with these commodities. Other items can be added according to cultural or nutritional needs (e.g., sugar, vegetables, spices, salt, fruits, tea). Although these items may be viewed as relative "luxuries" by donor nations or agencies, the refugees may regard them as essential staple items. To help maintain morale and avoid possible wastage, it is important that the food provided should be culturally acceptable (i.e., that it not offend social or religious beliefs) and suit local tastes. Every effort should be made to provide foodstuffs that are familiar to the refugee population and to adhere insofar as possible to traditional food habits. Refugee nutrition and health may be unnecessarily jeopardized if the importance of these principles is not fully recognized.

Vitamin requirements need to be considered after the initial emergency subsistence period has passed. Attention should be paid to locally prevalent nutritional deficiencies. Of particular importance is vitamin A deficiency, which leads to xerophthalmia and eventual blindness due to keratomalacia.

Distribution Systems. The need for a fair, efficient, and regular ration distribution cannot be overemphasized. Disruption of the system or corrupt practices lead inevitably to widespread discontent. An accurate registration system of individuals or families for general rations is needed in all except the most transient situations. Two major distribution patterns for general feeding programs are described below.

- Dry-ration distribution—Uncooked food is received by the consumers, who bring it to their living quarters for preparation and consumption. The most easily administered dry-ration-distribution system is one in which bulk supplies are provided at pre-arranged regular intervals to selected refugee leaders, who are then responsible for the equitable distribution to family units. If resources for distribution are available, rations may also be supplied directly to family units. The dry-ration system requires cooking facilities, fuel, and storage containers for each family.

- Cooked food distribution—This system necessitates a centralized kitchen with adequate utensils, water and fuel supplies, and suitably trained, healthy personnel. Since at least two meals each day are usually served, an efficient cooking/distribution system is absolutely necessary.

Whatever distribution arrangement is made, it must be reliable. The people need to know when and how much food they will receive. Individuals who distribute the food must have exact instructions regarding how much food each person/family unit is to receive. Standardized measures and easily understandable weight and volume comparisons for each commodity must be provided.

Supplementary-Feeding Program

A supplementary-feeding program caters to the needs of people who are particularly vulnerable to protein energy undernutrition (PEM). For this reason, such a program is sometimes called "vulnerable group feeding." It is intended to prevent and, in some cases, treat mild PEM through the provision of supplementary foods to the general food ration. Both administrators and refugees must understand that this is a supplement to (and not a substitute for) the basic ration.

The aim is to provide on a daily basis high-energy, high-protein, low-bulk food. The number of meals and amount of food depends on the overall nutritional status of the population, the nutritional value of the general ration, and the target group age. The size of the supplement depends on the nutritional requirements of the target group but usually ranges from 300-500 kcals/day/person and provides about 15 grams of protein.

Food is usually prepared in porridge form, which can easily be eaten by all, including the sick and very young. Porridge can be made from cereal/legume mixtures or from certain milk preparations. The energy content can be further increased by adding oil; sugar can be added if desired for palatability.

To be most effective, a supplementary-feeding program should be organized and run by the refugee population, with only essential logistic and technical assistance being provided by professional relief workers.

The following groups are most nutritionally vulnerable: a) children <5 years old, particularly soon after weaning; b) pregnant and lactating women; c) children discharged from therapeutic feeding programs; d) persons with certain medical problems, e.g., those with tuberculosis or severe anemia; e) undernourished people (regardless of age); and f) elderly and other socially vulnerable persons, such as unaccompanied minors. If resources are limited, supplementary feeding should be restricted to those groups determined to be at highest risk.

Registration. Patients selected for supplementary feeding should be registered and given an identification card or bracelet to facilitate follow up. Initially, registration programs may be chaotic; identity cards can be lost and bracelets removed. The process should improve as the population being served becomes more familiar with the program. If the process does not improve, or if the rapid influx of additional refugees complicates registration, administrators may have to resort to simple head counts of attendees. If patients are identified through registration, attendance may be monitored and those not attending followed up.

Methods of Distribution. The take-home supplement is relatively simple to administer and requires few facilities. After registration, patients assemble at regular intervals (daily, weekly, or on local market days) to collect a supplementary food ration such as a cereal/legume blend, fish powder, or fortified flour, which they then take to their homes. The weakness in the take-home system is that the food supplement frequently becomes part of the family cookpot, and thus the benefit to the target group may be diluted.

On-the-spot feeding requires a place with sufficient space for people to sit and eat, adequate fuel and cooking facilities, trained staff, and clean water. Patients are asked to come to the center for meals at a scheduled hour each day. Since all food must be consumed at the center, the patients are sure to eat their diet as prescribed. Depending on the size and staff, one feeding center is generally required for every 200-500 patients.

The success of on-the-spot supplementary feeding depends on the following factors:

- Distance from homes to the feeding centers (should be as short as possible).
- Food being made palatable, by adding sugar or local spices if necessary.
- A rapid and efficient serving procedure to avoid long periods of waiting.
- Discipline maintained by the staff but without coercion.
- Consideration of social or religious customs (e.g., a separate screened area for women in Moslem areas, and a vegetarian diet for people who do not eat meat or fish).
- Participants' ability to satisfy their hunger (but food should not be wasted by over-generous servings).
- The schedule should not interfere with the distribution of general rations or with other activities such as traditional family meal times.

Therapeutic Feeding

Therapeutic feeding is directed toward severely undernourished patients who cannot be rehabilitated by general and supplementary feeding and who require intensive feeding. Therapeutic feeding is comparatively expensive because it requires the close supervision of qualified medical/nutritional personnel and special facilities.

In famine situations affecting large numbers of people, therapeutic-feeding programs should be set up only after general and supplementary-feeding programs have been organized, thus protecting the larger vulnerable group against further deterioration.

Facilities. Therapeutic feeding should be done on an in-patient basis if possible to ensure adequate supervision and care. Although out-patient feeding can be undertaken, a maximum of only three-four feedings a day can be given, and the rate of recovery is likely to be slower and less certain. A therapeutic-feeding center (ward) can provide suitable accommodation for about 30 (but not more than 50) in-patients and their immediate relatives who assist in providing care. At least one (but preferably two or more) health worker needs to be on duty at all times.

Arrangements also need to be made for providing meals to relatives and staff. In addition, the center needs storage capability for food, fuel, and medical supplies, as well as sufficient clean water and sanitary facilities for patients, relatives, and staff.

Pattern of Care. In therapeutic feeding, each patient should be treated individually—according to medical and nutritional needs as assessed at the time of admission and through follow-up observation and examination.

In general, criteria for admission are: severe marasmus (or weight for height <70% of the WHO median reference) or kwashiorkor with edema. Admission criteria may vary according to staff and material resources available.

On admission each patient is registered, a medical history is recorded, and dietary and other treatment requirements are determined. If indicated, a 3-4 hourly feeding schedule is worked out in order to satisfy the patient's total nutritional requirements.

Specially formulated foods (usually milk-based) are prepared for this purpose, and individual minimum daily needs are calculated as follows: 150 kcal/kg body weight/day, plus 3/g protein/kg body weight/day.

Children may have to be encouraged to take all food given them at each meal. Nasogastric tube feeding is sometimes required. The volume taken must be recorded after each meal. Use of infant feeding bottles in therapeutic-feeding centers should be discouraged.

Regular weighing is important to monitor progress. Weights must be recorded and the presence or absence of edema indicated.

If vitamin A deficiency is suspected in the area, all children <5 years old should receive a single age-appropriate dose of vitamin A concentrate on admission. This prevents xerophthalmia, one of the common causes of blindness among children exposed to famine conditions. Iron with folic acid is also generally recommended.

Measles vaccine should be considered for all children < 5 years old on admission, since the mortality rate from measles among the severely undernourished is high.

Every child should be accompanied by a guardian, preferably the mother, who will be responsible for feeding and care. Continuing health education, including basic nutrition and simple nursing principles, is needed to prevent future relapse. Educational programs should be attended by recipients and attending relatives. Relatives should be actively encouraged to take part in the management of the center and aspects of patient care.

Discharge. Criteria for discharge from the therapeutic-feeding program generally require that the patient appears healthy (active, good appetite), has no edema, has regained to 80%-90% of the WHO reference median weight for height, and has at least one healthy relative available to provide care.

On discharge, all patients should be referred to a supplementary-feeding program. Weighing needs to be continued at least twice a month together with regular home visits to ensure continued improvement.

Monitoring Effectiveness

Since the refugee community is totally dependent on a reliable food supply, monitoring the effectiveness of these feeding programs is important. The quality and quantity of the ration supplied must be discussed at frequent and regular intervals with the leadership of the refugee community. All complaints should be investigated without delay and the findings made public. Feeding facilities must be visited by the administrative staff at meal times (without previous notification) to observe what the people are eating and determine how the food is being prepared, particularly if the food is unfamiliar to the people.

The nutritional status of the refugee population should be assessed on a regular basis using systematic sampling procedures. Weight and height measurements are generally the most useful indicators in crisis situations for several reasons. For normal pre-pubescent children, the relationship of body mass to height is nearly uniform regardless of sex, race, or age. Body weight is extremely sensitive to acute changes in food supply, whereas height remains relatively constant over short periods of time. Morbidity and mortality rates are twice as high for children who have a low weight-for-height ratio as those for "normal" children. The use of the weight-for-height index precludes the need to determine a child's age accurately, a procedure that is often difficult among refugees.

By using accurate portable scales and measuring boards, trained personnel can determine the weight-for-height ratio of individual children and compare it to a reference. Usually the most vulnerable group of children, i.e., < 5 years of age and/or < 110 centimeters high, is measured. Accurate follow up of a large population over a period of time requires technical expertise in sampling methodology. However, some relatively simple indicators may be useful, such as levels of undernutrition measured in screening programs or at maternal and child health clinics. Since children attending screening programs or maternal and child health clinics constitute a non-random sample and since this sample composition may change over time, caution must be exercised in interpreting

the results. When individual children can be followed, repeated evaluation (weight, height, and examination for edema) of a valid sample of children over a period of time provides some information on trends. In addition to monitoring the general nutrition status, careful observation should be kept for specific vitamin and iron deficiencies.

The effectiveness of supplementary- or therapeutic-feeding programs can be monitored as follows:

- Reviewing daily attendance records to determine the regularity of attendance (scouts to follow up those who do not attend can be useful in increasing attendance).
- Estimating the percentage of the vulnerable group benefitting from the supplementary- and therapeutic-feeding programs, e.g., comparing the number of persons expected to attend with the number actually attending. The number of children expected to attend can be estimated through house-to-house surveys or by comparing the age distribution of children in centers with that in the general population.
- Weighing and measuring children on admission to the feeding programs and repeatedly evaluating (weight, height, edema) at intervals to monitor their progress.

The results of nutritional assessment activities should be analyzed at regular intervals and reports sent to health workers, relief administrators, and major donors so that adjustments in the food programs can be made to reflect the changing needs of the refugee population. The aim of an ongoing monitoring system is to make possible prompt and appropriate action by identifying nutritional problems as they occur.

Summary

The process of feeding refugees is one of the most expensive and logistically complex parts of a refugee operation. General, supplementary- and therapeutic-feeding programs must provide nutritional maintenance for the masses and prevent deterioration of the at-risk and undernourished segments of the population. A nutritional monitoring system is suggested as a means of identifying priorities in setting up and operating these programs. The system may range from surveying population prevalence of states of undernutrition to monitoring the progress of individual patients.

Chapter 25

Donated Foods and Their Use in Refugee-Assistance Operations

Eva Wallstam, Phillip Nieburg, Elisabeth Eie, Andreas Lendorff

In this section are addressed the complex issues surrounding the donation, transportation, storage, and distribution of food supplies in the course of the Khmer refugee emergency relief operation.

The nutritional aspect of the Khmer relief operation involved a number of different organizations. The distribution of bulk dry rations to the Khmer refugees was the responsibility of the UNHCR in the holding centers and of UNICEF and ICRC in the border camps. The World Food Program (WFP) coordinated the purchase and transport of bulk food supplies to the warehouses managed by UNHCR and ICRC/UNICEF. As the lead agency for health concerns of the relief operation, ICRC served as adviser for all aspects of bulk food handling that might affect the health and nutritional status of Khmer refugees and was also responsible for coordinating different kinds of nutritional therapy and supplementary-feeding programs.

The food initially distributed included rice, dry salted fish, and oil. Beans, fresh vegetables, salt, spices, and occasionally fresh fish or meat were later added. Foods were selected to conform with Khmer eating habits, but availablility in local and regional markets also figured in the selection process. Logistics management and local transport functioned relatively well because of effective planning and the availability of trucks, good roads, and adequate warehouse facilities.

In addition to the general distribution of the staple foods described above, "special" foods were also distributed. These included a range of donated foods that either arrived in quantities too small to be included in the general food distribution or foods that were foreign to the Khmer tastes and thus needed special testing, cooking, or demonstration. These food supplies almost always arrived in an uncoordinated manner—often without the field staff's having been notified.

Because the very presence of these supplies of food meant they must be used, the field nutritionists were faced with finding ways to use them for the

maximum nutritional benefit of the Khmer while at the same time informing donors of the problems with distribution, acceptance, and suitability of certain donations. Recipes were developed and acceptability tests made. Simple information sheets were written, listing the donated foods available in different warehouses and various means of using them. These were regularly updated and distributed to the users (i.e., the staff in charge of various feeding programs).

Information concerning food needs was given to donors through regular meetings with the major donor organizations. Also, a special paper entitled "Recommendations on Food Donations" was written by nutritional and public health staff working in the camps. In a food shortage emergency, food donations, an expression of humanitarian concern, are certainly to be encouraged. However, some foods are clearly more acceptable nutritionally and culturally than others. How to encourage certain food donations and discourage others without offending well-meaning donors is a particularly delicate problem. The "Recommendations" paper was provided to potential food donors and did appear to slow the donation of some of the foods that were not recommended or usable.

The three major categories of donated food items are discussed below, as are some of the other lessons learned during the early days of the Khmer relief operation.

Milk Products

The appropriateness and value of milk and formula products were the subject of lengthy discussions among nutritionists, medical staff, and aid administrators. These discussions reflect some aspects of the worldwide debate about use of milk formula or substitutes in the diet of young infants and in the diet of populations from countries in which milk is not produced or consumed.

Discussions among health workers focused on the following points:

- Animal milk is not part of the traditional Khmer diet. Introducing milk products could encourage a dependency on imported goods that could not be obtained after the Khmer returned home.
- Safety and logistics: If milk and formula powder are to be used safely, potable water must be used, and standards of hygiene and knowledge of proper dilution and storage of milk must be applied. When these requirements cannot be met, health hazards are created. Giving animal milk and milk-based formulas to infants instead of breast feeding them constitutes a recognized health hazard and is a preventable cause of infant morbidity and mortality among the poor. If cans of liquid milk are opened and reused without being refrigerated they create the same health hazards as those mentioned above.
- Lactose intolerance is common among the Khmer. Consumption of milk may be associated with digestive problems, diarrhea, and general aggravation of an already poor nutritional status.
- More than a dozen different types and brands of milk powder were available to the Khmer refugees. These included skimmed, partially defatted, full cream milk, modified milk, infant formula, and chocolate mixtures. Package size varied from 0.5 kg to 25 kg; quantities of each varied from 1,000 pounds to several hundred tons. The great variation in type of packaging and amount of product to be stored created problems in logistics that were aggravated by the slow turnover rate of these items.
- Two varieties of canned liquid milk products were sent: sweetened condensed milk (SCM) and unsweetened milk either in an evaporated or a "ready-to-drink" form. SCM was the only liquid milk product that some of the Khmer had used or heard of before. Since it contained 46% sugar, it was often used as a sweetening agent. The occasional practice of the Khmer of giving infants diluted SCM was discouraged because of associated health risks. Thus, relief agencies were discouraged from using SCM as payment for construction workers in "food-for-work programs" in the camps. The Khmer did not like the unsweetened evaporated milk, sometimes adding sugar before using it. The "ready-to-drink" variety (more that 90% of which is water) provides an example of unnecessary expense for transport.

Both the dried and canned milk products were mainly used as ingredients for different dishes served in supplementary-feeding programs. For instance, liquid milk enriched with sugar and oil was given to severely undernourished persons in hospital feeding programs. Infant formula products donated to the relief operation were used only for young orphans and for the rare infants whose mothers could not breast feed. Breast feeding was strongly encouraged; all baby bottles found in the camps were confiscated. Instead of bottles, the use of cup and spoon was recommended for feeding young infants if breast feeding was impossible. Even premature infants could be—and were—successfully fed in this manner.

Cereal Blends

More than a dozen varieties of cereal mixtures were donated in bags and in small consumer packs. The four types with a rice base were readily accepted and were used as weaning foods or a porridge for small children. Those with bases such as wheat, corn, bean, and soya were less acceptable and were, at least initially, used only as ingredients or thickening agents in certain dishes such as soups or stews.

Later on in the Khmer refugee-relief operation, some donors began to provide biscuits and noodles made from donated milk products and cereals. The Khmer liked these products, and thus some large supplies of donated food that had not been acceptable could be used effectively. Other attempts to distribute Western cereal blends in the general food-supply program met with varying degrees of success. In general, these foreign food products were not liked and when used were eaten only by adults.

Canned Baby Foods

Large supplies of Western-type baby foods packaged in glass jars or bottles were donated by many well-meaning agencies and individuals. Serious difficul-

ties were encountered in trying to make responsible use of these products. First, the fruits and vegetables contained primarily carbohydrates, with most of the original taste and vitamins having been lost in processing. In addition, there were risks of disease involved in feeding part of the contents of a bottle or jar to a child and then storing the rest unrefrigerated for subsequent use.

The Khmer did not care for the savory varieties of baby foods, i.e., those containing mashed meat, fish, potatoes, or vegetables. In addition, the small size of the packages made them impractical for large-scale serving. Initially, such baby foods were used as ingredients in dishes served in supplementary-feeding programs. Later, when larger supplies of these products began building up in the warehouses, some attempts to use them in a general food distribution were only partially successful. In any case, the transportation and storage costs for expensive foreign products of relatively low nutritional value cannot be justified in an emergency relief operation, when scarce funds need to be spent as efficiently as possible.

Lessons Learned

The purpose of emergency food assistance is to save lives and to improve the resistance to diseases frequently complicated by or complicating undernutrition. In addition, as is true in any assistance program, the outside donor desires to learn how to help most effectively. Achieving these objectives requires effective exchange of information.

Recommendations

- A brief explanation and a list of acceptable and unacceptable food items for the specific relief program should be issued to all potential donors.
- Advance information of expected shipments of donated food supplies would help field-nutrition staff effectively plan nutritional support and treatment programs.
- When donors are considering sending large shipments of foods that have not previously been shown to be acceptable in a population, it might be helpful first to field-test such products in small samples.
- Field-nutrition staff should be consulted before large donations of new foreign products are accepted.
- The number of different food products and types of packages should be kept at a minimum in order to avoid logistical problems and confusion among feeding agencies and the population requiring assistance. Supplies should be sent in bulk to allow for efficient distribution.
- Foods familiar to the people requiring assistance are preferred if circumstances permit a choice. Care needs to be taken to avoid creating dependency on imported commercial foods that might later be unavailable or prohibitively expensive.
- Foods with low nutritional value, i.e., those containing high proportions of water or carbohydrates, have no place in emergency relief programs.

- Foods requiring special storage or handling (e.g., requiring refrigeration or dilution with water) may result in harmful effects on the health of the population and should be avoided.
- Donated food and its packaging material should be able to withstand transportation and handling in the climate in which the supplies are to be used.
- Foods with expired consumption dates cannot be accepted, and potential donors should be so informed.
- Agencies involved in refugee-relief efforts should seek early guidance from competent nutritionists with field experience in emergency food assistance. If possible, these persons should be familiar with the nutritional preferences of the affected population.

Chapter 26

Vaccination Programs for Refugees

Stephen R. Preblud, Phillip Nieburg, Donald T. Allegra

Ideally, accurate information on the morbidity and mortality associated with a given disease is necessary to plan for a public health intervention program. Such data can be used to measure the impact of disease on the population as a whole and identify the subsets of the population at greatest risk. This information can then be used to set priorities. However, in developing countries and particularly in refugee-assistance programs, such data frequently are not available or are derived from anecdotal reports. Repeated experience in both developing and industrialized countries shows that the complete absence of data on a particular disease does not always mean that the disease or its complications do not constitute a public health problem.

There are certain situations in which those responsible for public health programs need not document actual risk, but can instead rely on previously documented experiences. For example, public health workers and epidemiologists can realistically assume that certain diseases, such as measles, pose a high risk to children—especially undernourished children < 5 years of age.

The childhood vaccine-preventable diseases discussed below should automatically be of concern. While vaccination programs against these diseases are being carried out in many developing countries, no child should be considered vaccinated unless documentation is provided; in most refugee situations, such records are not available. On the other hand, knowledge that a certain vaccine has been routinely offered to a population group is helpful in planning programs for vaccines given in multiple doses, e.g., diphtheria and tetanus toxoids, pertussis vaccine (DTP), and oral poliovirus vaccine (OPV). If time does not allow the full series of vaccine doses to be given, one may feel secure that some individuals have been adequately vaccinated by virtue of their previous (albeit individually undocumented) experience with the vaccine. This hypothesis suggests that using such vaccines for the population being assisted may be effective—even if the time available for administration of multiple doses is limited or unknown.

Documentation of vaccination through an organized system of records is important for the individual vaccinee, as well as for the population of children as a whole. This is especially important in unstable or changing circumstances (e.g., a growing refugee camp that may later undergo subdivision). It is difficult to outline exact criteria, but some important features of these records include permanence (both physical—by using suitable record forms; and psychological—by educating the family as to the importance of keeping these records) and documentation of the date and type of vaccination. Vaccination records can be linked to nutritional, growth, and developmental data (e.g., the UNICEF Road-to-Health card).

Any plan to provide vaccine for a community must include provisions for proper transport, storage, and handling of vaccines. Giving a vaccine that has been unknowingly "inactivated" by improper refrigeration imparts a false sense of security and wastes scarce financial and personnel resources. Even more important, large numbers of cases of the disease among improperly vaccinated children can lead to a general lack of confidence in the concept of prevention among the general population as well as among health workers.

The general principles of vaccine storage and handling are known and are based on the knowledge that vaccines are not heat stable and that some are inactivated by light: a) vaccine should remain in the pharmacy or hospital laboratory in a properly functioning refrigerator or freezer, and must never be stored with food or beverages; b) meticulous arrangements for such provisions as ice as well as personnel for on-site vaccination clinics are mandatory and should be planned well in advance; c) vaccines should be kept in a cooling receptacle at the on-site clinic.

Parents (and children, if old enough) should be told if specific vaccine side effects are expected (e.g., fever after measles vaccine) in order to avoid misunderstandings.

Undernutrition itself is not a contraindication for the vaccines discussed below. There is no increased rate of vaccine reactions among undernourished children, and several studies have shown that even severely undernourished children achieve protective levels of specific antibody after vaccination (*10*). The risk of disease and its complications (including death) for these children far outweighs the risk of any side effects associated with vaccine. On the other hand, there are some individuals with specific conditions (e.g., high fever, malignancy) for whom the vaccines are contraindicated. Anyone using or supervising the use of vaccines should read and become familiar with the contraindication(s) listed on the package inserts. Most of these vaccines can be administered simultaneously without increasing the risk of side effects or decreasing vaccine effectiveness.

Finally, experienced and concerned refugee health workers have repeatedly warned against providing "high-technology" medicine at a level that cannot be maintained once the refugees return to their homeland or otherwise become self-sufficient. Along with health education and training, modern vaccines are one of the few health interventions whose effect can still be measured long after outside health workers leave. Also, most vaccines provide long-term immunity

(e.g., the effectiveness of a complete series of tetanus toxoid is at least 10 years—except for the most severe injuries—and may be lifelong). The following are principles upon which the vaccine recommendations were based:

- Disease risk—Vaccines must not be used if the disease in question is not a risk (e.g., smallpox).
- Demonstrated efficacy of the vaccine—In refugee-assistance situations, scarce financial and personnel resources should not be used in administering vaccines that are of unproven or limited value (e.g., typhoid).
- Duration of effect—Resources are more efficiently used for vaccines with long-term effectiveness (e.g., measles). Vaccines that provide only short-term protection (e.g., cholera, 3-6 months) should not be used unless absolutely necessary.
- Alternate approaches—An alternative to vaccination may be preferable for preventing some diseases. For example, if cholera and typhoid are of concern, it may be preferable to use resources in improving the environment or in health education programs—measures that are more likely than vaccination programs to have a lasting effect on other diarrheal disease problems as well.

Childhood Vaccine-Preventable Diseases

Measles. In underdeveloped countries, measles can be a severe disease with high rates of such complications as pneumonia, stomatitis, and protracted diarrhea. Death rates for severely undernourished children may approach 50%.

Measles vaccine is made from live-attenuated measles virus. When properly transported, stored, and handled, it induces antibody production (i.e., confers protection) in about 95% of vaccinees. Vaccine-induced immunity is durable (>15 years) and may even be lifelong.

- Recommendations—

1) Give a single dose of live measles vaccine for all children between 9 months and 3-5 years of age. Protection conferred by maternal antibody usually lasts for 6-9 months after birth, but may vary depending on local factors such as nutritional status of the mother and the child. If there is a measles outbreak and children <9 months of age are involved, it may be advisable to lower the 9-month lower limit for vaccination to 6 months.

2) It may be important to consider the recent experience in Thailand before deciding on upper age limits for measles vaccine administration. For instance, when giving measles vaccine at the Khao I-Dang camp in Thailand, 5 years was chosen as the upper age limit. This was done at least in part because the Khmer Serai in that camp had lived for a number of years in relatively small rural population groups with limited mobility. It was felt that their children might have, as a group, had less exposure to and thus higher rates of susceptibility to measles at the time they entered the Khao I-Dang camp. In other situations in which "usual" measles transmission patterns have probably been maintained and in which the children are better nourished, upper age limits for vaccination of 3-4 years might be chosen.

3) Each 3-6 months, infants in the group that have reached 9 months of age since the last measles vaccine program should be vaccinated.

• Adverse effects—Up to 15% of vaccinated persons have fever 7-10 days after vaccination; some have a measles-like rash at the same time. Other more severe reactions have rarely been reported.

• Clarification of common misunderstandings—

1) Measles vaccine is not made in eggs (other vaccines such as those for influenza and yellow fever are made in eggs). Measles vaccine can thus be given to persons who are allergic to eggs but who have not had anaphylactoid reactions. In fact, in carefully monitored situations, the vaccine has been safely given to a number of persons with severe egg allergies.

2) In measles outbreaks, persons who are vaccinated for measles several days after being exposed to infection and later have clinical illness are often erroneously thought to have severe vaccine reactions. Although limited data suggest that vaccination within 72 hours after exposure may provide partial protection, measles vaccine cannot be relied on to confer full protection to a child who has already been exposed.

3) With a susceptible high-risk (e.g., undernourished) population, measles vaccine should not be withheld until the first measles case is documented. The first case seen by a health worker may indicate that dozens of cases are occurring among the refugees and that many others have already been exposed. Repeated experience has shown that measles vaccine is less effective in stopping an outbreak once it has begun than it is in preventing an outbreak. In addition, quickly obtaining and effectively distributing measles vaccine may be difficult.

4) Measles vaccine is fully effective for undernourished persons. Severely undernourished children are at highest risk of complications or death from measles and must receive high priority in a vaccination program. Measles vaccine is an integral part of programs for nutritional rehabilitation of children <5 years of age.

• Miscellaneous—A jet injector and 50-dose vaccine vials must be available if a large number of children are to be vaccinated in a short period of time.

Poliomyelitis. Paralytic poliomyelitis is a common problem among children in developing countries in which poliovirus vaccine is not routinely administered. Trivalent oral poliovirus vaccine (OPV) is recommended by WHO for all children in the target age groups. The current approach to controlling poliomyelitis is based on the administration of three doses of OPV early in childhood—preferably within the first year of life.

• Recommendations—

1) Two or three doses of poliovirus vaccine, 4-8 weeks apart, to all children 6 weeks-5 years of age.

2) There is a little risk that breast feeding will interfere with the effectiveness of this vaccine; it can therefore be given without considering the breastfeeding schedule.

3) Because of a documented association between paralytic poliomyelitis and recent injections (including vaccines), consideration should be given to

giving vaccinees at least one dose of oral poliovirus vaccine before they receiv injected vaccine.

• Adverse reactions—Serious reactions including paralysis have bee noted at a frequency of 1/4,000,000 doses.

Diphtheria, Tetanus, and Pertussis (DTP). A series of doses of DPT vaccin protects against all three of these diseases. The diphtheria and tetanus toxoid are good "antigens," three doses of which provide protection to >98% of recipients. While a series of three doses is optimal, even a single dose may provid some protection for most vaccinees. The pertussis (whooping cough) compo nent is slightly less effective but is included because pertussis is such a seriou illness for young infants.

• Recommendations—

1) Three doses, 4-8 weeks apart, for all children 6 weeks-5 years of age.

2) Since neo-natal tetanus is a frequent cause of death in developing countries, and since it can easily be prevented, tetanus toxoid (or, preferably, diphtheria-tetanus toxoid) should be given to pregnant women at monthly intervals throughout the third trimester of pregnancy. Two doses provide 80% and three doses provide >95% protection from tetanus to mothers and to their unborn infants.

• Adverse reactions—

1) Reactions to DPT vaccine are common, but almost all are mild and self-limited.

2) Low incidence of sterile abscess at injection site (for vaccines containing "pertussis" component).

3) Other more severe reactions such as encephalitis have been reported and are thought to result primarily from the pertussis component of the vaccine. These reactions are uncommon (approximately 1/110,000 injections) and are usually temporary.

Typhoid and Cholera. The vaccines for these bacterial infections are discussed together because they share a number of related characteristics. They have often been sent by various donor agencies as part of post-disaster aid, and are often (although decreasingly) used in that setting. They are not of value in controlling common-source outbreaks of typhoid or cholera; the "carrier-state" is not prevented. At least two doses must be given to achieve any effectiveness (1-4 weeks apart for cholera, 4 weeks apart for typhoid). Cholera vaccine effectiveness is approximately 50% after two doses, and diminishes after 6 months. Typhoid fever vaccine achieves about 75% effectiveness and requires booster doses every 3 years. Neither provides substantial protection against a concentrated exposure. They often result in 1-2 days of pain at the injection site. Finally, these vaccines are not a substitute for adequate personal or camp hygiene.

• Recommendation—These vaccines are usually not recommended in disaster or refugee situations; the resources needed to purchase and administer them are usually better spent on improving sanitation.

Tuberculosis. Experts' opinions vary on the effectiveness of Bacille Calmette-Guerin (BCG) vaccine for tuberculosis (TB). However, most agree that BCG may be of some value in preventing disseminated disease, e.g., TB meningitis or miliary TB among infants and young children.

•Recommendation—BCG vaccine is not recommended for general use in refugee camps. The limited economic and staff resources available in these camps would be more efficiently used for tuberculosis case finding and chemotherapy programs. In refugee camps in which tuberculosis has not yet been controlled, consideration can be given to using BCG for persons at highest risk of disseminated disease (i.e., children < 5 years of age).

Smallpox. The last naturally occurring smallpox case was reported in October 1977.

•Recommendation—There are no medical reasons for any refugee or relief worker in a refugee-relief program to receive smallpox vaccine.

Summary

A vaccination program should be an important part of the preventive medicine program in a refugee camp. The focus should be primarily on children < 5 years of age. Measles, DTP, tetanus toxoid, and poliovirus vaccines are often useful, whereas BCG, cholera, and typhoid vaccines should only be used under special circumstances. Smallpox vaccine should not be used.

Chapter 27

Surveillance of Fertility Patterns in Khmer Refugee Camps: A Guide for Anticipated Health Services

Susan E. Holck, Willard Cates, Jr.

The fertility or reproductive capacity of a population can reflect its health and, together with death and migration, can determine the age structure and the pattern of growth or decline of the population. Although epidemiologic surveillance of refugee populations is intended to assess health conditions and the need for health-care resources, measures of fertility have rarely been included in surveillance activities. The level of fertility most directly affects the needs for pre-natal care, obstetrical and child health services (including vaccinations), and birth-planning services. However, a changing population size and structure also affect the needs for general health-care resources.

Fertility may be substantially altered by various conditions frequently experienced by refugees—including famine, disease, disruption of the social structure, and other stresses associated with mass migration (*11*). Reports of amenorrhea were common during World Wars I and II, and abnormally low birth rates have frequently been reported during famines. The siege of Leningrad in 1942 (*12*) and the Dutch famine of 1944-1945 (*13*) are two situations in which lowered fertility was documented in association with poor nourishment. However, the scientific literature contains little information on fertility patterns of refugee populations who undergo the combined stresses of undernutrition and mass migration.

The availability of vital statistics collected in a registry of births and deaths and those collected in periodic surveys offered an opportunity to examine the population dynamics in Khmer refugee camps in eastern Thailand in 1979-1980, with particular emphasis on measures of fertility.

Background and Methods

Sakaeo, the first of the larger Khmer holding centers, received about 28,000 Khmer Rouge refugees in a short period of time. Most of these refugees were

from rural areas, were of relatively low socioeconomic status and educational background, and apparently had had limited access to health care in the past. The second holding center established at Khao I-Dang eventually contained approximately 130,000 Khmer Serai refugees. Relatively more of the members of the Khmer Serai population were former urban residents, were of higher socioeconomic status and educational background, and were better nourished when they arrived in Thailand.

Registries of all births, deaths, and hospital admissions were maintained in both holding centers. In addition, periodic surveys were conducted in both to estimate the number of residents and their age and sex distribution. A survey was conducted in Sakaeo of all households that included at least one married woman to estimate the number of out-of-hospital births in the camp and to estimate the proportion of women 15-44 years old who had ever been married, the proportion pregnant at that time, and the proportion of married women whose husbands were absent. In a second Khmer Rouge holding center, a survey of 100 randomly selected married women was conducted to determine their menstrual status both on arrival at camp and 11 weeks later. Surveys were conducted in Khao I-Dang to estimate the proportion of pregnant women and the number of out-of-hospital births. In both camps, a pregnancy was recorded when a woman reported that she was expecting a child.

Fertility and Underlying Health Conditions. The health measures of death, hospital admissions, and birth weights all indicated that the refugees in Sakaeo were initially in worse health than those at Khao I-Dang. Mortality (deaths) and morbidity (illness) were initially higher in Sakaeo, and the return to pre-crisis levels was slower (Chapter 7). The proportion of infants of low birth weight was also significantly higher in Sakaeo.

Fertility appeared to vary with the overall health conditions. In Sakaeo, where health conditions were worse, the initial crude birth rate (CBR) was 13 births/1,000 refugees/year. In Khao I-Dang, the CBR was 4-fold higher, or 55/1,000/year. On the basis of the last nationwide census in Kampuchea, conducted in 1962, the CBR was estimated to be 47/1,000 persons/year. The higher CBR in Khao I-Dang than in Kampuchea in 1962 can be attributed to the relatively large proportion of women of childbearing age in the Khao I-Dang population. The CBRs in both Sakaeo and Khao I-Dang are skewed upward because of the population distribution. Moreover, the general fertility rate (GFR) in Sakaeo was 35/1,000 women 15-44 years old/year, and in Khao I-Dang it was 203/1,000/year.

Factors Contributing to Low Fertility. Several factors are likely to have contributed to the low fertility observed in Sakaeo: oligomenorrhea (infrequent or absent menses), proportionately fewer women married and living with their husbands, and underreporting of births.

Of the 100 married Khmer Rouge women surveyed several months after they arrived at the refugee camp, only 17 reported having regular menses when they arrived, and 43 reported having amenorrhea for at least 3 months previously; one was pregnant. A smaller survey conducted in Sakaeo shortly after a group of refugees arrived yielded similar data. High levels of amenorrhea have been reported in other situations involving both undernutrition and emotional stress. The oligomenorrhea reported among Khmer Rouge women probably was a major factor in the low fertility observed.

Since, among the Khmer Rouge population, almost all women who bear children are married, low fertility in Sakaeo may partially reflect the low proportion of married women (47% of Sakaeo women 15-44 years old). More than 60% of the Sakaeo women 15-44 years old were <25 years old, and only 5% of the women who were married were <20 years old. Thus, a large proportion of women of childbearing age were young, not yet married, and thus not yet bearing children.

Mass migration associated with disasters frequently leads to the disruption of families, and, obviously, the separation of adult men and women can cause rates of conception to decline. A household survey in Sakaeo showed that approximately 15% of the married women's husbands were not present in the camp, because they had died, had become separated from their families during migration, or were serving as soldiers. However, the proportion of men and women in the two camps was similar.

In the registration process conducted at that time, only births noted by hospital staff were recorded. Surveys in Sakaeo and Khao I-Dang indicated that in each camp as many as one-fourth of the births did not occur in the hospital and thus may not have been recorded.

Other factors that can affect fertility seem unlikely to have contributed to the low fertility in Sakaeo. For example, there was no evidence that lactation was more prolonged among women at Sakaeo than women at Khao I-Dang. There was no indication of widespread use of contraception during the first months of the camps' existence. Family planning services were first offered in February 1980, at which time approximately two-thirds of the women at Sakaeo and nearly one-half of the women at Khao I-Dang were reported to have received contraceptives (*14*). Since injectable medroxyprogesterone acetate, a highly effective method of preventing pregnancy, accounted for 95% of contraceptives provided at this time, these levels of contraception may have affected subsequent fertility levels substantially. However, family planning services offered in the camps would not have affected the birth rates measured at that time (i.e., births that occurred during the first 6 months of the camps' operation resulted from conceptions that occurred before the camps were opened). There was no indication of increased numbers of spontaneous or induced abortions. Studies have not shown a link between undernutrition and intrauterine mortality. Data on hospital admissions for complications associated with abortion showed no evidence of attempts at induced abortion; this procedure was not one of the medical services offered in the camps.

Fertility and Improving Health Conditions

As food, shelter, and basic medical care became available, mortality declined dramatically at both Sakaeo and Khao I-Dang. Concurrent with improving

health conditions, there was evidence of increasing fertility in Sakaeo. On the basis of a GFR based on the proportion of women who were pregnant,* projected levels of fertility indicated a 40% increase in the live-birth rate at Sakaeo by the end of 1980 (Table 21). Consistent with rising fertility levels was the rapid reversal toward more regular menses among the Khmer Rouge women. After 11 weeks in the camp, 37 of the same 100 women discussed earlier reported having regular menses, 21 still reported amenorrhea, and three were pregnant at that time. Evidence from the Dutch famine of 1944-1945 indicates that with adequate nutritional supplementation, oligomemorrhea is quickly reversible.

In contrast, fertility among women in Khao I-Dang apparently changed little after they arrived in the camp. However, since the initial level at Khao I-Dang was similar to that of Kampuchea in 1962, a large increase would not have been anticipated. Even with fertility levels rising at Sakaeo and remaining stable at Khao I-Dang, the projected fertility level in Khao I-Dang was still 3-fold higher than that at Sakaeo by early 1980.

TABLE 21. *Observed and projected fertility, Sakaeo and Khao I-Dang, November 1979-April 1980, and observed fertility, Kampuchea, 1962*

	Sakaeo 1979-1980	Khao I-Dang 1979-1980	Kampuchea 1962
Observed fertility (November 1979-April 1980)			
Number of births	148	2,547	
Total population	24,100	109,000	
Number of women 15-44 years old	9,100	29,600	
Annual crude birth rate	13	55	46
Annual general fertility rate	36	203	221
Projected fertility (late 1980)			
Pregnant women ages 15-44 (%)	(3.2)	(11.3)	
Projected crude birth rate	20	53	
Projected general fertility rate	55	194	

tion when pregnancy first recognized (7 months).

Population Dynamics

The age and sex distribution of the Khmer population in 1962 was similar to that of most developing countries, with the proportion of the population increasing markedly with decreasing age. The population structure of these camps was strikingly different. The usual broad-based population pyramid was replaced by a diamond-shaped population age and sex distribution (Figure 5), as a combination of low fertility and selective high mortality rates for children and the elderly led to a population structure comprised mostly of young adults. Sakaeo, with the highest mortality and lowest fertility, had a smaller proportion

*Projected GFR = 12 x percentage pregnant x 10/average remaining length of gestation when pregnancy first recognized (7 months).

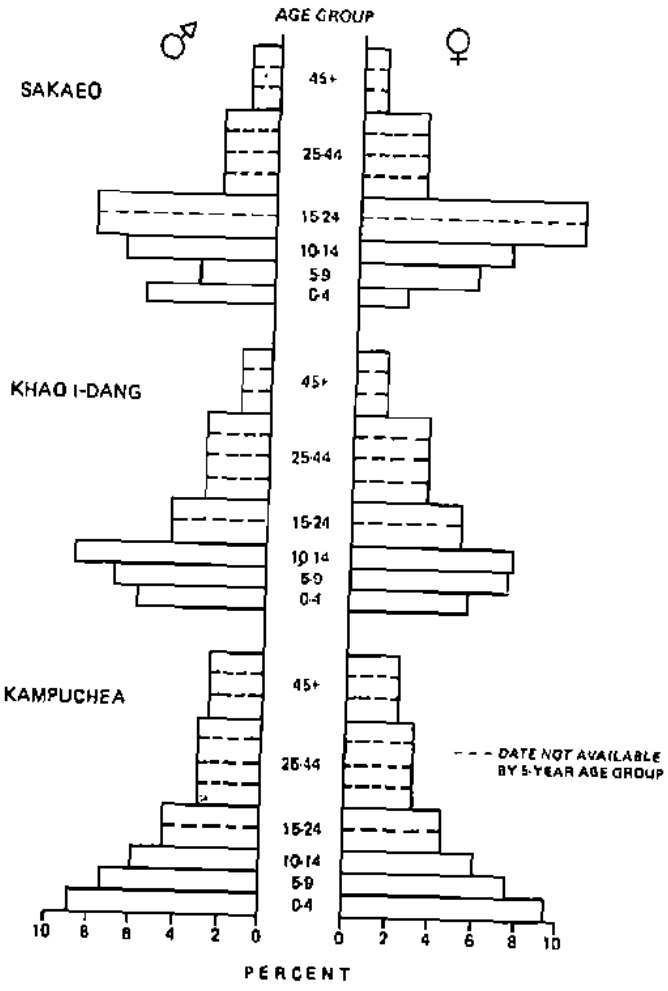

FIGURE 5. Percentage distribution of the population by age and sex, Khao I-Dang, January 1980, and Kampuchea, 1962

of persons <5 and >44 years old than did Khao I-Dang. Both increased mortality and low fertility could account for the relatively small proportion of children <5 years of age. This age group probably suffered more than older persons from the chronic famine in Kampuchea after 1975. When weaned from breast feeding, young children may have been at a selective disadvantage in competing for limited food supplies. The resulting undernutrition would have increased their risk of dying from disease. In both Sakaeo and Khao I-Dang, children <5 years old initially had a mortality rate much higher than the 1962 Kampuchea estimate and consistently had the highest mortality rate for any age group in the camps. This may have been related in part to low initial birth weights (see Table 22).

TABLE 22. Birth weight of live-born infants, Sakaeo and Khao I-Dang, November 1979-April 1980

Birth weight	Sakaeo Number (%)	Khao I-Dang Number (%)
< 2,000 grams	6 (10.2)	18 (2.8)
2,000-2,499 grams	10 (16.9)	108 (16.9)
2,500-2,999 grams	31 (52.5)	246 (38.6)
≥ 3,000 grams	12 (20.3)	266 (41.7)
Total	59 (100.0)	638 (100.0)

Lower birth rates for Kampuchean women after 1975 would also contribute to a decreased proportion of children <5 years old. The low fertility rate observed at Sakaeo relative to that in Kampuchea in 1962 may reflect the level of fertility among Khmer Rouge women over a several-year period and would lead to relatively fewer children in the population. However, the differences reflect high mortality among selected age groups.

In the first weeks of the study reported on here, there was an overall natural population decrease at Sakaeo; however, with dramatically declining mortality, the number of deaths soon fell below the number of births, and the population began to grow. The overall rate of natural decrease during the first 6 weeks in Sakaeo was 113/1,000 persons/year; with a 5-fold decline in the death rate, the rate of natural increase the following 3 months was 6/1,000 refugees/year (Table 23). Assuming no further change in the death rate, the projected rate of natural increase based on projected fertility is 13/1,000/year in Sakaeo. However, the large proportion of women of childbearing age in Sakaeo who are <25 years and not yet married represents even greater potential for a rise in the fertility level and therefore in population growth.

At Khao I-Dang, the initial death rate was lower than the birth rate, and the population had a rate of natural increase of 28/1,000/year during the first 3

TABLE 23. Death rate, birth rate, and rate of natural change, Sakaeo and Khao I-Dang, November 1979-April 1980, and projected rates, Kampuchea, 1962

	Death rate* (deaths/1,000/year)	Birth rate* (births/1,000/year)	Rate of natural change (%)
Sakaeo			
Nov. 8, 1979-Dec. 12, 1979	126	13	(−113)
Dec. 13, 1979-Apr. 2, 1980	7	13	(+6)
Projected	7	20†	(+13)
Khao I-Dang			
Nov. 21, 1979-Dec. 12, 1979	11	55	(+28)
Dec. 13, 1979-Apr. 2, 1980	8	55	(+46)
Projected	8	53†	(+45)
Kampuchea			
1962	15	45	(+30)

*Per 1,000 refugees/year.
†As estimated from the proportion of women pregnant.

weeks—similar to the rate in Kampuchea in 1962 (30/1,000/year). Because mortality during the first weeks was much lower and declined less at Khao I-Dang than at Sakaeo, the shift in the rate of natural change was therefore not as marked (from 28 to 46/1,000/year). The resulting higher rate of natural increase at Khao I-Dang than in Kampuchea in 1962 at least in part reflects the greater proportion of women of childbearing age at Khao I-Dang than in Kampuchea in 1962. With fertility projections indicating little change in the birth rate, and assuming no marked change in the death rate, the rate of natural increase in Khao I-Dang was expected to remain relatively stable.

This anticipated population growth does not take into account the potential effects of family planning services provided in the camps. The type of contraceptive used and the extent of its use determines the impact on population growth. Highly effective contraception and widespread use could substantially lower the fertility rate from that projected. However, allowing more time between pregnancies—a frequent result of implementing family planning practices—could lead to fewer deaths of mothers, infants, and children.

If population growth continued in both refugee populations, with no further large in-migrations, the age distribution would become more normal, and the need for health services would change. In the initial weeks after the refugees arrived, acute care and treatment of the most critically ill required almost all of the health-care resources available. As numbers of illnesses and deaths declined, services for pre-natal care were expanded and began to include birth planning services, vaccinations, more comprehensive health screening, and health education. The subsequent shift in health and fertility was predictable, and health-care providers could begin to plan accordingly for their changing use of available resources.

Conclusion

Our data indicate that the population structure of the refugees arriving from Kampuchea was disrupted by war and famine and resulted from high mortality and low fertility for at least one group of refugees. Low fertility appeared to be readily reversible with improved nutrition, availability of basic medical care, and a more secure environment. More data on fertility levels in disaster and refugee situations and their relationship to both physical and social events are needed.

Chapter 2

Obstetrical Services for Refuge

J. Both, B. Magnuss

Initial Evaluation and Planning

Pregnant women have special health-care needs, and the organization of health services in a refugee-assistance program should provide for their health care throughout the pre- and peri-natal period. In a newly established refugee camp, an initial assessment of this situation is of high priority. Suggestions for initial evaluation and planning activities include:

- Estimation or a count of the number of women who are pregnant, preferably by establishing a registry, and recording the estimated date of delivery.
- Assessment of the general health condition of the entire refugee population and of the subgroup of women of reproductive age. Health screening at the time of census or registration can be used to establish an overall estimate of health service needs for pregnant women and to identify those pregnant women who are in need of special medical attention.
- Assessment of available medical staff and supplies needed to provide adequate obstetrical care. Basic supplies needed include: appropriate medicines, surgical/obstetrical instruments, and a means of sterilizing instruments. The assessment of staff resources includes identifying refugees trained in providing obstetrical or general health care, as well as those willing and able to perform necessary ancillary jobs. Interpreters may be essential. Clear definition of the duties and responsibilities of the staff is important.
- Familiarity with "local" refugee customs related to childbirth. Common practices of the refugee population should be incorporated into the delivery of any health-care service, including peri-natal care.
- Consideration of other reproductive-health services that may be desired by the affected population (e.g., such as contraception, and voluntary sterilization).

The medical services established for pregnant women will vary according to the refugee population and resources available. In general, obstetrical activities

Chapter 29

Laboratory Services in a Refugee-Assistance Program

Richard K. Turnbull

It may not always be possible to establish a clinical laboratory under the field conditions associated with a refugee-assistance program. However, even a small, simple laboratory equipped to perform a limited number of basic tests can provide valuable information in providing health-care services.

General Considerations

The Role of the Laboratory as Part of the Emergency Health-Care Team. The primary roles of an emergency field laboratory are to provide an immediate source of laboratory assistance in diagnosing illness, treating patients, and providing data for disease surveillance. Well-kept laboratory records are an important source of epidemiologic information about the refugee population. The laboratory can provide current health and other statistics on the patient population and can provide support for health services for the entire refugee community.

Testing Capability. Local determining factors will dictate the level of service that can be offered by a field laboratory. Listed below are recommended tests chosen because of their diagnostic value and practicality.

- Microbiology—a) Gram stain; b) a carbol fuchsin stain, e.g., Kinyoun or Ziehl-Nielsen; c) examination of stained thin and thick blood films for parasites (a Giemsa method enables thick and thin films to be prepared on the same slide); d) urine microscopy; e) stool examination for ova and parasites (direct and flotation techniques only); and f) inoculation of growth or transport media and their dispatch to a referral laboratory. Culture and subsequent identification of viruses or bacteria are usually not feasible under field conditions. However, the timely identification of pathogens at a referral laboratory may be crucial in the early identification of epidemic infections.
- Hematology—a) hemoglobin or hematocrit, b) total and differential white-blood cell count and other body fluids (using counting chamber), c) reticulocyte count, and d) erythrocyte sedimentation rate.

can be divided into four categories: ante-natal care; care at the time of delivery; post-natal care; and evaluation. In addition, educational activities should be incorporated throughout all phases.

Ante-Natal Care

This serves at least three purposes:

- Establishing a data base for health assessment and progress of pregnancy.
- Identifying pregnant women at risk of having complications and intervening as soon as possible.
- Establishing a relationship between the pregnant woman and the peri-natal staff.

In general, ante-natal examinations include assessing overall health, estimating gestational age (usually by recording the time of the last menstrual period and by measuring the fundal height), measuring blood pressure, and screening for anemia. Health care may include supplying multivitamins, iron, supplementary feeding, tetanus vaccination, and other prevention and treatment as dictated by the woman's condition and the services available.

Care at Delivery

Practices used for delivery should not conflict with the customs and practices of the refugee population; otherwise, women may avoid seeking care even when they have problems. Although delivery in a hospital setting may be encouraged, giving birth at home may be preferred and sought by refugee women; efforts may thus need to be placed on providing trained attendants for births at home. Utilizing the services of trained birth attendants from the refugee population, both in homes and in hospitals, is a major means of providing comfort and assurance to the refugee patients. Hospital facilities should be basic and simple: an examining room, a delivery room, a ward, a kitchen, a storeroom, and a room for the staff. Facilities for performing any necessary caesarean sections should be nearby.

A registry of hospital admissions and births serves as a record of the services provided and of the outcome of pregnancies. Basic information that should be recorded includes: the date of delivery; the age, parity, and gravidity of the mother; the sex, birth weight, birth length, and estimated gestational age of the infant; any complications of the pregnancy or delivery; whether the mother had received ante-natal care; and the general condition of the infant at birth. These data provide useful information regarding general health conditions—including changes over time, child health services needed (including supplementary-feeding centers), and anticipated obstetrical resources required.

Post-Natal Care

This encompasses care for the infant and the mother, including contraception and supplementary nutrition, if desired. Successful breast feeding is a very important aspect of the post-natal period. Medical staff should help discourage potentially dangerous bottle feeding practices and should assist mothers in providing optimal nutrition for their infants by encouraging breast feeding.

Educational activities are important throughout the peri-natal period. At the time of registration and during ante-natal visits, expectant mothers should learn basic hygiene, nutrition, and events involved in the delivery. Education programs for women in the obstetrical ward should include topics such as breast feeding, infant care, general nutrition, and contraception. In the post-natal period, continued emphasis on hygiene, contraception, breast feeding, and basic general child care is useful.

Educational programs for the refugee staff will facilitate their becoming well-trained and self-sufficient in delivering peri-natal health-care. The future conditions under which they will probably be working must be considered, and classes should be geared toward such anticipated situations.

Evaluation

At regular intervals, aggregate data should be evaluated to ensure that obstetrical care is being optimally provided. Appropriate indices of obstetrical care include such items as: maternal mortality rate, peri-natal mortality rate, neo-natal mortality rate, breast-feeding rate at discharge, mean birth weight, percentage of births < 2500 grams, and percentage of delivering women who received ante-natal care. Persistent high rates—or rising rates—of poor outcomes indicate that more resources may need to be made available.

Summary and Recommendations

- Initial activities should include an assessment of the numbers and health status of pregnant women and some familiarization with local customs, practices, and wishes regarding reproduction, delivery, and contraception.
- A registry of obstetric admissions and of births should be established.
- Pre-natal preventive services (e.g., tetanus toxoid, supplementary feeding) should be provided to whatever extent possible.
- Breast feeding should be emphasized; except for emergencies such as maternal death or severe illness, formula feeding should not be allowed.
- Patient education during both the pre- and post-natal periods should be emphasized.
- Education of local staff should support the concept of eventual self-sufficiency in handling normal pregnancy and delivery.
- Regular evaluations of pregnancy-outcome data will ensure ongoing delivery of optimal obstetrical care.

• Blood banking—Because of the risks and the practical obstacles associated with establishing a transfusion program, medical personnel should determine whether a clear need exists for such a field capability. ABO and Rh blood grouping and cross-matching (the combination of saline and albumin cross-matching procedure at 37°C for 30 minutes) will identify most life-threatening blood incompatibilities.

• Biochemistry—Apart from dip-stick tests, biochemical procedures are difficult to perform accurately under field conditions and are not recommended.

Laboratory Equipment. The following is a list of the equipment and associated items neeessary to perform the procedures outlined above. Because the availability of particular models and makes of equipment vary from country to country, no such specific recommendations are made here. The list of equipment below is based on the assumption that the laboratory will have a source of 230- or 110-volt electricity.

1. Microscope with oil emersion ability (one/1.5 technologists) and appropriate light source
2. Small bench-top-type centrifuge (capacity—16,18-mm test tubes; centrifugal force—700 g; maximum power—500 watts)
3. Small blood-banking serology centrifuge
4. Water bath (room temperature to 100°C)
5. Triple-beam weighing balance
6. Bottled liquid propane gas, reducing valve, and burner
7. Pressure-cooker-type sterilizer
8. Cell counting chamber
9. Water de-ionizing unit or apparatus for a water distillation unit
10. Blood-bank refrigerator (capable of regulation accurately to 4°C ± 2°C and of robust design; propane gas or kerosene refrigerators are not suitable)
11. Electrical generator
12. Set of tools for repairing and maintaining facility and instruments and appropriate spare parts

The Laboratory Building. Ideally the laboratory should be located in a relatively safe and permanent location. Tents can be used for the short-term, but a more suitable accommodation should be obtained as soon as possible. A medical technologist should be involved in planning the laboratory facility.

Electrical Supply. Generally, in an emergency relief operation, when no outside supply of electricity is available, a small electrical generating plant is needed. Many types of such plants are commercially available. By adding together the maximum power requirements of all on-site and anticipated electrical equipment (including lights), the total electrical power requirements of the laboratory can be determined. Should a blood-bank refrigerator be required, a 3,000-4,000 watt generator will be needed; otherwise a much smaller generator (1,000 watts) should be sufficient to provide 6-8 hours of electrical power per day (diesel motor is preferable). Gasoline generators, although less reliable, have the advantage of being about 1/6 the weight of an equivalent diesel generator. Compatibility with the electrical equipment in the laboratory must also be assured. Alternating current electricity in Asia is most commonly supplied as 230 volts, 50 cycles.

Water Supply. A laboratory needs 2-5 liters each day of clean and relatively pure water for preparing reagents and cleaning equipment. Properly collected rain water is adequate. A water distillation apparatus can be constructed from clean oil or fuel drums and several meters of plastic piping, or de-ionized water can be obtained by processing available water through small, transportable, commercially available mixed resin beds.

Laboratory Records. A simple and efficient system of requesting tests, collecting laboratory specimens, and recording and reporting results must be established. In the simplest system, results are reported on the back of the submission form, which is then returned to the requesting health workers. Results are also recorded in the daily log book. Planning a system for communicating and recording results should be included with other aspects of laboratory design.

Planning and Administration. If a relief agency plans to include laboratory facilities in its health program, a laboratory kit should be prepared and kept on hand in anticipation of a call for assistance. The agency should retain an experienced medical technologist to advise on the purchase of equipment, spare parts and supplies, and the selection of personnel. The consultant should prepare a detailed list and assemble the equipment and materials in the quantities required, specifying the manufacturer or supplier's name and the model or catalogue number. When possible, reagents should be prepared in a "ready-to-use" form. When the laboratory kit is assembled and dispatched, the technologists who will operate the laboratory should be briefed on its contents.

An efficient operation can perhaps be best achieved by designating a single relief agency to be responsible for establishing and maintaining all laboratory services. This agency should ensure that supplies and equipment are standardized or compatible. In the field, a coordinator for laboratory services should be appointed to facilitate communications and management.

The Field Laboratory In Sakaeo, Thailand

During the first week the Sakaeo camp was in operation, the medical staff recognized the need for a clinical laboratory and requested ICRC provide such a service. Three technologists commissioned to set up a laboratory began work about 2 weeks after the camp was established. From the beginning, the workload for hospitalized patients far exceeded the laboratory's capacity (Table 24), so no epidemiologic surveys for malaria, intestinal parasites, tuberculosis, or anemia were done. The laboratory was able to contribute significantly to the diagnoses of *Plasmodium falciparum* malaria, severe anemia, tuberculosis, pneumonia, and diarrhea.

During the emergency phase (the first 2 months the camp was in operation), it was impossible for the laboratory to meet the demand for services—despite 10-hour work shifts and no holidays for the staff. Without consulting each

TABLE 24. Tests performed at Sakaao laboratory, November 1979-January 1980

Test	1st Month	2nd Month	3rd Month
Blood grouping (ABO only)	644	874	150
Cross-matching (saline & albumin)	384	793	130
Hematocrit			
Total white-cell count	*No accurate data available (relatively*		
Red cell morphology	*few procedures performed)*		
Reticulocyte count			
ESR			
Malaria examinations	511	612	1300
Stool for ova and parasites	98	138	347
CSF examination	191*	83	54
Sputum for acid-fast bacteria	877	935	590
Gram stain			
Micro-urine examination	*No accurate data available*		
Total	2,705	3,615	2,571
Estimated number of technologists	4	5.5	6
Number of tests per technologist	676	857	321

*During the first month, an outbreak of meningococcal meningitis occurred, resulting in high demand for CSF examinations.

other, several relief agencies independently recruited technologists, which resulted in an excess of staff by the third month of operation (January 1980). Additional assistance was obtained locally from the medical staff, from other volunteers, and from the refugees themselves. In both the Sakaeo and the Khao I-Dang laboratories, Khmer were employed as laboratory aides and bench workers. In January, formal training programs were set up in both laboratories to teach other Khmer the techniques of staining and microscopy.

For the first 3 weeks, the laboratory at Sakaeo was situated in a large tent. This unsatisfactory working environment improved somewhat when the laboratory was moved into the rear of the admission/surgical ward, which was constructed of wood and bamboo, and had a thatched roof, straw matting walls, and a stone rubble floor. There was no running water, no drainage, and waste disposal was far from adequate. For the first 4 weeks of operation, before the hospital was connected to the local electrical system, the laboratory used a 1,000-watt gasoline generator. The most important piece of equipment in the laboratory was the microscope. The Sakaeo laboratory initially had two microscopes and by mid-January, nine—four of which had not been requested and were not needed. Although there were a variety of microscopes, it was difficult to obtain spare parts (especially light bulbs).

The laboratory performed all the tests listed earlier. In examining blood films for malaria parasites, the shortened Giemsa stain method was the most suitable since it stained the parasites well and enabled a thick and thin film to be prepared on the same slide. Wright or Leishman stains were used for examining routine blood films. An analytical grade of methanol (acetone- and water-free) was essential for properly fixing blood films. The hematocrit was the simplest and most reliable test for anemia. Kinyoun stain was used for sputum examinations for acid-fast baccili. Cerebrospinal fluid examinations consisted of a white blood-cell count and a Gram stain if large numbers of white cells were found.

Blood banking was a major part of the work load at Sakaeo. Initially the technologists provided a rudimentary blood-banking service using blood collected from visitors and health workers. ABO group-specific blood was used for transfusion after being subjected to a saline room temperature compatibility check. The demand for blood far exceeded the supply, and a month after the camp was established, arrangements were made to obtain supplies on a regular basis from overseas. In the first 3 months, over 1,200 units of blood were given in treating persons with chronic anemia. The factors that contributed to this overuse of transfusion were the lack of guidelines for the appropriate indications for transfusion and the ready availability of blood and compatibility testing in December and January. Despite requests for use of hematocrits or other objective criteria the decision to give blood was often based on a clinical assessment. Later, when criteria for giving blood transfusions were developed, the number of units of blood used for transfusion was reduced. For the first 2 months, before the laboratory acquired a blood-bank refrigerator, blood was stored in ice during the day, and the few units that were not used were stored at night in the blood bank of the local Thai hospital.

From the beginning, all results were recorded in a daily logbook, and locally printed cards were used for requesting laboratory examinations and reporting results. Daily results were monitored by the epidemiologist, and retrospective summaries were presented to meetings of the principal medical workers in the camp.

Recommendations

- A basic laboratory service is not a luxury. In the refugee-assistance program in Thailand, the laboratory was an essential part of the health-care effort and operated effectively under field conditions.
- The health agency charged with the responsibility of directing in a refugee-relief operation should plan and coordinate laboratory services from the very beginning of the operation.
- Coordination of recruitment of laboratory staff helps prevent under- and over-staffing.
- To prevent overuse of the laboratory, criteria for requesting blood for transfusion and for ordering laboratory studies should be agreed upon.
- Laboratory equipment should be selected by an experienced medical technologist. Standardization and uniformity of laboratory equipment are important.
- A medical technologist should be involved in planning the laboratory building and operations.
- Careful attention should be given to supplying adequate electricity and water.
- A simple but efficient system of requesting tests, submitting specimens, and recording and reporting results is of utmost importance. Such a system will help health workers, epidemiologists, administrators, and patients.

PART III

The Role of Epidemiologic Surveillance

INTRODUCTION

Epidemiology had its formal beginning in the 19th century during the investigation of outbreaks of such infectious diseases as bubonic plague, cholera, and smallpox. John Snow, one of the founding fathers of epidemiology, linked an outbreak of cholera in London in 1854 to a contaminated public well. By removing the handle from the pump of the well, he stopped the outbreak, and modern epidemiology was born.

The scope of epidemiology has expanded dramatically since John Snow's time. Epidemiologic methods are now used in such diverse projects as drug efficacy studies and studies of the associations between various chemicals and toxins (e.g., cigarette smoking, asbestos) and cancer.

Epidemiology is not an exact science; it is rather a set of methods for logically approaching problems. An epidemiologist is a health worker whose patient is the community. S/he looks for trends and patterns of illness and helps to design preventive measures to lower the rates of illness (morbidity) and death (mortality). Although the epidemiologist applies theories from the mathematical and statistical sciences, his/her methods can be as simple as looking for common times or places of exposure among a group of ill individuals.

Epidemiologic techniques are being used in an increasing number of refugee-relief operations. They have been found to be most useful in relatively stable refugee camps where resources are limited and where it is necessary to set health priorities.

In the following sections, the roles and limitations of epidemiology in the context of refugee health are discussed.

Chapter 30

Organizing Epidemiologic Surveillance for a Refugee Population

Roger I. Glass, Margaret Dalia, Phillip Nieburg, Donald T. Allegra

Collecting information to address issues concerning the health of a population and the adequacy of health programs comprises a major function of an epidemiologist. This health professional, often a physician, views the entire community, rather than the individual, as a patient and is concerned with assessing the distribution and determinants of disease in the population so that appropriate health intervention can be planned. The epidemiologist measures the well-being of the community in terms of rates of illness or death, noting the number of specific disease events (the numerator) affecting the total population at risk (the denominator). These rates can either be compared with those observed for the population before they became refugees or with expected or known standards. From these crude overall rates of death or illness, the epidemiologist tries to identify groups in the population (e.g., children <5 years old, pregnant women, the elderly) who are at greatest risk of disease, so that when appropriate these groups can be targeted for special health interventions. For example, when faced with anecdotal reports or newspaper accounts of individuals suffering from undernutrition, cholera, or untreated wounds, an epidemiologist might try to quantify the rate of occurrence of the condition(s) in the population and to identify groups most affected. These data have function and relevance—they allow decision makers to know the extent of the problem, how the data compare to rates of illness in the victims' country of origin or in another disaster situation, how many resources will be required, and at whom control efforts should be directed.

Epidemiologists use a number of techniques to make community diagnoses. These include: 1) census and sampling methods with which to identify the denominator population, 2) survey and screening techniques to quantify illness in the population (the numerator), and 3) reviews of health records (e.g., death

registration, hospitalization log book) and repeated sampling to monitor events over time.

These methods can be simplified for field work and adapted for use by a single individual or an epidemiologic team, depending on the resources and the need to know.

In a crisis setting, an epidemiologist can be most effective by following several simple guidelines.

- Be relevant—Since every study is difficult to perform and the need for key information is critical, every data bit collected and analyzed should address a question demanding an immediate solution or decision. Data that will not be used should not be collected. For example, some pertinent questions are: What is the most important cause of preventable death? Is cholera or typhoid an immediate problem? Are injured people being inadequately triaged? The relevance of each study performed should be obvious enough so that no one can seriously question the reason for a study's being done.
- Use simple methods—Since resources including staff, communications, laboratory support, supplies, and data processing facilities may be limited, surveys must be conducted rapidly using the simplest, most straightforward design, omitting sophisticated diagnostic techniques, large sampling populations, and dependence on potentially unreliable outsider, and on technical facilities such as communication, equipment (phone, radio, telegrams), and road or air transport.
- Be timely in disseminating results—Decision making during major emergencies is a series of day-by-day events. Collected epidemiologic information should be analyzed and disseminated to decision makers as soon as possible. Short reports documenting the key points of surveys and their implications should be prepared weekly or bi-weekly. In the post-disaster setting, anecdotal accounts and eye-witness (whether factual or not) reports of health problems tend to attract disproportionate attention. A brief professional report by an epidemiologist based on reliable survey data can fill this information void and provide reliable, population-based health information.
- Be a competent and available adviser—The epidemiologist functions as an adviser to persons in charge of resources and health-assistance programs. Unless the epidemiologist has a close tie with appropriate health officials, the impact of his/her surveys may have little impact. Furthermore, decision makers attempting to respond to offers of health assistance can effectively use epidemiologic services to assess the value of accepting such assistance.

Where to Begin—Background Information and Initial Rapid Assessment

Background health data about the affected group of people, the areas from which they came, and the areas in which they are relocated are important factors in preventing early errors in judgment and false rumors of disease. Ideally, some of these data will have been collected before the crisis arises. On the basis of information about the seasonality, endemicity, and background incidence of local infectious disease (e.g., measles, malaria, typhoid, cholera), the epidemiologist can suggest the current epidemic potential of such problems. In many areas, diseases considered by health workers and others to be epidemic may actually be endemic and thus be unlikely to spread further. Knowledge of the vaccination status, common nutritional deficiencies, and social/anthropologic characteristics of the persons to be assisted and their level of understanding of such issues as sanitation principles should permit more effective consideration of specific health-assistance programs. In such a setting, a seasoned public health worker may be able to temper many unfounded reports of unusual disease outbreaks or premature or unwarranted concern for specific immunization initiatives.

An initial walk through a refugee camp or disaster area is the starting point for setting up a surveillance system. Observations of the visible prevalence of persons with poor nutritional status, obvious medical disorders, common problems that can be solved (e.g., better delivery of care and improved water and sanitation), and future risks (e.g., epidemic potential) can help identify problems to be included in a surveillance system and can help determine relative priorities. Observations of the degree of crowding, quality of sanitary practices, the nutritional state of the group, housing, and exposure to the elements and to insect and animal vectors of disease all provide impressions of risks that may need to be considered. For issues perceived to be of major importance, quantitative information must be obtained in order to define the extent of the problem and to determine strategy for dealing with it effectively.

Persons at Risk—The Denominator. An accurate estimate of the size of the affected group of persons is the first key piece of information to obtain, since this figure will be used to calculate the needs for food, clothing, shelter, medical and sanitary services, and other supplies. In a small refugee camp or isolated area, the epidemiologist can determine the population—if the number is not already known—through a census or survey, and may be able to make arrangements with authorities at entry and exit points to count people as they enter or leave. From such a survey, the age and sex distribution of the population can also be assessed, as well as other relevant demographic information (e.g., ethnic or political groups, religion, areas from which people came). This simple demographic information can help identify issues related to health-care delivery (e.g., Is there a substantial group of infants, pregnant women, elderly persons, or others in need of special care?). In dealing with large numbers of uprooted people or in situations in which refugees are spread over a wide area, estimates of the population should be obtained from the most reliable sources available. Irrespective of source, such data should be re-examined for accuracy, perhaps through small random or representative surveys. Results from such surveys can then be extrapolated to the entire group of refugees. It is relatively easy to combine the collection of such demographic information with other data-collection efforts.

Causes of Death and Severe Illness—The Numerator. Setting up a simple death registry for a contained population or investigating a sample of deaths among refugees can provide useful information on the death rates and on prevalent

diseases—information essential for the institution of effectively targeted health measures. While the number of deaths is often the most visible measure of the extent of a disaster, only deaths that might yet be prevented are useful for the relief effort. Age- and sex-specific death rates (calculated with the number of deaths as the numerator and the group at risk as the denominator) can help identify the effects of the disaster and allow them to be compared with the mortality rates for this group of people before they became refugees.

Only simple information that can be used should be monitored; data collected should be tailored to the principal problems confronting the intervention—e.g., if programs for controlling malaria are being organized, malaria/fever-related deaths should be monitored. Often, information for this death register is best obtained from people who are concerned with the bodies of the deceased, e.g., local civil or religious leaders, indigenous healers, or burial agents. Trained volunteers or refugees with a simple log book can carry out the necessary interviews and are a valuable resource (Tables 25-26). Later, when surveillance is better organized and most of the persons are hospitalized at the time, daily reports of the numbers and causes of deaths can be obtained from hospital staff.

TABLE 25. Sample of daily morbidity registry page from admission log

Age	Nov 21	Nov 22	Nov 23	Nov 24	Nov 25	Nov 26	Nov 27
< 1 mo							
1-11 mo							
1-4 yrs							
5-14 yrs							
15-44 yrs							
> 45 yrs							
Sex: M							
F							
Dx							
Fever/malaria							
Diarrhea/dehydration							
Pneumonia							
Undernutrition							
Anemia							
Meningitis							
Trauma							
Other							
Total							

TABLE 26. Sample census sheet

Date	Daily total (new) arrivals)	Cumulative camp total	Sent to hospital (daily total)	Pregnant (daily total)	Male	Female	Children < 5 yrs	Referre to OPD

Medical Records Review. When patients in a disaster area are hospitalized, some records are usually kept by the hospital. Monitoring simple categories of diagnoses of patients from an admission log book (e.g., diarrhea, upper respiratory infection, fever, undernutrition, acute trauma, severe anemia) is adequate to determine the distribution of diseases and their relative prevalence among hospitalized patients. These indicators can be used to monitor the frequency of illness in this group of people over time, as well as the need for specific emergency supplies and relief personnel. Hospital surveillance data can be made more reliable by having a single team of physicians assigned to admit all patients. Such physicians can also be helpful in serving as an early warning system for outbreaks of communicable disease.

Diagnostic data from hospital records or a death registry will make it possible to identify the most serious causes of illness and allow the problems to be ranked in order of importance and followed over time. In contrast, data from out-patient clinics are initially much less useful because patients with severe disease are usually referred to a hospital where they are identified through the hospital surveillance system. In addition, many people seek out-patient medical care following a disaster simply because medical care is available. Generally they have minor, self-limited complaints made worse by the stress of the situation. Finally, the large clinic work loads make recordkeeping a major, time-consuming function.

Clinic records accurately maintained by reliable staff members can help in assessing the delivery of care and the distribution of diagnoses, especially in locations without a hospital or a death registry. When the situation stabilizes and as time and additional staff become available, an out-patient surveillance system can also be valuable. It is a tool with which to monitor outbreaks of disease, to assess the efficiency of the clinic operation, to perform surveys, and to

determine the need and potential for health personnel to be assigned to outpatient services.

In these circumstances, laboratory support, sometimes considered a luxury, can become extremely helpful in confirming or ruling out illness of epidemic importance (e.g., cholera, malaria) and in helping to identify the most prevalent diseases. Initial field collection of specimens should be limited to those required to establish key diagnoses of epidemiologic and public health importance.

Determining the Prevalence of Selected Diseases in the Population: Community Surveys and Entry Screening

Community-based surveys and entry screening are techniques used to determine the rates (prevalence) of selected illness for stationary or mobile groups of people. Although records of deaths or hospital care can provide clues to the prevalence of severe disease, these figures will be biased if only selected groups of patients seek hospital care or if persons die at home and are buried or cremated by family members. To conduct a screening program or community survey, one must first identify (from a site visit, from reports and investigations of rumors, and from discussions with refugees or officials) the health problems considered to be the most severe and most in need of policy-level decisions. Some identified diseases may be common but not life threatening (such as intestinal helminths or anxiety reactions), whereas others may be severe but hard to identify or to treat patients for in an unstable setting (e.g., tuberculosis). Still others may be less common but may be severe and easy to treat or prevent (e.g., severe diarrhea, measles). The diseases that should be surveyed first are those that are common, contagious, life-threatening, and responsive to practical preventive measures.

Appropriate survey techniques are dictated by the size of the group of people to be sampled, the availability of personnel or laboratory support, and the level of precision of the data needed. Usually, the groups of people to be surveyed tend to be large, personnel and laboratory support are limited, and a rapid, relatively reliable estimate is adequate. If a list of registered refugees is available, a random sample can be generated. If the people are widely scattered or have not yet been accurately counted, other methods must be used to select a representative sample that is free from obvious selection biases. By surveying a cluster of families around the index (first-selected) family, field work can be carried out more rapidly with little loss of precision. In many situations, it is not practical to use proper but more complicated random sampling techniques, and a reasonable representative sample is all that can and should be obtained.

The sample size should be determined by the available time, personnel, and laboratory support, and by certain statistical considerations. In short, for assessment of the age, sex, and basic demographic information that can easily be collected on a questionnaire or tally sheet, a well-chosen sample (i.e., random is most desirable; representative or "cluster" is next) of at least 300 people can be considered adequate for most camps. If clusters of four to six families are used and if each family contains roughly four to five members, data from 15-50 clusters of families should give representative results. For assessment of nutritional status, groups of 25 children of known age who are <110 cm in height and chosen from 10-30 sites can be weighed (using a Salter scale) and measured to determine the prevalence and severity of undernutrition. For assessment of specific illnesses such as vitamin A deficiency or anemia that require clinical examination, fewer records obtained by a limited number of observers are preferable to data obtained by a larger group of inexperienced surveyors. When laboratory support is required (e.g., malaria smears, hematocrit determinations), the numbers surveyed can similarly be reduced to accommodate the capability of the laboratory. In general, however, at least 100 specimens will be needed from individuals chosen without obvious bias. In this type of survey, the people to be examined or tested should be identified before the dwelling is entered (e.g., data should be collected for all people who slept in that place the preceding night), and anyone not present should be sought on a return visit, referred for follow-up, or noted as absent in the report. When screening tests are performed in the field, one must resist the urge to take specimens from people who are obviously sick rather than those who have been identified for the purpose of a random or representative survey. In assessing the percentage of people who are severely ill and in need of immediate hospitalization, the number who have diarrhea, or the number of families who have recently had a death, one often needs only to interview the head of household to determine the status of all immediate family members.

If an accurate random survey has been carried out, all people in the group being studied should have had an equal chance of being sampled so that results can be extrapolated to the entire population. If a representative (or "cluster") sample is used, it is often impossible to determine potential biases, and the validity of extrapolating these results to the entire population is questionable.

Community surveys can be performed if a relatively stable population group is confined to a camp or to a series of villages. If an area is about to receive a new influx of refugees, screening refugees as they enter a new camp, cross a border, or travel along a main highway can provide similar information.

Outbreak Investigations

Outbreaks of disease are best investigated as soon as they are reported or suspected or as soon as rumors reach authorities. The source(s) of reports of outbreaks should first be traced, and each report should be confirmed before an investigation is begun. These investigations should be given top priority even if they are based on rumors. It is important to disseminate all reports of epidemiologic investigations as widely as reports of the outbreak spread.

Summary

Many field techniques can be used in rapidly assessing the health status of a group of uprooted people. The techniques can include collecting census information, setting up a death registry, performing camp-entry screening and community surveys, monitoring hospital and laboratory records, and identifying

and investigating outbreaks of disease. All surveillance should relate directly to the health problems of the people affected and should address qualitative and quantitative aspects of the intended or already implemented health intervention. In the initial chaos following a sudden disaster, information collected should be of immediate use, and every survey finding or activity should be transmitted to the decision makers and to the leaders of the affected group of people.

While information leading to identification of actual health problems is important, negative information (i.e., data demonstrating that a perceived or rumored problem is *not* of consequence) is also important. Ruling out problems can prevent waste of supplies, resources, and time. For example, although cholera and typhoid vaccination programs are often suggested in the wake of a disaster, they are rarely indicated and divert resources from other interventions that are actually needed.

Chapter 31

Rapid Health Screening as a Epidemiologic Tool in Refugee Camps

Donald T. Allegra, Roger I. Glass, Phillip Nieburg, Magnus Grabe

Rapid assessment of the health status of a refugee population is one of the first tasks facing health teams when they initially arrive. Such assessment is important in order to identify persons in immediate need of health-care (triage), to identify specific current health needs, and to predict long-term health-care needs.

In this section, the screening procedures used at the Khao I-Dang camp are discussed in order to describe the type of information that was collected, the public health programs implemented, and the manner in which the assessment procedure affected the health-assistance program.

The Screening Process

The system described below was used over a 2-month period in which 112,000 refugees entered the camp, and during which numbers of daily arrivals ranged from a low of 76 to a high of 7,700. Each refugee was screened quickly so that large numbers of new arrivals could be evaluated each day without slowing down the process of settlement in the camp.

Setting Up the Screening Area. Buildings in which to conduct health screening are not usually available immediately; an outdoor area with marked-off or roped-off segments for crowd control may be the only feasible solution. At Khao I-Dang, refugees were brought in open trucks and buses from the border area to the camp, a distance of about 15 kilometers. Often eight to 10 buses and trucks would arrive at once, and a traffic-control system had to be set up to avoid mass confusion. Each bus or truck was directed to stop in front of one of up to eight locations of screening teams. The teams were composed of one to three nurses, two to three interpreters (who themselves were refugees), and occasionally a doctor and/or non-medical volunteers. Some of the teams worked full time at screening, but most were part of larger national Red Cross or volunteer agency teams, who rotated their personnel through the screening

activity. When refugees arrived, each bus or truck was met by a member of the screening team, who would scan the interior of the vehicle for any critically ill persons. Once identified, such people were placed in ambulances and taken directly to a hospital admissions ward for further evaluation. The wait for a vehicle and trip from the border in an open truck, all under a blazing sun, led to significant dehydration, particularly among infants, and water was made available at the point of entry to the screening area so that both children and adults could be rehydrated before entering.

Demographic Data. After the new arrivals were unloaded and moved into one of the roped-off areas, the refugee interpreters counted the total number from each bus. The age and sex of each refugee was recorded, as was the area or settlement on the border from which each had come.

Physical Examination. After the initial census data had been obtained, each refugee was given a brief physical examination. If anyone complained of illness, a more thorough history and physical examination were completed. The basic examination consisted of looking for conjunctival pallor, enlarged spleen, and high fever. The seriously ill were taken to an admissions area by vehicle (if available) or on stretchers. Those with mild fever, moderate anemia, or other conditions not requiring immediate attention were given referral cards to go to one of the out-patient departments after they and their families had settled in the camp. Since the initial plan was to send seriously ill patients to the hospital without delay, the screening process took place near the main hospital admission ward.

Referrals. Three types of referrals were made in the screening area. The immediate referral of critically ill patients to the hospital and the referral of patients with non-emergency problems to out-patient departments have already been mentioned. Since a substantial proportion of the Khmer refugees entering Thailand were undernourished, members of high-risk groups (children < 5 years of age and pregnant women) were identified and referred to supplementary-feeding centers, where they could receive an extra meal each day and be followed for nutrition-related problems.

Special Situations.

- Pregnant women—Women of reproductive age were asked if they were pregnant. If they said yes or were not sure, they were referred to a small enclosed area where they were seen by a nurse-midwife and were given a more detailed physical examination that included determining pregnancy, estimating the month of gestation, and measuring blood pressure and weight. This information was recorded in each patient's record, and the pregnant patients were referred to pre-natal clinics attached to the out-patient departments in each section of the camp.
- Children to be vaccinated—Children 9 months-5 years of age were sent to a special area where they were vaccinated against measles. The decision to give measles vaccine to all these children was based on the fact that a measles outbreak in an undernourished population can cause significant illness and large numbers of deaths.

Epidemiologic Surveys. If time and numbers of new arrivals allowed, epidemiologic surveys were carried out as part of the daily screening process. One c every five or 10 buses or trucks was selected for specific surveys to gain furthe information about the population of incoming refugees. The decision of whic surveys to do was based on an initial impression of the major health problem among arriving refugees. Surveys done during the initial screening proces were sometimes preferable to those involving the settled population of refugee because the initial surveys were logistically much easier to perform, and a clus ter sampling technique (e.g., sampling every fifth vehicle) was much simpler t implement. Also, these initial data were a baseline against which later survey in the camp could be compared to assess the efficacy of health intervention pro grams (e.g., results of nutritional surveys during the health screening proces could be compared with results obtained after feeding programs had been imple mented). The major disadvantage of surveys during the screening process wa that the people sampled on a given day or in a given week may not have bee totally representative of the population of refugees already settled in the camp To obviate this problem, an attempt was made to repeat initial surveys at a late date (if the surveys were simple and if supplies and personnel were available). I the results of the repeat surveys were nearly identical to those of the initia survey, it was concluded that the initial results probably applied to a substantia proportion of the refugee population in camp. If, however, the two sets o survey results differed greatly (a situation that did not occur at Khao I-Dang), i would have then been concluded that the population in the camp was truly hete rogeneous and that no single survey result obtained in the screening area coul be extrapolated to the entire camp population. Alternatively, it could have bee concluded that the ongoing intervention program(s) were successful. Survey of this type at Khao I-Dang included those for malaria, anemia, and nutritiona status.

- Malaria—On several occasions, blood smears for malaria testing wer taken from new refugee arrivals. The low incidence of malaria parasitemia (8% only 4% of which was *falciparum* malaria) indicated that malaria was much les prevalent among the refugees at Khao I-Dang than among the refugees a Sakaeo. This reemphasizes the point that surveys done on a group from a singl region cannot be extrapolated to include refugees from another region even o the same country. As has been mentioned earlier, the Khmer rouge refugees ir Sakaeo camp came through a mountainous, forested area where malaria wa hyperendemic, while the Khmer Serai at Khao I-Dang traveled through a dr plains area where malaria was less common. Mass treatment of all refugees ir Sakaeo camp was recommended because of the high levels of parasitemia, bu at Khao I-Dang the potential benefits and cost effectiveness of a mass campaig to treat refugees for malaria were too low to justify such a program.
- Anemia—A random survey of a representative Khmer refugee popula tion sample showed that significant anemia (< 30% hematocrit) was a majo problem, particularly among pregnant females, for whom the prevalence wa 37%. The results of a simple survey of a random sample of the population pro-

duced objective data that confirmed the existence of a specific problem, its magnitude, and the groups at highest risk. This information helped direct appropriate therapeutic interventions.

Nutritional Assessment. This topic was covered in detail in Chapter 15. In summary, weight-for-height ratios were calculated for persons on every eighth bus or truck that brought refugees to Khao I-Dang during various time intervals. This information helped identify border camps where undernutrition was particularly severe and also provided a baseline against which results of later surveys could be compared.

Mass Treatment for Malaria. Mass treatment of arriving refugees with Fansidar (sulfadoxine—500 mg + pyrimethamine—25 mg) was begun at Khao I-Dang because the malaria parasitemia rate had been expected to be as high as that at the camp at Sakaeo. The program was quickly discontinued when the initial malaria survey showed low levels of parasitemia.

Results of Screening

General interest in collecting data and in maintaining a health screening system can only be sustained if the health workers collecting the data see that the information gathered is being used. At Khao I-Dang, the results of screening were tabulated daily and posted on a large blackboard the next morning so that all interested personnel could see them (Table 27). An analysis of information obtained in the screening process was also presented at each weekly medical staff meeting. The data, particularly the census information, proved useful not only to the medical staff but also to administrators and government officials.

TABLE 27. Sample of data collected in daily screening, Khao I-Dang, December 1979-January 1980

Date	Camp or area of origin of refugees	Daily total	Cumulative total	Number to hospital	
				Daily	Cumulative total
Dec 12	Border area	5,771	50,365	19	751
Jan 10	Border area	335	101,171	4	1,036
Jan 28	Battambang	76	111,662	5	1,082

Date	Daily	Cumulative total of pregnant women	Male adults	Female adults	Children (< 12 years)	Number referred to outpatient departments
Dec 12	123	1474	1691	2022	2056	380
Jan 10	18	2988	126	121	88	15
Jan 28	0	3082	16	20	40	0

TABLE 28. Activities during health-screening, Khao I-Dang, December 1979-January 1980

Purpose of activity	Method	Rationale and outcome	Group screened
Census and demography	a. Count all arriving refugees; b. Determine age/sex distribution of sample	a. Data needed to plan for food, water, shelter, etc. for all; b. Age- and sex-specific information needed to determine high-risk groups	100% 15%-25%
Nutritional survey	Measure weight-for-height ratios with Salter scale and weight board; edema count	assessment of need for special feeding programs	10% children (< 100cm)
Triage of acutely ill	Examine for serious illness	Identification of refugees needing immediate hospitalization	100%
Ante-natal care	Identify pregnant women, obtain baseline measurement (weight, blood pressure, and determine estimated date of delivery)	Identification of group needing antenatal care (vitamins, supplementary food, tetanus toxoid)	Pregnant woman
Measles vaccine	Vaccinate	Undernourished, unvaccinated children are at great risk	Children 9 mo-4 yr of age
Malaria prevalence survey	Examine blood smear	Identification of need for mass Fansidar cure—low *P. falciparum* prevalence	200 persons (random) in first 3 days

Summary and Recommendations

Rapid health screening is a simple epidemiologic method that can be useful in assessing the basie health status of a refugee population, in quickly identifying specific areas where special medical resources may be needed, and in predicting future health needs of the persons screened. The model discussed above was used successfully in a situation in which the health-care personnel arrived shortly before a camp was established (Table 28). Although the overall experience during the Khmer relief operation in Thailand may be unique, the basic principles learned and applied in rapid health screening of Khmer refugees at Khao I-Dang may be applicable to other refugee-relief operations.

The system as described can be applied anytime a need exists to collect data (e.g., demography) rapidly, sereen for illness (e.g., triage), or apply preventive tools (e.g., measles vaccine, vitamin A) to a mobile group of refugees.

Chapter 32

The Role of the Epidemiologist in the Established Refugee Camp

Donald T. Allegra, Phillip Niaburg

As discussed in earlier sections, some of the potential functions of an epidemiologist in a refugee-assistance program are helping to establish an initial health-screening system and a disease surveillanee program. Once such goals are met, the epidemiologist may need to assume other roles such as those discussed below.

Coordination of Health Screening Activities

In some refugee-assistance operations, the influx of refugees may continue for a prolonged period of time and make health-screening activities necessary for an indefinite period of months—or even years. Once established, such a health-screening program may soon be self-sufficient, but newly arriving refugees may have different health problems from those of the original group of refugees, and potentially epidemic diseases may be imported. Periodic epidemiologic surveys may be needed to reassess changing disease patterns.

Monitoring a Morbidity-Mortality Surveillance System

A permanent record of hospital admission diagnoses and causes of death is important. As time passes and the camp population becomes more stable, the diseases leading to hospital admission and the causes of death may change markedly, reflecting conditions inside the camp rather than conditions in the areas from which the refugees came. These changing patterns of illness and death need to be clearly documented so that future health planning for the camp can be better directed. Also, as time permits, the initial surveillance can be expanded to include surveillanee of the diseases seen in out-patient clinics, of births in the camp, of surgery performed, and of any other health activities that seem pertinent to the camp eoordinator, to clinical physicians, and to epidemiologists.

Public Health Adviser

Epidemiologists in industrialized countries often serve as advisers on public health problems or issues. This role is also appropriate for them in refugee camps. For example, issues associated with sanitation-related diseases, rabies control, or isolation of patients with infectious diseases are within the frame of reference of the epidemiologist and are encountered in many refugee situations.

Organization of Long-Term Preventive-Medicine Programs

Important long-term medical and public health programs include vaccination, control of diarrheal disease and tuberculosis, and provision of safe food and clean water supplies. Appropriate vaccination programs can have a major impact on illness and death. In crowded refugee camps, especially those in which undernutrition is a problem, outbreaks of some vaccine-preventable diseases are a constant threat. The epidemiologist, in concert with other public health personnel, can help define the population at special risk, decide on an appropriate vaccination schedule and vaccines to be used, and organize and supervise the vaccination program. Tuberculosis control can also be a major problem in crowded camps. From surveillance and/or survey data, the epidemiologist can help determine the magnitude of the problem and plan and implement a tuberculosis-control program.

Designing and Conducting Surveys. The epidemiologist's roles also include designing and conducting surveys to help define the most urgent health needs of a population. Especially important, if laboratory support is minimal, are well-designed surveys that can provide valuable information to clinicians for calculating probabilities of the occurrence of certain diseases in specific situations. Below are two examples of useful surveys:

- Fever/Malaria—If fever is a common complaint of refugees seen at a health facility in an area where malaria is common, some percentage of patients with fever may have malaria. A certain number of patients (e.g., 50 or 100) with a documented fever (temperature of 38°C) can be randomly surveyed by examining blood smears. If, for example, 80% of those with fever have malaria parasites but only 10% of the well population do, the recommendation would be to treat febrile patients in this population. If, however, the rate of parasitemia among febrile patients is not substantially different from that for well people, the cause of fever should be further investigated. A recommendation that all febrile patients be treated with anti-malarial agents would not be appropriate in such a situation.
- Diarrhea—Some surveys can be very simple in design and require no laboratory testing. For example, in the Khao I-Dang refugee camp in Thailand, diarrhea was the chief complaint of more than 30% of the refugees hospitalized in the first week. Many physicians and administrators expressed concern about the quality of the water supply in the camp. A simple survey questionnaire was designed in which the refugees were asked where they began to have diarrhea (either at the border camp from which they had come or after they arrived at Khao I-Dang). Over 95% of the refugees stated that their diarrhea had begun before they reached the camp. This finding freed the camp water supply from association with the diarrhea outbreak and pointed instead to border staging areas as possible sources of infection. As part of the same survey, patients were asked about other symptoms accompanying the diarrhea. The most commonly associated symptoms were bloody stools (67%) and fever (50%). With this symptom complex, it was felt that the most likely diagnoses were shigellosis or amebiasis. A decision was made to treat all such patients empirically for amebiasis with metronidazole, to follow their clinical course, and to keep careful records. When most patients improved markedly after this treatment, camp physicians were advised to regard bloody diarrhea and fever as reflecting amebiasis until data showed otherwise. Thus, survey data were useful in defining the potential source(s) and cause(s) of this diarrhea and in deciding on standard therapy even before laboratory reports were available. Obviously, the diarrhea example does not represent an optimal study. When laboratory testing becomes available in such a situation, the initial hypothesis should be tested by specific laboratory testing of specimens from a random sample of patients with diarrhea.

Outbreak Investigations

The traditional role of the epidemiologist is investigating disease outbreaks. The potential for outbreaks of communicable disease in refugee camps is great because many of these camps are crowded and have limited sanitation systems. However, outbreaks do not necessarily have to be infectious in origin. Epidemiologists should recognize clusters of disease, whether the disease is caused by an ingested toxin, a vitamin deficiency, or some other agent.

Other Possible Roles for the Epidemiologist in Established Refugee Camps

Clinical Medicine Consultant. Physician-epidemiologists experienced in tropical diseases may be helpful to less experienced clinical colleagues by describing prevalent disease patterns. Also, besides unfamiliarity with some of the diseases, individual health workers may not recognize population patterns of illness among their patients because their efforts are directed at emergency medical care. For example, a health worker seeing a patient with weakness and peripheral neuropathy may not immediately consider beriberi in the differential diagnosis. However, an experienced epidemiologist monitoring surveillance data for the entire camp may recognize a cluster of patients with weakness and peripheral neuropathy and may thus be more likely to suspect beriberi.

One technique used during the Khmer refugee operation in Thailand was a brief weekly or twice weekly meeting of all physicians in the camp. The epidemiologist began the session by presenting the latest surveillance and survey information. The clinical physicians then described difficult diagnostic and therapeutic problems they had encountered. The entire group of physicians then went to the bedside of each patient and exchanged ideas about the most probable diagnosis and possible methods of therapy. These meetings were useful in providing a forum for an exchange of experience and individual observations as well as in

providing a basis for formulating standard approaches to diseases of potential public-health importance. For example, after seeing a patient with bacterial meningitis, the group discussed a differential diagnosis and adopted a common policy for caring for patients with fever and coma.

Assessment of Effectiveness of Mission. Large sums of money are spent on refugee-relief operations, and the headquarters of relief agencies and major donors—concerned that available funds be spent effectively—expect to receive regular reports on the progress of such operations. Information such as the number of refugees in the camp and the number of hospitalizations is valuable, but systematic analysis of the impact of specific programs with the goal of trying to increase their effectiveness can further inject a sense of professionalism into the operation and help document for donors that their contributions are having a beneficial effect on the health of the refugees. Although this is not a traditional role of epidemiologists, they can easily apply the tools of epidemiology to this type of analysis. For example, the effectiveness of using laboratory facilities for diagnosing tuberculosis and malaria was studied at Khao I-Dang camp. As a more comprehensive laboratory facility was established, health workers trained in industrialized countries (and accustomed to high-technology medicine) began to order increasing numbers of diagnostic tests, with the result that the limited laboratory resources were quickly overwhelmed. An analysis of test results over time and of the indications for tests in individual cases suggested that, in many cases, these tests had been requested for patients who did not have any symptoms of the disease in question. This information, provided to the camp physicians, was useful in promoting more efficient use of laboratory services. In another situation, the value of selective supplementary-feeding programs was documented by monitoring changes in objective nutritional standards over time. This type of analysis could be expanded to include such activities as appropriate use of food donations, use of antibiotics, and the effectiveness of surgery in relief programs.

Completion of Mission

When have epidemiologists completed their mission? As long as the overall refugee situation and the health needs of the refugees remain in flux, at least one person with epidemiologic skills can be of value. As the influx of newly arriving refugees decreases and the number of hospital admissions and deaths continue to decline to the level common in the host country, the need for full-time epidemiologic assistance also decreases. Eventually, maintenance of a simple surveillance system and analysis of the accumulated data will be the main day-to-day tasks. From the very beginning, the epidemiologist should enlist help from refugee and national workers and provide training in data collection and analysis to assure continuation of basic epidemiologic activities by local staff. The basic principles of epidemiologic surveillance are relatively simple, and even workers with minimal training can accurately collect and collate data. Final analysis of data is more demanding but can be done by a clinical physician in the camp or a consulting epidemiologist who visits the camp at regular intervals.

Conclusions

The epidemiologist's role in established refugee camps has not yet been clearly defined because epidemiologists have only recently become involved in refugee-assistance programs. However, there is certainly a useful role for epidemiologists in such camps, and the proper use of epidemiologic techniques can be extended beyond the more traditional role of outbreak investigations to include such areas as coordinating continuing health screening activities, training local health personnel, and assessing relative effectiveness of various health programs.

PART IV

Epilogue

Epilogue

Phillip Nieburg, Donald T. Allegra

In early 1983, one of the editors had an opportunity to spend 3 weeks visiting areas near the Thai-Kampuchean border where the events described in this report had taken place. Many things had changed, and many others had stayed the same.

The underlying political situation was essentially unchanged, although some minor shifts in alliances had apparently occurred. Large numbers of Khmer refugees were still living in several camps discussed in this report (e.g., Khao I-Dang, Nong Samet), while others (e.g., Nong Chan, Mak Mun) had been destroyed in the intervening years. The holding centers within Thailand at Kamput and Sakaeo had been closed in December 1982; those residents who had not gone to other countries (approximately 16,000) were moved to Khao I-Dang at that time.

Conditions in the border camps, while have generally improved since 1979-1980, are still poor. Since water and land for agriculture remained scarce or nonexistent, nearly all food and water had to be provided by relief agencies, and supplies were thus subject to interruption by the occurrence or threat of armed conflict. The few sanitaton facilities that existed were primitive. Military activities added to the patient load and threat of attack added to the basic uncertainty of the situation.

At Khao I-Dang health conditions had also improved, although, as could be expected in a large refugee camp, problems still existed there. As of mid-June 1983, approximately 57,500 refugees were still living at Khao I-Dang; 21 agencies and nearly 1,400 workers (including nearly 1,300 Khmer and 18 Thai workers) supported their health, nutritional, and other needs.

The original health surveillance system at Khao I-Dang had continued to evolve and to function efficiently. Khmer health workers had taken over much of the responsibility for this surveillance system. In June 1983, information gathered by Krou Khmer (traditional healers) at the traditional medicine centers was included in the Khao I-Dang surveillance reports for the first time. During the 12 months ending in November 1982, 2,323 births were recorded in Khao I-Dang, representing a crude birth rate of 54.4 per 1,000 population; 1,682 (72.4%) of these infants were born in the hospital. Mean birth weight for 118 consecutive infants born alive in the hospital during early January 1983 was 2,980 grams. Of these, 11 (9.3%) weighed less than 2,500 grams. (The first 154

infants born at Khao I-Dang from November 16, 1979, to January 11, 1980, had had a mean birth weight of 2,810 grams.)

During the same 12-month period, 182 resident deaths were reported (Table 29), for a crude resident death rate of 4.0 per 1,000 residents. This surprisingly low mortality rate is lower than what is generally observed in many developing countries and is probably due both to the relatively low infant mortality rate (42.6 per 1,000 live births), which is usually a major component of overall mortality, and to the absence of some of the high-risk groups (elderly, chronically ill) who had died before they could reach the camp.

Under 1 month of age, prematurity (23 cases), sepsis (19), and congenital anomalies (7) were the most common causes of death, accounting for 75.4% of 65 deaths in this age group. The most common categories in the 1- to 11-month age group were "unknown" (12 cases) and congenital anomalies (4). In the 1- to 4-year age range, pneumonia (6) and sepsis (4) together accounted for 71.4% of all deaths. Eight accidental deaths were recorded in all age groups. Nine adults died of malignancies. In addition, 206 deaths occurred among other Khmer refugee patients referred for medical care from camps on the border (Table 29). More deaths occurred among young adults than among neonates and older adults (≥ 45 years) in the non-resident population. The difference in age distribution between resident and non-resident deaths probably occurred in part because the Khao I-Dang hospital is the major referral facility for seriously ill refugees in nearby border areas. Ill or premature neonates in this environment are still not often candidates for referral. The large proportion of deaths among young adult non-residents is due in part .o a large number of injuries from land mines or other weapons.

TABLE 29. Age distribution for residents and non-residents who died, Khao I-Dang Holding Center, Thailand, December 1981-November 1982

Age	Resident deaths Number	%	Non-resident deaths Number	%
< 1 mo	69	37.9	31	16.0
1-11 mo	30	16.5	52	25.2
1-4 yrs	20	11.0	23	11.2
5-14 yrs	8	3.3	6	2.9
15-44 yrs	24	13.2	83	40.3
≥ 45 yrs	33	18.1	11	6.3
Total	**182**	**100.0**	**206**	**100.0**

Two hundred eighty-seven *Plasmodium vivax* malaria cases and 78 *P. falciparum* malaria cases were reported among Khao I-Dang residents during 1982. Most, if not all, of the *P. falciparum* cases occurred among persons transferred to Khao I-Dang when the Kamput holding center, located in a malaria-endemic region, was closed.

In October 1982, a health and nutrition survey of a random sample of children < 5 years old in Khao I-Dang revealed evidence that five (1.5%) of 328 children were acutely undernourished. (Eighty percent of the mean of World Health Organization/National Center for Health Statistics standards for weight-for-height was used as the cut-off point.) Evidence of chronic undernutrition was found in 22 children (6.7%). Conjunctival xerosis or other ophthalmologic signs of recent or healed vitamin A deficiency disease were seen in 14 children (4.3%). All 75 surveyed children < 1 year old were breast fed. Of 63 children 12- to 17-months old, 58 (92.1%) were breast fed; 41.1% of 56 children 18- to 23-months old were breast fed.

During the latter half of 1982, increases in the number of cases of beriberi (vitamin B_1 deficiency) were noted by health workers. In addition, several children were admitted to the hospital during that time with corneal involvement compatible with severe vitamin A deficiency. Because of these problems, two steps were taken. Undermilled rice was introduced in March 1983 as a total substitute for white rice in the Khao I-Dang food distribution system. As of June 1983, all non-breast-feeding children 6 months to 5 years of age and all lactating women attending the maternal- and child-health centers were given 200,000 International Units of vitamin A. Younger children received 100,00 International Units. Neither beriberi nor vitamin A deficiency was reported to be a prevalent problem at Khao I-Dang as of June 1983.

No outbreaks of vaccine-preventable diseases were reported in 1982 or through August 1983. Because a survey in the maternal- and child-health facilities in December 1982 had shown that only 84% of the eligible population had complete vaccinations, a major catch-up vaccination program was undertaken in May 1983. A follow-up survey demonstrated that 99% of school-age children at Khao I-Dang had completed a basic vaccination program.

Including patients transferred to Khao I-Dang from other recently closed refugee camps, 303 newly diagnosed tuberculosis (TB) patients were placed on therapy in 1982. Of the 298 who left the TB treatment program during the same period, 226 (75.8%) did so because they had completed the prescribed course of 4-drug therapy (rifampin and isoniazid for 6 months plus streptomycin and pyrizinamide for the initial 2 months). Another 41 (13.8%) were transferred on medication and with records to other refugee processing centers; 7 (2.3%) died and 24 (8.1%) are assumed to have defaulted from their treatment program because of departure to refugee camps nearer the Kampuchean border where adequate follow-up is more difficult. Of those with smear-positive pulmonary TB completing the treatment regimen, 96% had favorable outcomes, as judged by persistence of smear-negativity over the final 3 months of treatment; 3% had uncertain bacteriologic response; and 1% appeared resistant to the above drug combination. The overwhelming success of the tuberculosis control program is especially gratifying since there has been much debate in the days immediately following the opening of these holding centers in 1979 about the appropriateness of tuberculosis therapy in this setting.

As of June 1983, four traditional medicine centers and 31 Krou Khmer (traditional healers) were serving the camp population. Including follow-up visits, nearly 3,000 patients a day were being seen in these facilities at that time. Cooperation and cross-referrals between Western-trained health workers and traditional healers were increasing. Also, as of June 1983, information gathered by these Krou Khmer was included in the Khao I-Dang surveillance report for the first time.

In addition to training for provision of basic health care, ongoing training programs for Khao I-Dang residents included production of water jars and soap, bread making, carpentry, wood carving, sewing, weaving, fish farming, blacksmithing, tinsmithing, rice milling, and classical Khmer ballet, music, and theater. As of July 1983, a major school health program was contributing to both the health and education of school children. Activities included distribution of shoes and water jars, education about basic sanitation issues, dental screening and treatment, and identification and complete medical evaluation of handicapped children. This program is facilitated by at least two school health workers per school.

Not surprisingly, training of health workers at Khao I-Dang is made more difficult by the frequent re-settlement to third countries of health workers. Despite these frustrations, a Basic Health Workers Education Program has been developed to provide, in an 8-week period, concepts of health and disease to workers in school health, public health, maternal and child health centers, and outpatient clinics. Course content includes nutrition, sanitation, hygiene, common illnesses, and first aid.

Some important lessons have been learned during the 4 years that this situation has continued. Many are documented elsewhere in this report. Two deserve particular re-emphasis.

The first lesson is the importanee of the indigenous and traditional healers to this refugee culture. The early efforts to support and encourage the development of a traditional medicine program at Khao I-Dang have paid dividends many times over.

The final lesson is that a relatively simple, population-based surveillance system can function over several years at a refugee camp environment despite the wholesale turnover of expatriate public health staff in the camp. The system, which has relied increasingly through the years on Khmer health workers, continues to provide information used by administrators and by health workers to maintain or improve health conditions at the camp.

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