EPIDEMIOLOGIC SURVEILLANCE OF PROTEIN CALORIE MALNUTRITION

W. H. FOEGE
Center for Disease Control
Atlanta, Georgia 30333, U. S. A.

I. Introduction

The definition of surveillance has changed with time. Until recent years, surveillance commonly referred to the observation of a person who had been exposed to a communicable disease. While there have always been people such as William Farr and John Snow who have understood the concept of surveillance, it has only been in the past 25 years that surveillance has been increasingly developed as a systematic approach to health problems with certain principles, with definite components, and with well tested techniques.

We now understand disease surveillance as *« the continuing scrutiny of all aspects of occurrence and spread of a disease that are pertinent to effective control »*. Systematized approaches to nutritional surveillance are even more recent in origin. Using the definition of disease surveillance as a model, surveillance of protein calorie malnutrition can be defined as the continuing scrutiny of all aspects of the occurrence of protein calorie malnutrition that are pertinent to effective control.

The establishment of a surveillance program, whether it be for a communicable disease or for a nutritional condition, involves three distinct functional components as shown in figure 1. Certain events are occurring

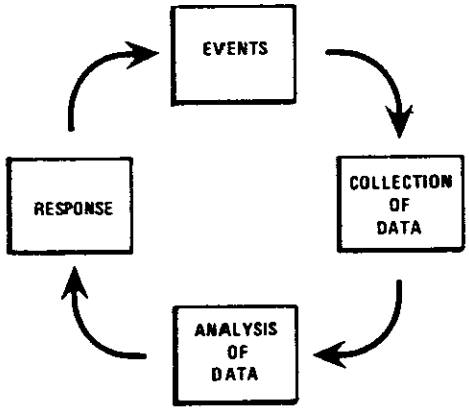

Figure 1

The surveillance arc.

which must be evaluated. Therefore, a system of data collection, data analysis, and response are required in order to understand the significance of those events and to alter the events.

The establishment of a nutritional surveillance program must be seen in a context which explains why surveillance should be instituted. The why of surveillance can be appreciated by looking at table 1. If, for instance, the nutritional surveillance program is in response to a nutritional crisis, the objectives of a response to that crisis would be to eliminate preventable social, physical, or psychological dislocations. To do this, one must be adequately versed in lessons from past experiences.

TABLE 1

Planning for times of crisis

I. OBJECTIVES OF DISASTER RELIEF.

- A. To eliminate, subsequent to relief intervention, morbidity and mortality in the disaster area which exceeds the normal levels for that area.
- B. To eliminate preventable social, physical, or psychological dislocations following intervention and to reverse dislocations occurring prior to intervention.

II. WHAT ARE THE LESSONS FROM PAST EXPERIENCES ?

- A. Discernable patterns.
- B. Predictable effects.
- C. Objective criteria for measurement of the situation.
- D. Avoidable mistakes.

III. SURVEILLANCE OF THE CRISIS SITUATION.

- A. Collection of data.
  1. Denominator data
  2. Numerator data.
  3. Other data.
- B. Analysis of data.
- C. Response

IV ASSESSMENT (Surveillance of response outcome).

At the same time, as when dealing with an individual patient, the lessons of the past become useful as applied to the current situation and, therefore, surveillance of the crisis situation itself will be required.

Finally, an adequate response to the crisis situation requires assessment of the response program. Assessment is, in fact, nothing more than surveillance of both the response process and the response outcome; therefore, assessment initiates another complete cycling of the surveillance arc as one collects assessment data, analyzes this data, and again responds to change the program as indicated. It is increasingly clear, whether discussing communicable disease control or malnutrition control, that surveillance is the very foundation of programs designed to alter unwanted events, whether these occur in an individual or in a community or within an entire country.

Table 2 provides guidelines for nutrition surveillance. Since the outline is self-explanatory, I will not go through it and will limit my remarks to some principles of surveillance for protein calorie malnutrition.

TABLE 2

Guidelines for famine relief surveillance

A COLLECTION OF DATA.

I. Denominator data.
   (1) Age and sex composition of the population.
   (2) Population density by geographic area.
   (3) Population migration (direction and volume).

II. Numerator data (must be quantitative, objective and simple).
   (1) Deaths.
      (a) By geographic area.
      (b) By age and sex.
   (2) Nutritional status
      (a) By geographic area.
      (b) By age and sex.
   (3) Diseases
      (a) Emphasis on selected diseases with epidemic potential.
      (b) By geographic area, age and sex.

III Other data.
   (1) Food
      (a) Local requirements by food category.
      (b) Local food prices by geographic area.
      (c) Food availability by geographic area.
      (d) Food importation requirements.
   (2) Logistic capabilities
      (a) Vehicles, ships, planes, etc.
      (b) Warehouse space.
      (c) Distribution resources.
   (3) Other.
      (a) Medical resources.
      (b) Community resources.

B. CENTRAL ANALYSIS.

I. Collate and interpret surveillance information.

II. Evaluate logistic potential.
   (1) Transportation capabilities.
   (2) Storage capabilities
   (3) Distribution capabilities.

III. Determine availability of food and medical relief supplies.

IV. Develop or modify response plans.

C. RESPONSE.

I. Provide information quickly to those who need to know.

II. Develop food distribution plans based on objective needs.

III Develop health programs.
   (1) Treatment of nutrition-related diseases.
   (2) Sanitation programs.
   (3) Epidemic control.

D. ASSESSMENT.

I. Evaluate efficacy of surveillance system.

II. Evaluate effectiveness of response system.

II. Surveillance of protein calorie malnutrition

A. *Data collection*

1. Some principles of data collection have evolved in recent years. First, systematize data collection wherever possible. Whether information is being collected from relief teams, hospitals, clinics, or special sentinal villages, a definite form should be developed which is to be filled out and submitted on a specific date or a specific day of the week. If such a system has been developed, the absence of a report is easily detected and systematic followup can be initiiated. The more automatic the system, the less likely that significant information will go uncollected.

Second, systematized data systems should not ask for more information than is needed. Surveillants become discouraged if required to provide large quantities of information or information which seems irrelevant.

There has been a tendency with nutrition surveillance to involve dietary histories, excessive laboratory tests, and anthropometric measures. Surveillance systems should be as simple as possible.

Third, negative reporting should be mandatory. The absence of a report does not permit the evaluator to know whether the event did not take place or whether it took place but was not reported. The presence of negative reporting is one sign of a quality data collection system.

Fourth, assessment of data collection is required. While this may introduce redundancy into a surveillance program, it is important to have a sample survey or a second surveillance system to determine the efficiency of the reporting system.

2. Types of information required

While not going into details, it is important to understand that analyses of the data requires collecting denominator data even when it is crude and incomplete. Death information by area, age, and sex, and morbidity information on diseases that have epidemic potential or have a unique relationship to malnutrition, such as measles, should be collected. For lack of time, the surveillance system required to determine food availability, logistic capabilities, and resources available will not be discussed.

The type of nutrition information collected will depend on the circumstances. In some cases, surveys as simple as examining the edema rates can be useful in estimating the size of a problem and comparing the magnitude of problems in different geographic areas.

Table 3 provides an example of a very simple edema survey form used in West Africa during the Nigerian Civil War. In Nigeria, edema rates varied from 0 to over 50 per cent and provided useful geographical and temporal information. On the other hand, edema rates do not provide useful information regarding malnutrition in India where total caloric intake is deficient, and in our experiences they have not been useful in measuring malnutrition in the Sahel in recent years. Likewise, several of the suggested surveillance systems presented earlier are probably not useful under field conditions. The logistic difficulties and sample size required to use birth weight or

edema during pregnancy are far too formidable to be considered. Likewise, the use of weight for age has the severe handicap of requiring accurate age data. The groups most subject to malnutrition are the least likely to have data or to have been previously involved in a health care system which has provided them with records. The determination of age in the field is possible using local calendars, but it is a time consuming procedure which is likely to provide great differences in the reliability of information collected by temporary workers.

TABLE 3

Edema collection form

Village .....

Date .....

Age	Male		Female	
	No Edema	Edema	No Edema	Edema
0 - 4 years				
5 - 14 years				
15 - 44 years				
45 plus years				

Age	Total Seen			Edema			Percent Edema		
	M	F	Total	M	F	Total	M	F	Total
0 - 4 years									
5 - 14 years									
15 - 44 years									
45 plus									
Total									

Many nutritionists and epidemiologists are increasingly recognizing that weight-height curves are largely independent of sex, race, and age. It is, therefore, possible to compare surveillance data with a recognized reference population even though that population is from a different ethnic group. It is also, therefore, possible to avoid collecting age data for many surveillance programs.

It is important to know what height and weight measurements can and cannot do. A recent review by Jean-Pierre Habicht has concluded :

(1) Weight for height is always useful in defining caloric deficiencies. It is frequently also useful in defining severe protein deficiency.

(2) Weight for height is not useful in defining mild to moderate protein deficiency when caloric intake is normal.

(3) Height for age is useful in defining mild to moderate protein deficiency. Differences in growth due to environmental factors have a five-fold greater effect on growth than do differences due to genetic factors.

In practical terms, most disaster situations requiring nutritional data can be adequately met by weight for height measurements.

3. Sources and collection of data

The data source will be very much influenced by whether one is dealing with acute famine situations in a localized geographical area, a more generalized food problem such as experienced recently in West Africa, or a desire to establish ongoing surveillance systems in areas prone to repeated food deficiencies. Depending upon the situation, a nutrition surveillance program could include some or all of the following :

a) A network of selected hospitals, clinics, and sentinal villages supplying continuous information on nutritional status, food prices, etc.

b) Randomly selected population clusters repeatedly visited to give prevalence data, incidence data, and longitudinal information on a representative sample of children.

c) Periodic reports from relief teams, utilizing a standardized format.

d) Random sample surveys done at intervals but not utilizing the same sample each time.

It is important to note that the usual surveillance systems, based on hospitals and clinics as reporting sites, are not likely to provide useful data. The most vulnerable groups have limited access to medical facilities, and when access is available the problems of correct diagnosis, quantification, and reporting introduce major difficulties in interpretation.

B. *Data analysis*

Analysis of the data is necessary to understand the trends and to determine the most logical control activities. Analysis should also be used to assess the efficacy, efficiency, and effectieveness of control activities as well as to identify problems with control procedures. The major questions to be answered in analysis are :

a) Where is the problem concentrated ? What are the geographic boundaries, are the geographic boundaries changing, and how fast ?

b) Who is affected ? We know from past experiences that pre-school children are the most sensitive indicators of protein calorie malnutrition in a community, therefore, most analysis will involve this age group.

c) When is the problem evident ? Are there seasonal trends which can be used to predict the situation weeks or months in advance ?

d) Why are the events which are being observed actually occurring ?

C. *Response*

The collection of data and the analyses of data do not constitute a surveillance system. The object of surveillance is to change and control a problem, therefore, response is essential. Response can be seen as including two areas of activity. The first area involves response to disseminate the surveillance data collected. To whom should the data be sent ? Past experiences have shown two groups of people should receive surveillance information which has been collected, collated, and analyzed. Those who need to know for program, political, or administrative purposes and those who have in some way contributed information to the surveillance system. This is done in order that they can be informed on how their information has been used and, thereby, motivated to supply additional information in the future. How often should information be sent ? In a disaster relief situation, response may be on a daily or a weekly basis while for ongoing surveillance programs a monthly, quarterly, or even an annual report may be adequate.

The other area of response involves the direct activities taken to correct the situation including the development of agricultural programs, food distribution plans based on objective needs, development of health programs to treat nutritionally related diseases, sanitation programs, and control programs for communicable diseases. Again, without a response to complete the surveillance arc, a surveillance system does not exist.

D. *Assessment*

As already mentioned, this is really the institution of a surveillance program to measure the response activities and outcome. Proper assessment should evaluate the effectiveness of data collection systems, the appropriateness of the analysis, and the effectiveness of response programs.

As an example of nutritional surveillance in 1973, 1974, and twice in 1975, five West African countries have conducted PCM surveillance programs, and the Center for Disease Control has been invited to participate in these programs.

In each country, 35 clusters were selected on a random basis. In each cluster, 25 children between 65 cm and 115 cm (roughly 6 months to 6 years of age) were measured and weighed. Height was taken to the closest tenth of a centimeter and weight to the closest tenth of a kilogram using Salter scales.

Information was collected on a form such as shown in table 4. In recent surveys, age has been collected on only limited numbers. Grouping of data is easily possible for each cluster as shown in table 5, and individual values or grouped values can be plotted on figure 2.

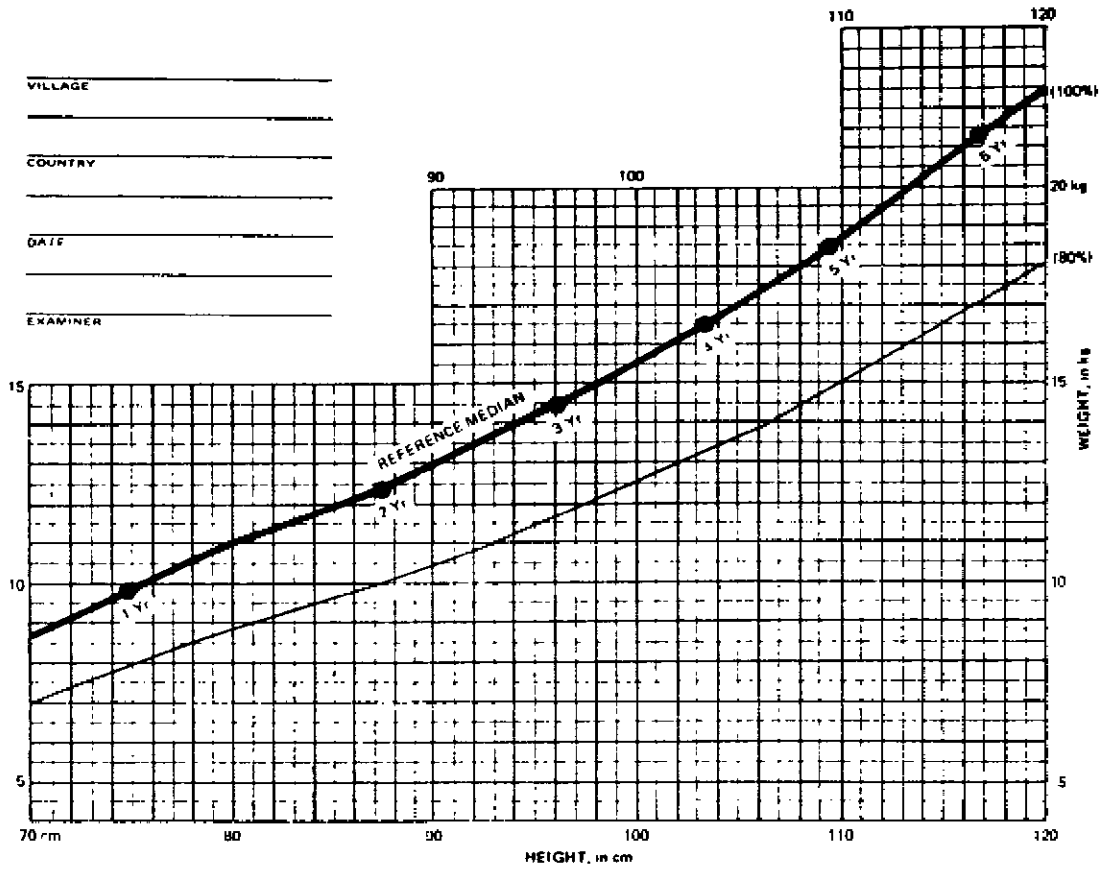

Figure 2

Weight for height distribution.

In 1974, approximately 3,000 children were examined. One approach to understanding the nutritional situation is to study the distribution of children as compared to the decile distribution of children in the Stuart-Meredith Reference Standard. Table 6 provides one such distribution for the 1974 sample. While 10 per cent of children should fall into the first decile, all countries had at least 34 per cent of children in the first decile, and Chad had over 60 per cent of children in the first decile. This type of analysis provides sensitive comparisons between countries and within a country from year to year.

In 1975, for instance, the survey showed a decrease in the percentage of children in the first decile for all countries, with the greatest percentage of improvement found in Chad where the first decile figure dropped from 61.2 to 29.9 per cent.

Another type of analysis involves calculation of the per cent of children falling below the acute undernutrition threshold. This is defined as 80 per cent of the median weight for height of the reference population or about the third percentile.

This has certain advantages when dealing with populations where many children are in the first decile.

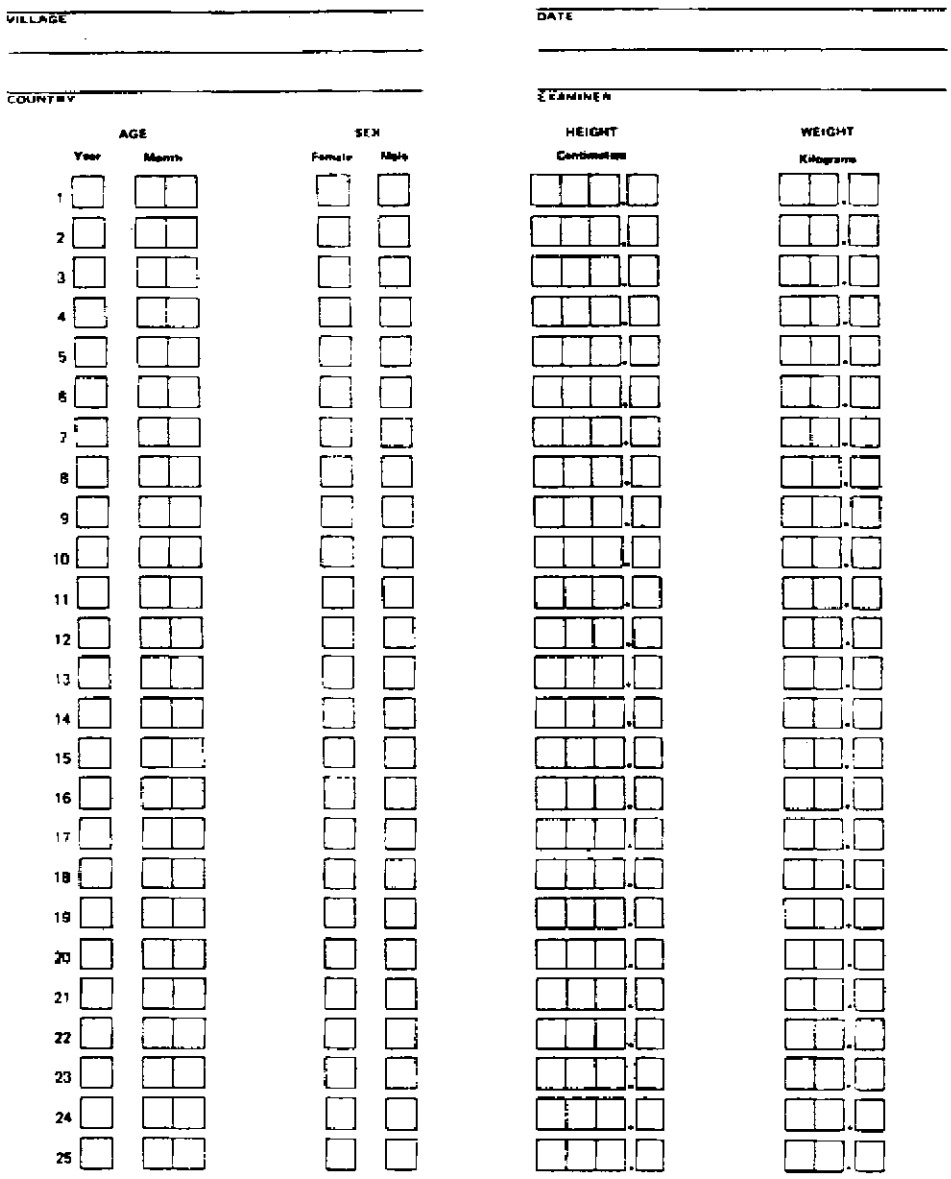

TABLE 4

Village height/weight record

In 1974, approximately 13 per cent of all children fell below the acute undernutrition threshold, while 1 year later the figure was less than 8 per cent — clear indications of nutritional improvement between 1974 and 1975 in West Africa.

While other information was collected in these surveys, including mortality information, infectious disease information, food stocks available in villages, etc., the limited data presented on weight for height documents improvement but also indicates remaining problems.

A second type of surveillance system has been developed in Upper Volta. Again, cluster sampling has been used with 60 clusters of 150 persons per cluster. The difference has been that this system has continued to use the same clusters and the same persons over a period of time with monthly visits to each cluster. Information has been gathered on a variety of disease

VILLAGE _____ DATE _____

COUNTRY _____ EXAMINER _____

Height in Cm.	Weight in Kg.					
	1. #	2. #	3. #	4. #	5. #	6.
	< 4.5	4.5–5.9	6.0–6.9	7.0–7.9	8.0–9.4	9.5+
70.0–71.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
72.0–73.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	< 5.0	5.0–6.4	6.5–7.9	8.0–8.9	9.0–10.4	10.5+
74.0–75.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
76.0–77.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	< 5.5	5.5–6.9	7.0–8.4	8.5–9.9	10.0–11.4	11.5+
78.0–79.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
80.0–81.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	< 6.0	6.0–7.4	7.5–8.9	9.0–10.4	10.5–12.4	12.5+
82.0–83.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
84.0–85.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	< 6.5	6.5–7.9	8.0–9.9	10.0–11.9	12.0–13.4	13.5+
86.0–87.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
88.0–89.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	< 7.0	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.4	14.5+
90.0–91.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
92.0–93.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	< 8.0	8.0–9.9	10.0–11.4	11.5–13.4	13.5–15.4	15.5+
94.0–95.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
96.0–97.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	< 8.5	8.5–10.4	10.5–12.4	12.5–14.4	14.5–16.4	16.5+
98.0–99.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
100.0–101.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	< 9.0	9.0–10.9	11.0–13.4	13.5–15.9	16.0–17.9	18.0+
102.0–103.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
104.0–105.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	< 9.5	9.5–11.9	12.0–14.4	14.5–16.4	16.5–18.9	19.0+
106.0–107.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
108.0–109.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	<10.5	10.5–12.9	13.0–15.4	15.5–17.9	18.0–21.4	21.5+
110.0–111.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
112.0–113.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	<11.5	11.5–13.9	14.0–16.9	17.0–19.4	19.5–21.9	22.0+
114.0–115.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
116.0–117.9	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5
	<12.5	12.5–14.9	15.0–17.9	18.0–20.9	21.0–22.9	23.0+
118+	1 2 3 4 5	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5

TABLE 5

Weight/height tally sheet

TABLE 6

Distribution of children measured by centile of reference weight for given height * for sample area within Sahelian nations

	No. of children examined	Decile[a]									
		First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth	Tenth
Reference population *		10.0	10.0	10.0	10.0	10.0	10.0	10 0	10.0	10.0	10 0
Chad	779	61 2	19.1	8 0	5.1	2.8	1.7	1 2	0.4	0.4	0.1
Mali	625	35 5	21.0	14 1	10.7	7.5	4.3	3.2	2.2	0.6	0.8
Mauritania	875	39 4	18.1	15.0	10.2	7.0	5.1	3.2	1.4	0.1	0.6
Niger	774	38.5	20.3	13 3	9.2	6 8	5.3	3 0	2.1	1.0	0.5
Upper Volta	875	34 3	19.8	15.9	9.8	7.1	5 6	4 5	2.3	0.6	0.2

* Stuart-Meredith reference population.
[a] The first decile contains the lowest 10 per cent of the reference population and the tenth decile contains the highest 10 per cent.

conditions, and height-weight measurements have been made on the children. This has allowed estimates of both prevalence and incidence data and has also provided longitudinal data on height-weight.

Weight-for-height measurements as taken in the June 1975 five-country survey showed that 9.1 per cent of Upper Volta children fell below the acute undernutrition threshold. Twelve-month figures from November 1973 to December 1974, using the second ongoing Upper Volta surveillance system, showed that 9.6 per cent of children were below the acute undernutrition threshold and also showed a generally increasing problem during 1974.

Such comparisons serve as cross checks and tend to validate the simple five-country approach to nutrition surveillance.

Instead of complicated nutritional surveys, surveillance adequate for determining response can be initiated with a device to measure height, a scale, crude demographic data, and transportation. Age assessment is not required.

In summary :

(1) Nutrition surveillance can be established using the techniques now standard for disease surveillance.

(2) Such a system requires data collection, data analysis, and response.

(3) Assessment of all three components should be an integral part of the plan.

(4) Nutrition surveillance should aim at simplicity. While complicated schemes may be attractive to the academically oriented, most situations requiring a food assistance response program can be evaluated utilizing height and weight op preschool children. Age can be added when evaluation of mild to moderate protein deficiency is required.

(5) Other aspects of nutrition surveillance such as denominator data, mortality, infectious diseases, food prices, food availability, and logistic capabilities are part of a comprehensive surveillance system.

(6) Most important — surveillance systems provide the foundation for quality programs whether they be disease control programs, nutrition control programs, or diseaster relief programs in general.

DISCUSSION

J. B. Mason : May I make just one or two points on this subject of surveillance ? First of all, without wishing to wade into the anthropometry argument, I think that, in fact, mid-upper arm circumference reflects *weight for height*, not weight alone. Within that particular context, I think a bit too much is being made of œdema as a measurement of deficiency status. What happens in the development of malnutrition is really three processes : one is a decrease in serum albumin, which can lead to œdema; secondly, there is the wasting process; and thirdly, the process of stunting. These may or may not be concurrent. Kwashiorkor can occur without wasting, although it's very rare and certainly almost never seen, I think,

in an acute situation. So one would not expect œdema necessarily to be of any use at all in assessing deficiency status, particularly in a cereal-eating community.

Secondly, to come to the point about surveillance versus repeated survey; no doubt one can ideed get continuing information by repeated survey, but one question is whether the country concerned will itself be left with the structure to continue obtaining this information, if the surveys are conducted by external teams.

The third point, which I think really should be emphasized much more carefully, is the question of seasonal change, particularly in the Sahel. Data from the Gambia, for example, which is sub-sahelian, showed a change from September, when 20 per cent of children were below 80 per cent weight for height, to April, when three per cent were. This is a significant difference, not related to external aid. At this point, I would like also to question the justification of taking 80 per cent weight of height as the limit to define acute malnutrition.

I think 70 per cent is probably a better level and, certainly, 70 per cent is usually found to be equivalent to 60 per cent weight for age, in other words, to acute malnutrition as defined by the Wellcome Committee.

Finally, I think at the end you did say that nutritional surveillance was by no means only trying to associate itself with food aid. In this case, certainly, one needs a broader picture, a view which was stressed at the Joint FAO/UNICEF/WHO Committee meeting in Geneva recently. I certainly agree that surveillance should concern itself not only with acute food aid situations.

W. H. Foege : I think table 2, in fact, shows some of the parameters that really are involved in doing nutritional surveillance. Back to your point the quack-stick as it has been used is in fact comparing arm circumference to height. That's the point, the quack-stick is measuring height and arm circumference and arm circumference, as I said, becomes an indirect measurement of weight. There is no reason to do that if you can get weight directly and get a better measurement with fewer errors in the measurement.

For œdema, I agree, this can only be used under certain circumstances. But, it was well-used in Nigeria where there was protein malnutrition. People were still eating casava, and were getting calories but no protein. It is not useful in many of the other malnutrition situations.

For the repeated surveys these have lead to some response in that donor agencies have not only paid for the surveys, but have used the surveys. U.S. AID has, in fact, charged us with doing the surveys so that they have an idea of how much food should be imported to West Africa.

As for the use of 80 per cent of the medium, instead of 70 per cent, there is no reason that either can't be used, but the original reason was that most data in the literature dealt with 3rd percentile figures and 80 per cent of the medium is the closest we have to the 3rd percentile and, therefore, one could compare with past information.

E. W. Kinney : I would like to make this point if I may that there is a built-in nutritional surveillance system that we schouldn't overlook, used particularly by operating agencies working with mothers with children under five and pregnant women, and that consists of the mothers them-

selves. Each mother has a chart which happens to be a weight/height chart, because I don't know whether we are ever going to solve the dilemna of which system is going to have the most advocates because there are advocates of each. There is the mother herself who can tell each month as she brings her children to the clinic or the distribution point, the impact of what she has learned in the educational courses. We actually use food as a tool to get the mother to a place where we can not only examine the child, weigh the child, put the child on the chart but also take the occasion to teach the mother how to make better use of the existing food. We are taking that out of the laboratory and we put it into the field of practice and made it an integrated system where we have an educational factor, we have a nutritional factor, we have a health factor. I want to emphasize the fact that the mothers themselves are an important part of any meaningful nutrition surveillance system, because they see the meaning of impact of proper feeding on the child and improvement of their health.

W. H. Foege : I agree with that. The problem that I see is that people who are accessible to such a system are already different from the usual people who get involved in extreme malnutrition. It's the person who has no access to a health care system that we have to be able to do a survey on.

J. Rivers : You missed out of table 2 a number of factors, I don't know whether accidentally or deliberately, which would seem to me to be important. You don't seem to be concerned with differences in numerated data by such factors as socio-economic groups, tribe economic system, all of which would seem to have been important in the Sahelian famines which you're examining and in the famines elsewhere in Africa. I am reminded that this is one of the justifications for the collection of dietary data. It might be fairly difficult to collect, one might have to resort to semi-quantitative data, but one would need to know what sort of food is acceptable to the people and what sort of time persumably in order to apply this data in your flow-chart for application.

W. H. Foege : I think we assumed this as we were talking about geographic areas, but you're absolutely correct that there should be determinations by tribe and socio-economic group. I think there have been differences in the West African surveys by socio-economic group. Dr Sencer, you were talking about one of them this noon. We did look at such differences but I haven't included it in the table.

D. J Sencer : This goes back to one of the comments that were made before lunch also. In looking at some of the data from the Sahel survey where they were clustered by socio-economic status, actually by occupation, the children of the people in the bureaucracy, the government employees were obviously the best fed and the servants of the nomades were the lowest, whereas everybody else being in between. I think this perhaps answers one of the questions or comments that was raised before lunch, that those people who are intellectuals and in bureaucracy are going to see to it that their children get food before the others do.

VITAMIN A IN TIMES OF DISASTER

H. A. P. C. OOMEN
Department of Tropical Hygiene/Nutrition
Royal Tropical Institute
Mauritskade 63, Amsterdam, Netherlands.

Compared to the requirements for calories and protein those for the vitamins are always small in size and bulk. The weight of the dry matter of the macronutrients required exceeds those for all the vitamins together by a factor of about 10,000. This is a definite advantage for relief measures which, however, is usually overrated. Man cannot live on vitamins alone and if at least calories do not reach a certain level they are useless. In the POW camps in the Far East after World War II we received sufficient vitamin preparations through the American Red Cross. We could cure early symptoms of pellagra. But we could not avoid neither deter the development of hunger œdema.

Which vitamins are important as regards relief measures in times of disaster ? Which hypovitaminoses tend to develop under such conditions and which are sufficiently serious to consider special measures ? These questions merit some consideration before we discuss the case of vitamin A.

The answer depends of course very much on the environment and on the previous nutritional state of the people concerned. A poor, and especially an urban poor, population of eaters of highly polished rice will be prone to beriberi, particularly those who are exposed to heavy physical labour. Poor maize eaters, on the other hand, either urban or rural, are menaced by pellagra, specially when they eat their maize in other forms than tortillas.

The specific clinical deficiencies which gradually developed during a prolonged and deteriorating food situation in the Far East concentration camps were : burning feet, camp eyes (retrobulbar neuropathy), pellagra and hungerœdema — just to mention the order and the highest incidences. In the long run the latter two completely overshadowed the former two. But among the thousands of internees who surrounded me for three years hypovitaminosis A was not a problem and isolate cases of nightblindness were probably due to other causes.

There was hardly question of preformed vitamin A or retinol in our diets. Irregular small quantities of indifferent vegetables may have provided some carotene. The period of severe food restriction lasted 18 months. In the civilian camps about which I am speaking the salient specific deficiency

was pellagra. But in the military POW's who had to toil on the Burma road and who were fed — even though underfed — on polished rice the main problem was beriberi.

Why did the European population in those POW camps suffer from various deficiencies except that by vitamin A ? This vitamin is, contrary to the water soluble ones of the B group, a depot vitamin and the stores are in the liver. The well-to-do class of colonial expatriates certainly possessed adequate stores. According to the classical Sheffield experiment it may take two years before the early signs appear in depleted but previously well-fed people.

This, however, does not mean that vitamin A is of no account in relief measures. If the population concerned, specially the pregnant and lactating mothers and the small children did not possess adequate liver stores before the calamity, the stage is set for trouble.

This would be the rule in such recent relief situations like in Bangladesh and the Sahel region but not in the Biafran catastrophe. In the forest region of West Africa the common food oil is red palm oil which is one of the richest sources of carotene, the provitamin which in the body is converted into retinol.

These examples illustrate the importance from the vitamin perspective to consider (1) the origin and food habits of the people concerned, (2) the quality of the staple food which has to provide the bulk of the calories, (3) the physical activities of the subjects.

Epidemiology of xerophthalmia

Before discussing the nature of vitamin A deficiency it is necessary to realize the epidemiological facts. In any historical (Japan 1900; Denmark 1920) or recent situation in which xerophthalmia occurred in endemic proportions the chosen victim was the small child. But here a distinction should be made. It is not so much the firstyear baby which is affected, provided that he is breastfed. The peak frequency in countries like South India and Indonesia comes later, that is in the third and fourth year of life. This story starts with the mother. As an adult she is a good carotene converter if it is only carotene which was the original source of her vitamine A liver stores. But her breastmilk contains retinol. So long the infant is on the breast of an adequately fed mother he will not develop vitamin A hypovitaminosis. Unfortunately the trend for premature weaning is making rapid headway in developing countries and with that the shift to unreliable breastmilk substitutes. Most of these first-year cases die.

Generally the nutritional situation of the young child is most precarious in the second year. In most tropical countries chances are meagre that it will find any of the animal retinol sources : milk, eggyolk or liver, in its food and even the omnipresent vegetable carotene resources are often neglected. In addition this is the period that it falls most frequently in the traps of diarrhoeal and infectious disease. This again is the peak period of PCM either of the kwashiorkor or the marasmic variety. The more serious stages of xerophthalmia are practically always associated with PCM.

Whether the association is only a few per cent like in the Arab countries or up to 70 per cent like in Indonesia depends very much on local diet and custom.

The toddler more often survives his clinical vitamin A deficiency. But if this is allowed to progress until the cornea is affected the consequences will be uni- or bilateral blindness and at least visual impairment by scars.

From a public health viewpoint vitamin A deficiency and xerophthalmia should be considered as a particularly nasty variety of PCM with in its wake a problem of juvenile blindness. It is by far the most common cause of acquired corneal blindness below age five and globally it may produce yearly between 80,000 and 100,000 new blind.

The eye affection is the only clear clinical manifestation of hypovitaminosis A in man. It is difficult to detect in time because the condition is rather painless and the destruction of the cornea is enacted behind closed eyelids of which the cause may escape the mother. The child usually belongs to a socio-economic background in which health care and medical facilities are scarce or far away.

Especially in countries where the affliction is more sporadic the doctor is often confronted with an incurably blind child.

Even if he is an expatriate western educated eye specialist he may miss the correct diagnosis or the real cause.

The eye is a very visible and external organ. The early changes by xerophthalmia can be seen by anybody who takes the trouble of looking carefully at the eyes even of an unruly child. Conscientious case finding is therefore a necessity in any suspect environment. It is superfluous for the nurse or the medical auxiliary to wait for the doctor for confirming the diagnosis because the treatment is simple and harmless and delay may mean blindness.

Every relief worker who has to do with child care should be instructed to look for and recognize the symptoms. This begins with observing in the behaviour of the child after dusk the presence of nightblindness and listening carefully for complaints of this kind.

Classification

In a WHO-sponsored conference on xerophthalmia at Jakarta, 1974 the symtoms and signs have been classified as follows :

X. 1.A. conjunctival xerosis
X. 1.B. Bitôt's spot with conjunctival xerosis
X. 2. corneal xerosis
X. 3.A corneal ulceration with xerosis
X. 3.B. keratomalacia
X. N. nightblindness
X. F. fundus changes
X. S. corneal scars

Of these especially the spots of Bitôt are a tell-tale sign in the exposed child population.

They may exist for a long time and indicate the child who in case of progressive malnutrition or at the occasion of infectious disease will develop corneal damage. For detecting the specific changes of xerosis of the conjunctiva and the cornea it may be helpful to held open the eye lids for half a minute. It is the unwettability by tears of the exposed epithelia which is the typical diagnostic criterium.

Prevention and treatment

The mass campaigns against xerophthalmia in India and Indonesia have proved that both treatment and prevention are very simple affairs. One oral dose of 200,000 IU (60 mg) of retinyl palmitate in oil suffices to cure present lesions and to protect the child for 3-6 months by adequate serum levels of vitamin A. The principle is that the liver stores are repleted by massive doses. This is contrary to the common custom of dosing the child with repeated small doses which of course is much less reliable and more cumbersome. Even in malnourished children sufficient retinol is absorbed to warrant good results. A baby below one should receive half this dosis.

The oily preparation is tasteless. It is given in Indonesia as a capsule and in India from a small special spoon. Of the capsule the snout should be nipped off and the contents expressed on the tongue of the child.

To protect a newborn child it can be given one dose of 50,000 IU or 300,000 IU may be administered to the nursing mother after delivery.

Only when adequate facilities are available or in case of periculum-in-mora one should resort to intramuscular injections. In that case not the oily solution should be used but the waterdispersible form of retinol.

It should be noted that these measures are only directed at curing and preventing xerophthalmia and xerophthalmia blindness. In cases of PCM nutrition rehabilitation and anti-infection measures are of course necessary.

The procedure I recommend here is a kind of vaccination against xerophthalmia and can easily be introduced in any regular vaccination schemes of current child care practices.

Who should receive the massive-dose

The answer in principle is very simple. Any child which is suspected of having an inadequate vitamin A status or which may develop it in the circumstances present can in this way be protected.

That implies dosing the subject who shows the signs described and considering as an emergency case any visible affection of the cornea. All kwashiorkor and marasmus cases ought receive the massive dose at starting treatment. Since especially pyrexial disease such as measles or bouts of diarrhoea often act as a trigger of the deficient condition such cases should be included in the routine.

The consequence is that the massive-dose preparations should be available when cases can be expected, not omitting the sporadic case which tends to be overlooked everywhere ! The repeated low-dose administrations should be abolished. Vitamin A should be handled as a potent medicine and not as a consolation prize or a polypragmatic routine.

No confusion should be possible betwen the current lowdose capsules, dragées etc. and the modern high-dose preparations. Although toxic reactions of the single massive-dose are negligible inadvertent repetition may cause hypervitaminosis A.

There should be uniformity in the preparations and the massive-dosis should be an obligatory item in government drug lists. It takes relief agencies often a very long time to change or correct their policies. At least UNICEF hitherto has assisted very much in providing the capsules for mass campaigns.

In Bangladesh the danger of xerophthalmia could have been predicted. Yet it took nearly a year before the specific weapon of the high doses was introduced. It seems that in tropical Africa xerophthalmia is often overlooked, that the drug is not available and that blindness in children is often ascribed to measles whereas the real cause may be the vitamin A deficient condition.

The skimmed milk problem

Vitamin A deficiency as a cause of blindness in children was discovered in Denmark in 1919 in orphans who received skimmed instead of whole milk. This classical event in the history of nutrition is still often forgotten in the race to get rid of surplus milk supplies. There is not only a protein gap to be corrected in the diet of needy children but also a retinol gap. By use of unfortified skimmilk clinical vitamin A deficiency in infants diets xerophthalmia is promoted. Cases due to the benevolent activities of donors still do occurr. Last year I had the opportunity to detect two cases of blindness due to the use of Belgian skimmilk in Sumatra. Despite precautions no donor agency knows exactly where their supplies are going to. In USA and in Holland skimmilk for human use is obligatorily enriched with vitamin A and this has to be indicated on the label.

The skimmilk of the other EEG countries is not because the calves which are the main consuments do not need it. Any relief worker should be carefully instructed on the difference.

Conclusions

Xerophthalmia is still a cause of preventable blindness in many tropical countries and in many disaster situations.

The prodromes and the eye signs can easily be detected by inpecting the eyes, even by medical auxiliaries.

The cure and the prevention are simple and do not require special skills.

The drug of choice is the single massive dose of vitamin A in oil given orally. The custom of administering repeated small doses is not rational.

The massive-dose preparations should be available everywhere when deficient vitamin A status can be anticipated.

All donated skimmed milk possibly reaching the small child should be enriched with vitamin A and so labelled.

THE PATTERN OF FAMINE IN BANGLADESH (*)

S. FRANKEN
Oogheelkundige Kliniek,
Academisch Ziekenhuis,
Oostersingel 59, Groningen, Netherlands.

J. G. F. ANTEN
Afdeling Tropische Hygiëne,
Koninklijk Instituut voor de Tropen,
Mauritskade 63, Amsterdam, Netherlands.

Bangladesh has become so prone to recurrent disasters both natural and manmade that intelligent and inventive people come to the recognition that they see no way out. Professor Henry Kissinger summed it up in the term empty basket. Let me try to make this verdict seem logical.

The Ghandian movement may be credited with the relatively bloodless transfer of power when the Indian subcontinent gained independance. The split up into Pakistan and India however, was accompanied by dissent, cruel bloodshed and perhaps most important mass-scale migration. East Pakistan separated by 1 200 miles from the western wing, surrounded by India was, though predominantly Muslim, distinctly different from the large partly semi-desert West wing. Both wings received a substantial immigrant population, lost many Hindus to India, but particularly East Pakistan retained a considerable Hindu minority. East Pakistan saw its problems increase in a way which is not so typical for this country. Many developing countries go through a comparable sequence of processes. Though this is unfortunately a widespread protracted fenomenon I have to mention it here in order to have the right perspective on the complexity of the acute disaster situation of the country under discussion.

The first aspect is the growth rate of the population. An ever increasing demand for food was accompanied by fluctuating food production. Conservatism and illiteracy play their classic role in a country with a feodal pattern. Small landowners were forced to sell their possessions and had to lend money at more than 10 and 20 p. cent monthly interest rates from traditional money lenders. Finally they had to give up their land and turned towards cities. There the capacity of industries was insufficient to absorb them as labourors. Begging was under the traditional outlook an acceptable way of life. The overall deplorable level of nutrition is only hinted at when I mention the 1968 figures for the outpatient department of Mymensingh Medical College, a place about 150 miles North of Dacca : 1,570 of the 10,569 children seen suffered from keratomalacia.

(*) Presented by J. G. F. Anten.

This means that 3 out of twenty children brought for medical attention suffered from keratomalacia. This is the worst manifestation of Vitamin A deficiency, inevitably leading to blindness. The widespread occurrence of xerophthalmia though well recognized in rice eating countries by nutritionists, is often not recognized by others engaged in the healthcare system.

Keratomalacia led parents to seek medical help for their children, whereas nightblindness and xerosis of the conjunctiva much more common and earlier symptoms did not so much alarm them. I found similar figures in one other medical college. I do not remember that East Pakistan was in the news as disaster area during 1968.

The deplorable situation of 1968 combined such features as

1. The existance of Medical Colleges, training centres for doctors.
2. The masses consuming rice with very little else and weaning their children on a diet of rice almost without any supplement. Toddlers were struck with blindness in huge numbers. We know nowadays that the majority of those toddlers do not live more than one year after the onset of blindness.

The discrepancy between accumulated knowledge in the compound of a medical college towering above a sea of undiversified crop and blindness still baffles the observer.

The enforcement of Urdu as National language in Bengal, the feeling that money earned in the East wing benefitted mostly 22 rich families in the West wing and the feeling that Bengal was not allowed to express its individuality were causes of dissent. When a democratic majority vote, December 1970, was ignored by the leaders of at that time still united Pakistan, indignation and protest were mouthed but were suppressed by the west Pakistan army. A considerable number of East Pakistan intellectuals and leaders were killed. Other atrocities caused 10 million people to cross the borders with India. Improvised shelters were organised in India. Refugees were transported by train towards centres far from the border area. India saw itself suddenly faced with the task to feed 10 million mouths more. It tried desperately to do this. That performance of how to cope with ten million refugees is worth a separate study.

As resistance in the East wing continued and pressure mounted, war erupted between Pakistan and India. The Indian army entered East Pakistan. This resulted in the transformation of the East wing of Pakistan into a new State of Bangladesh, professing to be a secular state. The ten million refugees made gradually for their old homestead. The Indian army left Bangladesh well before the deadline of March 23rd 1972. The exuberance about the second independance was short lived. The second war of liberation had among other things increased some of the old problems.

The economy had suffered tremendously by the West Pakistan army in 1971. Besides the ten million refugees gradually returning from India, some 30 million had been displaced inside their own country and went in search for old homes and new footing. Over 50 p. cent of the population was on the move.

During the first year of independance the food situation was alleviated by large-scale imports notably from India and the U. N. O.

The food situation was influenced among other factors by smuggling. Shortage of food prevailed also in the Indian part of Bengal and smuggling of rice and jute from Bengal into India took place where smugglers were paid in comparatively hard Rupees instead of soft Takas. Inflation mounted up to 70 p. cent in the first year.

The energy crisis hit Bangladesh as it did other developing countries much more than western countries.

The government of Bangladesh hampered by its inexperience of managing its own affairs, sorely feeling the deprivation of outstanding intellectuals, was faced with three main tasks :

1. reconstruction after the war,
2. promoting the development of a backward country,
3. preparation for natural disasters.

The disasters did hit when preparation had been insufficient and could not have been sufficient. The country offered the picture of a boxer knocked down in a fight and knocked down again before he even can muster his strength to get up.

Hence the disasters cannot be studied separately though I want to mention a few details.

The fertility of low lying Bengal is maintained by recurrent flooding of the Brahmaputra, Ganges and local rivers. In British times regular dredging helped to maintain sufficient depth of the rivers. Dikes were of no importance. The melting of snow and ice in the Himalayan range causes a yearly rise of riverwater and flooding which was beneficial as long as it was limited.

The rice plants kept by growing their heads above the water level and were good for harvesting when the waters receded. There are areas with three rice crops a year.

Fertility of the soil and the people had allowed Bangladesh to become the densest populated country in the world. Roughly 75 million people living on 140,000 square kilometers.

In the first post independance exuberance protective measures were ignored. Silting of rivers and perhaps deforestation caused an extraordinary rise of floodlevels. Beneficial floods turned increasingly into disasters since 1954. The waters brought a fertile layer, but standing crops were drowned in ever increasing quantities, hitting North and Northwest Bengal in particular.

At the same time the floods caused people to flee their houses and land. The total number of displaced people in 1974 was estimated at 10 million. Most of these people had to leave their homes without any possessions. They saw their land, cattle, crop and other possessions drowned. Many could save their lives after making rafts composed of bananatrees but others simply drowned.

Though the Bengalis complain bitterly about the neglect of the East wing by the west, something was done, i.e. the building of roads and rail-

way tracks. The dams on which these tracks were laid formed additional obstruction to the receding flood waters. thus having the effect of prolonging the floods.

The floods of 1974 not only unsettled people particularly in the North, it submerged a larger area than ever before and destroyed more standing crops. The need for import of food increased steadily. Post war reconstruction plans were hardly executed. Banditry, political unrest and corruption paralysed the government. Though a tremendous amount of goodwill stirred public opinion in western countries and all sorts of relief efforts were made, the effect was hardly noticeable. In the past the displaced people relied on their own production of food and now had to go begging for it while the majority of the others had very little to share. The total amount of food was already lacking in quantity and quality, notably protein and vitamins. Besides hunger edema, kwashiokor, starvation and an abundance of xerophthalmia, doctors had observed forms of B deficiency and scurvy.

A relief programme of so called gruelkitchens was organised. Fortunately many of the roughly 2,000 centres distributed not gruel but tjepati's, a flat disc shaped piece of bread made of wheat.

These floods in the North and East are not entirely natural disasters. They are partly manmade because of neglect, ignorance and lack of administrative control.

The floods on the South Cost are entirely natural disasters as they are mainly due to tidal waves and typhoons. The cyclone hitting the southcoast in the night of 12th and 13th November 1970 was estimated to have taken the toll of one million lives.

Sheikh Mujib toured the disaster area and accused his own Government of ignoring the forecast, failing to notify the inhabitants of the threatened area, though there was 48 hours warning time, failing to send helicopters and making boats available when foreign governments had already sent help after the cyclone had hit.

Terrible as this disaster may have been, it did not disturb the vital balance as much as the 1974 floods. The cyclone took besides food innumerable lives. The floods in the North took the crop and spared the lives of the eaters. This comparison is profoundly disturbing. The disaster in the North was prolonged because for many victims death by drowning was replaced by death by starvation.

I mentioned trading of rice in exchange of foreign currency. The treasury forfeited the foreign currency, the people lost food.

Hoarding by traders waiting for higher prices is another feature supporting a black market for some richer people.

In a deliberate effort to increase foodproduction the Government promised a premium for the production of more rice. No premium was given for crop diversification. The attention was focussed on staplefood, calories, not on a balanced diet. The increased surface planted with rice pushed the production of jute down. Jute is the main product for export and means of foreign exchange.

Higher yielding varieties of rice were introduced, requiring a fertilizer. In this way the catch of small fish is reduced. This humble source of protein can be seen in villages in incredible small amounts. I saw once

two fishes measuring 4 cm each put in a safe place for drying in the sunshine.

One of the striking features in that situation was and still is the absence of one single coordinating agency for all relief efforts. Emotionally induced goodwill movements had to make their own decisions what sort of food and materials to send. Airport and seaport of Bangladesh were sometimes clogged with unuseable materials and unsuitable food. There was not a clear voice dictating with authority what sort of food should be made available, perhaps indicating first and second choice.

Many smaller voluntary agencies tried to work on long range solutions on a small experimental scale like experimenting with schoolgardening, teaching of home economics, the staffing of healthcentres, giving out a choice selection of seeds for village gardens. Such agencies were usually working from before independance or from the first hour after the war of liberation.

The postwar influx of voluntary agencies brought many inexperienced people, who had money at their disposal but did not know how to spend it or at least were not in a position to determine intelligently how to put their resources to good use. Some of the better functioning voluntary agencies organised a weekly meeting, where a government, Unicef and W. H. O. representative were present. The purpose of this meeting was coordinating the help offered, preventing duplication and waste. The cooperation through this meeting was not compulsary for any of the agencies. The government representative could not direct any activities, could at the best give suggestions. The field of needs was perhaps so wide that each participant could pose his own priorities guided by whatever motive. The number of voluntary agencies increased steadily after 1971.

The effect of the efforts of some smaller agencies has been noticeable because there was a lot of pathfinding to approach long range solutions involved. The picture of much short term aid is often less encouraging, because of the inadequacy of the answer to the real need and lack of understanding of background problems.

Medical supplies, useful and useless alike, were donated. Supplies sent via the Red Cross chanels were soon sold through one of the 30 shops owned by the president of the Bangla national Red Cross Society. This was first heard as rumor but later publicly confirmed by Dacca papers.

A well meant and often ill used form of aid is the sending of large quantities of skimmed milk. No harm is done yet if this food is used as supplement to a diet lacking only the elements contained in skimmed milk. Distribution channels being what they are have not influenced the utilisation of skimmed milk. In places where infants were raised on bottles filled with skimmed milk I have seen xerophthalmia occur in otherwise well nourished children.

Larger international agencies like Unicef, W. H. O., and Unrod have made a tremendous contribution, both by giving short term help and by giving long range advice.

Some of the outstanding contributions to be mentioned are the plan for Thana based basic health services, and the distribution of Vitamin A

capsules through these centres. No sign or symptoms of xerophthalmia were noted wherever those capsules containing 200,000 i.u. of vitamin were distributed. But the distribution did not take place where the basic health system executed by Family Welfare Workers (F. W. W.) failed. The all too eyecatching cases of keratomalacia were found among children in the cities and refugees. Refugees left not only their homes but also this little bit of basic health service. In 1974 about 65 percent of the estimated 15,000,000 children received twice a year one massive dose of vitamin A.

The basic health service plan centering around the Family Welfare Worker has not yet had a chance to prove itself due to mainly the instability of administration, and the lack of guidance given to the Family Welfare Worker. One may well fear that distribution of vitamin A capsules given by Unicef meant to prevent early blindness will have to continue untill such time that long term measures can replace this measure meant to be temporary. This is a perfect example of the oppressive situation that help offered from outside sees itself condemned to continue without a reasonable prospect of overall improvement allowing for the cessation of the help given. The helpgiver feels trapped in the obligation to continue this sort of charity.

The incidence of smallpox decreased steadily during 1974. The worldwide attack on smallpox may have to fight its last Asian battle in Bangladesh. Cholera increased dramatically in 1973 and 1974. The cholera hospital has found an adequate answer for the mass treatment of victims of the ever recurring attack of cholera in the wake of the monsoon and floods. A rational procedure has allowed to reduce the average stay in the hospital to 48 hours. All fluids needed for intravenous use are produced here.

The activity of vaccinating teams roaming through the country has manifested itself in a considerable increase of hepatitis. In some refugee camps inmates are vaccinated against cholera five times in two months, where for thousand victims two needles are available, and the whole pricking programme is finished in three hours.

With an efficient and well organised Malaria Eradication Programme, I have heard little fear expressed that malaria will make a re-entry into the areas from where it disappeared. The main reservoir is still to be found in the Chittagong hilltrack.

The world faces a terrible new challenge in Bangladesh. Each year the country is struck again. As recovery is postponed we face the problem of recurrent disaster moving towards incessant disaster.

The approach required differs for this reason from that of other disaster areas and for another frightful reason in particular. The new disasters are predictable. There will be a basic pattern of overall protein deficiency and xerophthalmia with a high child mortality, accentuated by recurrent episodes of famine, displaced, job- and homeless starving people in millions. What the Sahel presents in a large waterless borderland of the desert with a relatively small population, Bangladesh does in a small densely populated flooded area.

The situation in Bangladesh has become alarming. Understanding that situation implies the possibility that the same fate will hit other developing countries. The basic problem consists of three components :

a) population increase has blocked any prospect of badly needed development,
b) recurrent disasters have had the two-pronged effect of unsettling large numbers of people and reducing the total amount of food available,
c) the willingness to offer help has been amply demonstrated but an overall lack of planning and coordination has reduced the effectivity of the help given.

The vulnerability of the country and its people are accompanied by an unstable government. Predisaster preparedness hardly applies in Bangladesh because predisaster equals postprevious disaster. Therefore predisaster preparedness in Bangladesh implies first of all the determined setting of priorities, like dredging of rivers and the firm establishment of the basic health care system such as Bangladesh has accepted in principle.

The so called integrated programme executed under the auspices of the well organised Department of the Malaria Eradication is in dire need of strengthening. This section is understaffed at all levels. At the same time it is a vital link in the welfare of the country. A braintrust is needed here, as it holds the keys to health, vigor and family planning.

The maldistribution of emphasis on services is further increased by disasters and by many forms of aid. There seems to be only one way out : Priority for basic problems and the determination not to be side tracked.

Any realistic effort to stem the tide has to come from Bangladesh itself. The first prerequisite is a stable and strong executive. Long term solutions to basic problems must get priority, though adaptability of systems and convertability of activities remain desirable.

One could think of a coordinating agency with executive powers, guided by the planning commission, mobilising the best people, utilising the potential of universities, acting with authority. The link with the usual specialised agencies of the U. N. O. and donor agencies should be strong at this level. This coordinating body should have precedence over the ordinary ministries. Under such a construction there is perhaps a possibility to create a predisaster preparedness linked with long term problem-solving.

REFERENCES

Assignment Report on the Blindness Prevention Programme, Bangladesh Dr. Wadie W. Kamel. (1972).

Bangladesh documents. Vols I and II (1973). Editor Sheelendra K. Singh. India.

Blindness Prevention Programme in Bangladesh. WHO Project · (Bangladesh 0016). Dr. S. Franken WHO Short-term Consultant (1975).

Eye Disease and Blindness in Bangladesh. (1973) : Report on a visit W. H. O. Project SEARO 0215. Dr. B. Nizetic.

Health in Bangladesh. W. H. O. Country Review. U. N. R. O. D Informationpaper 23 Dr. Sam Street.

Nutrition Problems in Bangladesh (1973) : U. N. R. O. D. Information Paper 27 Cato Aall.

The Health Situation in Bangladesh — The great Outreach. (1972) : United Nations Relief Operation Dacca Dr. Sam Street.

DISCUSSION

J. V. M Worsley : I think, in what we have all heard to-day there are two basic problems. Most of this discussion has been on the long term disaster relief program and I think that we need to consider the short term, which is what some of us working in disaster relief/emergency care have to consider. That usually is, as far as we are concerned, a period of less than two months. Listening to all this conversation on vitamin A deficiency and so on, I hope that some of you are taking into consideration what is a priority need when it comes to sending all of these huge requests which we get and I can assure you that they are phenomenal. This is not only true of governments, but this is true of the non-governmental agencies such as Unicef. Our lists are extensive, it's unbelievable and of course I understand what they're doing this for, but at the same time I must make a judgment as to what is the most important item to send to a country considering their problem at the moment. I hope that you'll all keep this in mind when you are discussing whatever goes on to-morrow, because I think this is very important, it's the short term. What goes on in the long term is a public health problem, as I see it.