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Famine in Africa

Proceedings of the Conference of a Working Group on Famine in Africa, held at Kinshasa, Zaire, in January 1980

Editor

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Kinshasa, Zaire, January 6-11, 1980

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Introduction

Julius Holt

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Readers of the last issue of *Disasters* (Volume 4, Number 1, 1980, pp. 55-65) will know that there was a famine in Zaire in 1978. Few other people outside Zaire will. This was not a well-publicized event, since it was not on the scale which the international media's public has come to expect of Africa. But the localized drought in Zaire's smallest region, Bas-Zaire, from late 1977 caused an appreciable shock amongst Zaireans at many levels. For one thing the drought struck the country's most densely populated area, and for another this generally humid region of Africa – though not immune to rain failures – has not in recent years displayed the proneness to severe drought which has come to characterize many of Africa's more arid lands. Lastly, Bas-Zaire is the main source of staple foods for the nearby capital of Kinshasa, in which some 10% of Zaire's population lives, and the drought therefore had extreme effects on a market already suffering from one of the world's highest inflation rates.

The conference workshop was on famine in Africa in general, and the organizers showed admirable restraint in avoiding over-representation of their own case-study. If I have begun with this case, it is not only as a mark of respect for our generous and efficient Zairean hosts, but because I was among a number of participants who had observed the effects of drought in very different territor : in the semi-arid Sahel, in the rangelands of the Horn and East Africa, on the eastern edges of Ethopia's highland massif, and in the Kalahari Desert. The ecological, economic and social contrast between these areas and Zaire is great, and the conference/workshop offered an opportunity for participants to sharpen their understanding of common and contrasting aspects of food shortage, famine prevention and famine relief in different regions.

The meeting was held under the auspices of Zaire's new Nutrition Planning Centre, which was inaugurated in 1978, and one of whose first tasks, fortuitously, had been to help deal with famine. The Centre is directed by Dr. Kabamba Nkamany, who was the conference chairman. USAID has put up the basic investment for the foundation of the Centre (as for the running of the conference, to which The Wunderman Foundation in New York also contributed) and the expatriate staff,

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including the co-director Dr. Robert R. Franklin, come via the formal link with the Department of Nutrition of the Tulane University School of Public Health and Tropical Medicine (TUSPH & TM) in Louisiana.

Not surprisingly, personnel from the Zaire Nutrition Planning Centre, TUSPH & TM, and USAID comprised over a third of the conference's approximately 40 participants, and a still stronger U.S. flavour was added by representatives from the U. . Peace Corps volunteers in Zaire, U.S. Presidential Commission on World Hunger, the U.S. Public Health Department, the Bureau for International Food and Agricultural Development (Atlanta, Georgia), the International Center for Health Science at the Meharry Medical College, Nashville, Tennessee, the Nutrition Department of the Massachusetts Institute of Technology (MIT), and The Wunderman Foundation.

On the other hand, African representation was disappointing, chiefly because those invited from the Sahel countries and from East Africa failed to appear. The problem for at least one Sahel representative was that Zaire had closed its borders to several days from Christmas in order to expedite a change in currency notes in the name of control of money supply and inflation, and the border with Congo-Brazzaville was still closed. Fortunately representatives from the Ethiopian Relief and Rehabilitation Commission, the Botswana Ministry of Local Government and Lands, and the Lesotho Ministry of Health and one or two Zaire Government departments were on hand to guide the largely non-African audience in some of the political and economic realities of Africa. But the chance of a greater sharing of information from the other African countries, and of a more intensive assault on the African Francophone/Anglophone barrier, was frustrated. The UN Food and Agricultural Organization (FAO) was represented, as were several voluntary agencies: The Salvation Army (Zaire), Oxfam U.K. (Zaire), International Rescue Committee, International S.O.S. Assistance Inc. (France) and members of the medical aid project of the Hopital Universitaire St. Pierre (Brussels) working in Kivu Province, eastern Zaire. The absence of representation from Catholic Relief Services was remarkable in consideration of their central role in the relief of the Bas-Zaire famine.

Three basic themes underpinned the formal papers and the workshop 'commissions': early warning and preparedness; famine prevention and famine relief.

Resolutions/Recommendations

Practically all countries in Africa suffer from famine or are threatened by famine either regionally or nationally. These famines are in most instances an exacerbation of the chronic cyclical food shortages which occur in most countries. Famines in Africa therefore have their main roots in the general causes of food insufficiency for some populations within the country and generally affect the poorest households in the area. The causes of famine can be considered under two headings: natural and man-made.

Natural Causes

Climatic aberrations, including rainfall failure and flooding, are among the main causes.

Man-Made Causes

The man-made causes are the reflection of the chronic underdevelopment of many African countries aggravated by the skewed distribution of resources and development policies favoring some regions to the detriment of others within a country. The added effects of the increased demographic pressures on the land, outdated cultivation practices and rapid urbanization increase the vulnerability of rural peoples to episodes of starvation.

Increasingly poor people in urban areas are vulnerable to increasing food prices when these are not matched by similar increases in income.

Political instability and armed conflicts, not uncommon in Africa, are disruptive of food systems affecting the poor, the young, and the old. The Workshop on Famine Prevention in Africa was concerned that the basic causes of food shortages and famine in Africa do not appear to be diminishing; indeed, all the indications are that areas and populations affected are increasing. Frequency and severity will also probably increase in the future until the general levels of living standards among the vulnerable groups in both rural and urban areas have risen and become stable.

The Workshop would like to re-emphasize statements already made in regional and international meetings and recommend some key issues for serious considerations. The first part of this report identifies specific topics which might provide guidelines for follow-up discussions or activities, and are based on the experiences shared by the Workshop participants coming from countries in Africa.

PART ONE

1. The Working Group draws attention to and endorses strongly international efforts to outlaw the use of food as a political and military "weapon". Prohibitions on such use of food are covered in appropriate United Nations, International Red Cross, and other international formal resolutions and conventions. The conference suggests that the African governments and major food donors and producers consider the continued relevance of these resolutions and conventions.

2. Considering the problems of famine relief, particularly in areas of political instability, civil strife and armed conflict, the Workshop recommends to African governments and the Organization of African Unity that a regional affiliate of the International Committee of the Red Cross be established, namely an African Red Cross. The Workshop further recommends that the African Red Cross be given the necessary credentials and support to enable it to operate as the lead agency in all emergencies and relief situations in Africa.

3. The Workshop recognized the existence and importance of an Inter-Ministerial Committee on Drought in the OAU. It was suggested that this facility be strengthened and used as a method of communication and collaboration between countries in Africa.

4. The Workshop recommends that one of its representatives, Dr. Fred Sai of the United Nations University, World Hunger Program, make a presentation of its findings to the UN ACC Sub-Committee on Nutrition and that he petition the Sub-Committee for funds to establish a nine member African Secretariat on Food and Nutrition. The Workshop felt that the majority of the members of the Secretariat should be African. The purpose of the Secretariat would be to help sensitize African Governments to the immediacy and urgency of the Food Crisis situation, and the need to take concrete steps to begin to prepare to deal with it. The secretariat could do this by using the methods outlined below.

   - To work with African Governments to help them to develop their capacity to respond to acute and chronic food shortages;
   - to work with voluntary agencies in times of emergency to facilitate their roles in the administration of relief programs;
   - to help develop cadres of trained personnel in nutritional assessment, organization and management of relief programs, and forward or upstream nutrition planning for famine prevention.

   Perhaps the FAO Food and Nutrition Commission for Africa could be revitalized and its secretariat strengthened through appropriate funding and staffing to allow it to play a specific role in famine prevention and food and nutrition policy and

planning activities, particularly those related to chronic food shortages in the African Region.

PART TWO

Suggested topics for further consideration and possible workshops:

1. Famine prediction and early warning systems

   - Creation of an effective early warning methodology that would be useful to national governments. Urging all governments who have not already done so to join the FAO Global Information and Early Warning System on Food and Agriculture. In addition, urging all developing countries in Africa to establish or improve, if necessary, their national early warning systems, and bilateral and multilateral donors to assist these countries in this regard.
   - Development of national knowledge on the nature of the food system, vulnerable areas, and population groups, and likely dynamics of any food shortages.
   - Institution of monitoring and surveillance systems at national level absorbing traditional methods and experience and involving national inter-ministerial collaboration.
   - Strengthening of communication channels between information systems and points of reaction to famine warning.

2. Famine preparedness

   - Identification of national coordination and leadership points
   - Contingency plan preparation
     - funds
     - personnel training
     - logistics
     - procedures
     - accountability
     - institutional responsibilities
     - transport and communications
   - Food security stocks and stocking strategies at central, regional, and local levels and definition of types for relief imports.

3. Relief operations

   - Government coordination and management
     - government initiatives with donor agencies
     - definition of priorities for action
     - mobilization of national resources
     - coordination of national institutions
     - community education and mobilization
     - coordination of donor inputs
     - coordination of donor activities
   - Monitoring and evaluation
     - use for management of relief inputs
     - use for terminating aid
     - use for long-term preventive measures

4. Famine relief and development strategies

- Famine usually occurs or is exacerbated as a result of under-development.
- Areas affected by famine are almost always those affected by chronic food shortages or instabilities.
- Therefore any famine relief operation should be made an occasion for a more general program of development within the affected region with particular emphasis on the improvement of the food supply system.
- This should begin as soon after the relief operation as possible, after an overall assessment of the underlying conditions, and aided if necessary by donor interest in the short-term problem.
- This should become part of the overall national development strategy.

These Resolutions/Recommendations were arrived at through discussions in small working groups, revolving around the topics presented in the following papers.

The papers are presented by author, and they have been abstracted and/or summarized by the editor, in such a way as to preserve the essential message, original intent, a particular point of view, etc. Each author was consulted, and given an opportunity to verify or alter the accuracy of his/her "statement".

The results are what follows.

Description of a Typical Food System

Roger Hay

A food supply system is defined as that complex of factors which determines food production, distribution and food consumption as a continuum for a particular population group. The food supply system is just one half of the ecologic perspective; the other half is the human society which interacts with it. The points where the human society interacts with the food supply system to modify it, are the points where the errors are between the components of the system.

The concept of a food supply system directs our attention to the causes of food shortages, and the system's deterioration, and vulnerability. In going backwards along the pathway, it suggests points of intervention. With the present knowledge of the dynamics of food supply, it is possible to predict the magnitude of shortage from the observations of the cause of conflicts. It is this predictability which will offer the greatest hope that rational policies can be developed to manage famines rather than to relieve them.

The concept of food sypply system is helpful in identifying patterns and characteristics of the way in which food supply systems behave. Each food supply system appears to have a capacity to absorb change. Some are extremely brittle so that if there is a small alteration in climate, the system tends to fall apart. Others have inherent and considerable stability. Some food supply systems appear to be able to carry unusual loads in terms of extra population. This is important during a famine when migration occurs and people rely unnaturally on other food supply systems.

During the development of food shortages, the relationships which exist between the various elements of the food supply system are by no means inelastic. All communities have developed mechanisms to buffer against the effects of shortages. In a pastoral food economy, climate is a determinant of pasture and water for animal production. A reduction of pasture carrying capacity may be buffered traditionally by movement of animals and people to dry-season grazing which is only used in difficult years. Various means of sharing resources with other pastoral clans may assist in buffering the effects of more serious animal losses.

It has been observed that there are many more buffering mechanisms available in animal dependent societies than are available to cropping communities. On the other hand, the dynamics of recovery

favor cropping agricultralists, because if the harvest is good, the recovery of the food supply system can be achieved in one season.

The concept of food supply system allows us to develop a way to see how the whole complex behaves and responds to fluctuations in the ecology. In general, each system has a built-in resistance to change. This buffering system varies from one food supply system to another. The first critical point is reached, during the rundown of the system, where the food supply system becomes isolated from the general economy of the area. The second critical point is reached when the buffering mechanisms begin to break down. This may happen gradually, as in pastoral communities, or more rapidly, as in a cropping community, until a flash point is reached after a long period of disequilibrium with a deteriorating situation.

Famines are generally of two kinds, although frequently the two may be combined. The first arises from a reduction in the production of food which may lead to a decline in food availability. The self provisioning community is vulnerable to this food availability decline. The second type, which affects households normally dependent on the market for food, is related to a relative reduction in the command over the available supply of food, or exchange entitlements decline.

The two phenomena may occur together as in the famine of the Ogaden area of Ethiopia and Somalia. Drought reduced the herd size and therefore the food supply. It also reduced the pastoralists exchange entitlements. They were faced with steadily rising grain prices and a rapidly declining exchange value of their animals. The rich maintained an aggregate demand on food, allowing prices to rise further and forcing the poor pastoralists out of the market altogether.

The Importance of Deserts in Africa

Fred Sai

The expansion of the desert in the western Sahara and the Sudan is due to natural and man-made causes. Unless containment activities are undertaken this desertification will intensify the threat of famine in many areas in Africa. Increased human and animal populations, methods of cultivation, and the non-renewal of soil are all contributors to the expansion of the desert.

Urbanization denudes many rural areas of man-power, and of the initiative and strength to assist with local economic and agricultural activities. People are not able to provide for their own food supply and become dependent on the market in the cities. The urban poor are increasing in number while food prices rise and are out of step with wages. People substitute their traditional foods, preferring those found to be more convenient, although not always more nutritious. Substitutes cannot always be found and the high price of regular foods is prohibitive. This effectively forces the urban poor out of the market. This sector of the market is under the threat of a "hidden urban famine". Also, the growing population pressure and depletion of the soils put a burden on agricultural production which cannot be met unless remedial action is taken immediately.

Food System of Bas Zaire

Kabamba Nkamany

The role of the Nutrition Planning Centre in the drought and famine in Zaire is discussed. The results of the nutrition survey showed that some of the precipitating causes of the famine were the drought and crop diseases. A severe drought in Bas-Zaire from November 1977 to October 1978 caused a 60% drop in food production. In addition, there was a crop infestation of tobacco mosaic virus which further decreased the availability of food crops.

The underlying causes of the famine were long-term problems of chronic malnutrition aggravated by the influx of refugees and a high rate of natural population growth added to an already heavily populated area. Inflation made foods prohibitive and the consequent switch to unfamiliar food substitutes led to a market dependency. Inflation affecting the energy sector further added to food prices due to high distribution costs.

Without an Early Warning System to predict the disaster, the famine was discovered too late to plan evasive action. Monitoring of rainfall would have been predictive of the imminent drought and resultant famine. Further, if crop yields had been monitored the imminent disaster would have been better foretold. Satellite remote sensing was unable to predict this disaster as it is not used for this purpose. The satellite sensing is used to monitor trends in climatic conditions.

The method used to assess the nutritional status of the population was that developed by the CDC in Atlanta. The method provides for a very fast and efficient assessment of the situation through the use of standardized testing procedures. In Zaire, the Nutrition Planning Center together with nutrition assessment teams from Tulane and CDC were able to implement a program in a little over one month. One feature of the program is that it represents a multi-sectoral assessment. The results indicated that 17.3% of school aged children had only reached 80% of the standard curve of their weights for heights. The limit of 80% is set as the acute undernutrition threshold as an indicator of nutritional status. The percentage edema found was also shown to be an indicator of kwashiorkor. Weight for height may underestimate the nutritional status of children with kwashiorkor since edema fluid can increase the child's weight by as much as 10%. It has been recommended, therefore, by Dr. Vernon Bailey, Regional WHO Nutrition Advisor

in Brazzaville, that to accurately assess the extent of malnutrition, those children presenting with edema be added to those who achieved less than 80% of the weight for height curve.

As an indicator of famine, corroborative data on recent hospital admissions were useful. It was noted that there had been an increased number of hospital admissions with full-blown malnutrition. This indicated an epidemic of malnutrition. Chronic malnutrition was underlying, which was the reason for such an acute outbreak of malnutrition.

The malnutrition was evidenced early in the course of the famine, yet relief was a long way off. To appeal for relief aid, government officials had to become involved. This mechanism, involving the bureaucratic network, can become counterproductive if critical time is lost waiting for relief food supplements. In Zaire, it was fortunate that seeds came in time, for the following harvest, to sustain the population through the season.

Malnutrition was almost exclusively that of protein and calories; no unusual cases of vitamin and mineral deficiencies were reported. Although certain unusual infectious diseases were reported (cholera, typhoid, schistosomiasis), their low prevalence and endemicity did not warrant the need for emergency medical measures. The large undernourished pediatric population was found to be unimmunized against measles, and this posed an acute threat for increased mortality from this common disease. It was recommended that a mass measles immunization campaign be organized against this highly fatal disease, should an outbreak occur.

Some of the participants were unfamiliar with the CDC abbreviated survey methodology. For them, the following summary was prepared.

Simplified Field Assessment of Nutritional Status – CDC

The CDC methodology is a simplified system for assessing malnutrition. The distinctive features of the methodology are the methods for choosing the population to be studied, and the methods for employing a minimum core of basic nutritional indicators. The parameters basic to the assessment methodology are: basic identification data, demographic and socio-economic data; body measurements: height, weight, arm circumference, fat fold thickness; clinical screening for edema and other signs; laboratory determinations of hemoglobin and hematocrit, plasma albumin, and urine chemistry. Care is taken in obtaining a representative sample population of pre-school children. The population is similar in sex ratio to facilitate the statistical analyses of the data. The purpose of the survey method is to generate useful data bearing upon the prevalence of the most common and severe nutritional problems of young children in developing nations, and to provide a firm basis for remedial action.

Comment: Drs. Hay and Carter

The merits of anthropometric studies, while extremely valuable, nevertheless seem to be over-rated. It is questionable whether a nutrition survey confined to the preschool child really tells you what is going on with the nutritional status of the entire population, including older children, adolescents, adult males and females, pregnant females,

and the elderly.

Neither does anthropometry afford as great a predictive value for famine as do the indicators of climate, rainfall and temperature, pasture-carrying-capacity and biomass; water quality, quantity, and evaporation rates; migration rates, and household livestock holding capacity.

If you want to identify the group most susceptible to the ravages of famine, identify the poorest of the poor by looking at indices of poverty, infant and early childhood mortality rates, maternal mortality, birth weights, etc.

Food System of Lesotho

Pascal Ngakane

The Food System of Lesotho is a complex of economic and environmental reliance on food imports. With full utilization, national food production can only support 30% of the population's caloric needs. In addition, 41.3% of the available work force is away working in the Republic of South Africa. The market is thus dependent on the purchases made with money earned in the South African mines and fields.

Erratic weather conditions have been singularly the most potent causative factor of famine in Lesotho. Severe droughts and unseasonal weather can disrupt basic grain and vegetable production. In this area, to achieve self-sufficiency, improved cropping methods which will counterbalance the extreme effect of climate are needed.

Short-lived food shortages occur as a result of these combined factors. The shortages last for two to three months at a time. There has been no significant change in the nutritional status of the population during these temporary shortages.

A constant threat is that of food and manpower withdrawal by South Africa. Should this occur the food situation will be under considerable strain. One of the goals of the Government of Lesotho is to achieve self sufficiency in the production of the basic food-stuffs and to reduce reliance on imports from the Republic of South Africa. The programs being implemented by the Lesotho Food and Nutrition Council and Inter-Ministerial Commissions are an attempt at achieving such an eventuality.

One of the nutrition activities within the Ministry of Health is the CDC adapted nutrition surveillance program. The broad objective of this program is to monitor on a continuous basis the nutritional status and changes in the nutritional status of individual children under the age of five. The method is that of using anthropometric parameters which are simple to measure and evaluate. These data will be used to plan and initiate adequate programs for remedial action at village, district and national levels.

Food System of Botswana

Bathusi Dintwa

The problem of the desert and recurring droughts is a fact of life in Botswana. Crop output is nearly eliminated during a drought. Live-stock is much more resilient except during successive years of poor rains.

During the good years, farmers produce enough food to last six to nine months into the next season. With a drought, that reserve is eliminated. In Botswana, where there are more cattle than people, overgrazing at watering points becomes critical during a drought, with up to 80% losses in livestock. The year 1979 was one of the worst years for rainfall.

A few of the major problems in Botswana are related to the poor transportation and communication. Food distribution is by overseas to South Africa and then by rail to Botswana. The remaining difficulty lies in getting the food to the villages and finally to the individuals. The Bushmen pose a special problem for distribution.

Nutrition surveillance is an on-going process in Botswana, since it was introduced on a national scale in January 1978, with the establishment of the Nutrition Unit in the Ministry of Health. The process of using weight for height measurements in pre-school children attending clinics in order to monitor nutritional status is now widely practiced.

Comment: Dr. Carter

Kung women in neighboring South Africa, when hunting and gathering for 6 months at a time, when food is scarce, and physical activity great, demonstrate a cessation of menstruation and ovulation accompanied by weight loss. These physiologic functions return when food becomes available again. As a consequence, a lot of babies are born at the same time each year.

Ethiopia Case Study

Aklilu Mewaee

Famine is the manifestation of a situation in which either food is insufficient or inaccessible to the poor. The famines experienced in Ethiopia were largely due to the absence of any form of warning system, making discovery of the situation possible only after it was already too late. The inadequacy of the institutional arrangements to cope with food shortage were realized and thus the Relief and Rehabilitation Commission was established. The Food and Nutrition Surveillance and Disaster Preparedness Planning Systems are operating within this Commission.

The functions of the systems are to monitor food production, distribution, and consumption, so as to identify food shortage and surplus areas. Nutritional status of the people will also be monitored to help policy makers take the appropriate measures on time. Disaster assistance under these systems will be aimed at reaching a level of self-reliance rather than at merely restoring the situation to its pre-disaster level. This type of assistance reaches the people before disaster strikes, when they are most vulnerable and aid is cheapest.

Field reconnaissance trips are made by nutrition surveillance teams. When discovering a severe situation, they radio the Commission for quick action to be taken, even though the surveillance team is still in the field.

Food shortage in cropping systems require prompt assistance, because there is no chance that the situation will improve on its own until the next harvest. Seed is a vital requirement for the subsistence food supply in decline.

Pastoral areas facing food shortages do not show as abrupt a decline as do subsistence cropping areas, yet they pose the most difficult in terms of delivering aid. The areas are usually vast and lack good communication facilities. Delivery of food aid is expensive and difficult. If early indicators of hardship are identified, a stable supply of grain at controlled prices will ensure that the pastoralist does not have to sell more animals, thus depressing animal market prices, to buy grain.

A possible strategy for dealing with increasing shortage is to establish three kinds of food stocks, strategically located throughout the country. A National Food Security Stock is to provide resources for a rapid response to shortages in a subsistence food supply system. This

stock is a 'first aid' stock and should be kept topped-up from surplus domestic production or from external sources. Use of a Commercial Buffer Stock is confined to the population of the market dependent food supply system. If grain is in short supply in a pastoral market, the commercial buffer stock may be used to support the supply. It can be established and replenished from surplus domestic production or commercial imports.

CEMUBAC's* Program in the Kivu Mountains

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Nutritional status in the eastern part of Kivu is of extreme concern. The entire population is actually undernourished. This chronic situation is growing worse. The two main causes of the situation (population increase and soil deterioration) are uncontrolled and increasing.

To evaluate this aggravation, it is necessary to monitor permanently the nutritional status of the population. This work is actually done by the medical department of the Institute de la Recherche Scientifique du Zaire in collaboration with the CEMUBAC. The methodology of this clinical survey is adapted to specific local problems and taking into account data that were collected in the past.

One of these sources of data is the food consumption surveys. These were initially carried out over ten years ago. The findings show that the energy needs are covered for about 85-90% of the normal caloric requirements defined by the FAO and WHO. Most of the calories are obtained from beans, sweet potatoes and cassava. Due to the fact that there are three elements responsible for the caloric intake, the growth curve remains relatively stable.

The protein needs, on the other hand, are covered for only a small fraction of the requirements. The important thing to note is that the beans alone are responsible for about 50% of the total amount of protein offered. There are important seasonal variations in the amounts of protein offered. The proteins available in October-November tend to be much lower than at any other time of the year. This is due to the fact that the dry season is extending from May until September and there is no bean harvest until December-January. At that time, the protein intake is beginning to increase, but each year there is a protein shortage during the intervening four months.

Since the Kivu mountains are an auto-subsistence system, we can conclude that since all the foods are coming from the family plots, the peasants have no means of establishing reserves, and that there will be an increasing problem of protein-calorie malnutrition during the months of October-December. One additional aspect of a system of auto-subsistence is that the energy supply per capita is decreasing when the number of children less than 15 years of age is increasing. The reason is that a surface which can be cultivated is limited by the physical effort performed by the adult, especially the mother. The

percent caloric intake decreases with increasing number of children and also a woman's capacity to work decreases with each successive pregnancy.

The clinical examination of the children confirmed that the primary food deficiency is essentially that of protein. Other signs of nutritional deficiency, including deficiencies of micronutrients, appear at a secondary and minor level. In conclusion, it seems that a determination of serum protein and serum albumin levels are necessary to evaluate the protein nutritional status in this area.

This is also very important because there exists a correlation between the serum albumin level and the in-hospital mortality. When one looks at global malnutrition this correlation no longer exists. Thus in this area, the serum albumin level is a very important indicator of protein nutritional status.

A seasonal variation in serum albumin levels can be demonstrated in the 2-6 year olds, who are the most vulnerable. Children with serum albumin levels below 2.5 need to be hospitalized.

In an area suffering from important endemic malnutrition, not only the children but also the women are malnourished. The reason for their greater vulnerability is that during their fertile life they are either in continuous childbearing or lactation. Some indicators of malnutrition in women are: (1) weight gain during pregnancy, and (2) serum albumin levels. In lactating women, albumin levels are lower than those found in men.

Another indicator of malnutrition is a diminished volume of breast milk produced. The reason for this is that milk production is dependent, first, on the fat reserves stored by the mother during pregnancy (if she didn't gain weight she didn't make fat stores) and secondly, it is dependent on the daily protein intake, which is also insufficient. The health status of children will suffer in this situation. The mothers are obliged very early to introduce supplementary foods, as is the pattern in urban areas. This urbanization influence is seen as a disruption of the breast-feeding practice. The result of an early introduction of supplementation is a rapid parasitic infestation of the children. Very early in life (4 months), there is a slowing down in weight gain as compared with western European growth curves. Another consequence of this practice is an increasing frequency of episodes of gastroenteritis and cases of very severe marasmus in breast-fed children. When malnutrition is occurring this early in life, one has to fear cerebral damage. On the other hand, due to the insufficient breast milk production, cases of protein malnutrition are seen now in breast-fed children.

The malnutrition of the mother and the practice of breast-feeding for two years favors a prolonged post-partum amenorrhea and a birth spacing of 33-39 months. Eighty percent of mothers are amenorrheic after one year and 40% are still amenorrheic after two years. The lengthening of the post-partum amenorrhea is both a function of high prolactin levels, as well as of the nutritional status of the mother. In this system of natural fecundity, where each mother has 7-9 children, of which four will die, this ensures an important demographic increment. This increment, when combined with an auto-subsistence economy, will induce the processes of malnutrition.

The agricultural effort is supported by the mother. Since peasants cannot affort to buy milk or to keep cattle, they use prolonged breast-feeding. These two factors increase the mothers' nutritional requirements and will thus induce maternal malnutrition. The mothers react to this stress in trying to restore equilibrium by diminishing their energy output in the field, by prolonging their post-partum amenorrhea,

and by decreasing their milk production. Thus a major task is to try to promote the nutritional status of the pregnant and lactating women.

In doing this, the quantities of breast milk shall be increased, thereby promoting the childrens' health status, while increasing the women's work capacity. The danger is to diminish the duration of the post-partum amenorrhea and therefore the birth-spacing effect of this phenomenon. This would increase demographic pressure. Thus we have to not only promote the nutritional status of the mother, but we must also introduce artificial birth spacing.

Infant formula promotion in rural areas is unimportant, but what is important is that most of the mothers are delivered in hospitals where they are impressed with a western view of maternity. They are separated from their children and give breast only at specified times. There is a supplementary factor in that mothers are obliged to go to work and at that time are separated from their children. They give breast in the morning before work, but in the afternoon someone else in the family is obliged to give supplemental feedings. When the fields are far away, the supplemental foods may cause a serious problem.

A prospective study of the Kivu mountain area using a mathematical model was made to analyze the events at hand, and develop a predictive model. The area divided into two zones, one representing fertile soils and the other less fertile or unproductive soils. The only stable element in the model was the total surface area. Some of the variables introduced influencing the population, nutritional status, and soil-erosion phenomena were: spontaneous or stimulated emigration, birth rate and mortality, agricultural production, influenced by the effectively cultivated fraction of the total area, soil decradation (reversible or irreversible), and productivity.

One of the hypotheses supposes that nothing changes from the present situation. Under this hypothesis, food consumption per capita remains stable until 1970 in both zones. At that time, the nutritional intake of the people in the fertile zone is decreasing due to overcrowding and over-utilization of the soil. The spontaneous emigration of young people begins in 1980, and will attain about 75% of the population in the year 2000, from the low fertile areas to the high.

The population in the low fertile area will decline according to the hypothetical model. The birth rate also declines followed by the same trend in the high fertile area. Most African populations are growing at 3.5% per annum. Urbanization in Africa is also proceeding at rates among the highest in the world. Abandonment of agricultural land and activities could contribute to a threat of famine.

The agricultural prediction is even less encouraging. The cultivated fraction passes from 50% to 100% by 1990. The soil can no longer rest and the productivity is declining from 100% to 50%. Erosion makes the usable surface diminish continuously, and a few years later desertification begins.

The conclusion of this hypothesis is that a collapse will occur in the coming 20 to 40 years if nothing is changed in the area. This will irreversibly transform the Kivu mountains area into a desert. The other hypothesis points out that unless there is an immediate effort of integrated development, including stimulated emigration to the outside, an intensive anti-erosion program, road construction, and the collusion of complementary monetary systems within the country, it will be impossible to prevent a definitive collapse of the Kivu mountains area.

Great Famines and their Relevance

James P. Carter

Famine, according to Mayer, "is the ultimate breakdown of nutrition, of public health, of society itself." When looking beyond the famine one finds social disorganization at the roots. This indicates that relief and rehabilitation efforts have to do more than bring conditions back to the extremely unsatisfactory level which existed before the famine. Relief has to go beyond that and into the realm of development and long range planning.

Included in the definition of famine are infectious diseases. Cholera, typhoid and dysentery are associated with severe malnutrition. Low nutritional status contributes to a breakdown in the immune response. In children with already marginal immune status, an epidemic outbreak of measles could be fatal.

The diseases which do not adequately immunize are the ones which become prevalent in times of famine, i.e. dysentery. Also, in some cases, an insufficient number of people are adequately immunized to create a "herd immunity". Thus, certain endemic diseases are selected and tend to take over. As an integral part of famine prevention, there is a need for specific planning for infectious diseases control.

Climatic causes of famine such as drought or flooding are second in importance only to social causes of famine. Devastating weather conditions can be remedied quickly in a stable economy. When natural disasters occur in a faltering economy, the possibilities of recovery are diminished. Another reason why climatic conditions are not as crucial to famine as the social, is that climatic factors can be anticipated in advance. A drought can signal the need for a response before food is exhausted.

Biological causes involved in famines include locusts, rodents, plant diseases. Combined, all these accounted for less than 10% of the famines in India. With proper planning, societies should be able to respond to these causes as well. Yet, if a society is disorganized, anticipation of biological or climatic factors is useless towards prevention of famines.

The Physiology of Fasting, Famine, Starvation and Stress

James P. Carter

What are the differences between the physiologic state of a fasting Mahatma Gandhi, a chronically starved underpaid Central American mestizo farm laborer, a "professional" faster such as Dick Gregory, who is into the fourth week of a total fast to call attention to the American hostages in Iran, and a pre-school Cambodian refugee child with malaria and dysentery? Briefly stated, it is the stress of infection, and the brain and autonomic nervous system control over the breakdown of muscle protein, and the re-cycling of glucose, both of which are apparently teleological responses to stress.

In the case of Gandhi or a Dick Gregory, or the mestizo laborer, there is probably also a difference in mood or mental state, the former two happy or even euphoric; the mestizo at the very least neutral, but the Cambodian child downright anxious – these mood states being determined perhaps by a newly described division of the autonomic nervous system which is chemically medicated by a group of naturally produced substances called endorphins.

The endorphins are the body's own "morphine like substances", which in addition to being pain-relieving, are probably also involved in the conservation of bodily energy, lean-body mass, and other body resources, as in the case of the North American black bear during hibernation. There is also probably a naturally produced "nalloxogenic" substance which is the antagonist to endorphin in its physiologic reactions.

Margulis speculates on the action of beta-endorphin:

> "Beta-endorphin, a morphine-like peptide, induces a state of lethargy, passivity and skeletal muscle relaxation. In this state, an attenuation occurs of the arousal capacity of many of the classical stimuli for the activation of the sympathetic nervous system including pain, cold, asphyxiation, oxygen lack and the emotions of fear and rage. This serves to conserve energy and to prevent wasteful expenditures. Beta-endorphin also reduces overall energy expenditures by the reduction of thyrotropin release, the lowering of the set point for body temperature and the elevation of the set point for carbon dioxide

tension in the blood. Drops in body temperature, respiration rate, cardiovascular output, sympathetic tone, and thyroid hormone release, reduce the energy production and oxygen consumption in almost every tissue in the body. Beta-endorphin also acts in conjunction with glucagon and insulin, whose release it stimulates, to conserve and extract and store every remaining bit of nutrient, water and minerals in the body. This occurs in various ways, including the inhibition of excretion in many organs. Sphincters for defecation, urination and bile release are tightly contracted. Simultaneously, propulsive peristalsis is inhibited and instead the gastrointestinal contents are stirred and mixed in place within the small intestine and large intestine. Beta-endorphin stimulates the release of anti-diuretic hormone which acts on the kidney to conserve water. Beta-endorphin also acts to inhibit the release of the gonadotrophic hormones thus reducing sexual urges. The actions of beta-endorphin are supported by ACTH release which stimulates the adrenal cortex to release the mineral corticoids and glucocorticoid hormones. These hormones further conserve sodium and carbohydrates and reduce the rate of their utilization. Finally beta-endorphin appears to have appetite and thirst stimulating abilities. Hibernation is an extreme form of the results of preparations implemented by the endorphinergic division of the autonomic nervous system. Hibernation represents an almost perfect adaptation to seasonal food shortages."

When the stress of infection is present, as is usually the case in famine situations, there are usually uncontrollable self-defeatist physiologic reactions which work against the starving patient. These reactions convert muscle protein, i.e. lean body mass, into glucose (gluconeogenesis) and re-cycle glucose already converted to lactate back to glucose (Kori cycle). Both of these reactions are associated with, and are probably triggered by hormonal changes involving an increase in glucagon and a decrease in insulin. The release of these hormones are in turn under brain and autonomic nervous system control. Both of these reactions, protein to glucose, and lactate to glucose, are extremely energy wasteful, causing a negative calorie deficit, and a loss of nitrogen in the urine or negative nitrogen balance.

This is what kills the Cambodian refugee child in contrast to the other three individuals. Also, the others will die too if they fast or starve long enough that their muscles are too weak to support breathing.

If we only had some way of shutting these negative break-down reactions off, more effectively than the specific treatment of infection, then maybe we could convert from the Cambodian state to at least the mestizo state, if not the Gandhi state, and hopefully avert death.

Social Responses during Severe Food Shortages and Famine

Adapted from Robert Dirks by James P. Carter
for these Proceedings

Dirks, in *Current Anthropology*, Vol. 21, No. 1, February 1980, reviews the world literature on behavioural changes during famine. To paraphrase his findings, he suggests that the social responses of groups during famine occurs in three phases. The first phase is **alarm**; the second phase **resistance**; and the third phase **exhaustion**. These phases roughly parallel the **General Adaptation Syndrome** of Selyé which he postulates that all organisms go through under conditions of severe stress. Stated another way, there is initially an alarm or "fight or flight" reaction, in which the hormones from the adrenal gland play an important role; this is followed by a second stage in which there is an attempt to conserve all of one's bodily resources; this, in turn, is followed by a third stage when exhaustion and death occur. These are remarkably parallel to the physiological changes occurring during starvation.

Starvation at the earliest stage increases anxiety, which draws people together, creating a volatile situation. Signs of this can be mass emigration and glutted markets with sellers seeking some return before all is lost.

Irritability, excitablity, nervousness and restlessness grow as starvation progresses. Organized violence and/or rebellion are most likely to occur during this early alarm stage. The alarm reaction can be based on a real or perceived food shortage. It certainly figured in the recent toppling of the 2,000-year-old Ethiopian monarchy, as well as in the 1978 price-of-rice riots in Monrovia, Liberia, the repression of which led to the overthrow of President Talbot's Government.

Gravely undernourished people are generally not revolutionary, however, because they are too preoccupied with their own survival. Theft and robbery, on the other hand, appear with greater frequency in the resistance stage, because people have neither time nor energy to pursue unrewarding courses of action.

Simultaneously with going through these stages, "the range of compassion is progressively decreased — from the community to the family to the individual." This has been pointed out by Dirks and by the Jelliffes in their commentary on Dirks' article.

Put another way, "as starvation presses in on a community, mutually helpful behavior disappears"; the weak, i.e. the elderly and young pre-school children, are neglected and left to die; older children and adolescents often form foraging and bandit gangs and can be quite

ruthless in their efforts to obtain food. Old folks are deliberately not fed, and mothers will sometimes take food away from the mouths of their infants.

Turnbull's description of the Ik is an example of this type of behavior. Also, Murray points out that in the Ethiopian and Somalian family shelters in the Ogaden in 1976, aged people were "neglected, ill fed, ill clothed, and often sick and left to die in their separate and poorly constructed dessas."

Also, some of the newspaper accounts of food-related behavior in Uganda would suggest that they are presently, i.e. mid-year 1980, in the exhaustion stage of their famine. As the Jelliffes expressed it in their commentary, "the social creature, man, has been replaced by the individual, hellbent and determined to survive."

Production, Processing and Preservation of Food Staples

Hans Guggenheim and Ray Pariser

The purpose of this paper was to discuss the production, processing and preservation methods of some of the food staples that are of importance to rural Africa and are relevant to famine-prone areas and populations. A further purpose of this discussion is to provide support for the recommendation that famine-prone populations be identified and characterized, that strategies be developed and implemented to improve the local storage conditions of staple foods, and that famine-buffer food reserves at the local village level be created.

The single most important natural factor in the causation of famines now, as it was in ancient times, is water: too much of it, too little of it, or poor water quality which can lead to the dissemination of disease.

The single most important mad-made reason, on the other hand, for the outbreak of famines in the modern world is not an overall shortage or inappropriateness of food supplies, but the unequal and inadequate distribution and re-distribution of existing world food stocks. Since the farmer has no control over either of the above factors, it is essential that, if he and his family are to survive food shortages, strategies be developed to enable him to increase his food production, reduce food losses, and most importantly, ensure that any additional food he produces remains available to him. The farmer's decision to adopt a particular production strategy, to sell and oversell food stocks, or adopt certain storage policies are predicated upon prevailing macro-economic conditions that are also often responsible for increasing the risks of food shortages at the local level.

Despite individual differences, certain food crop production, processing, and storage practices are characteristic of the majority of farmers anywhere in the developing world. In general, his primary goal is to ensure his family's minimum food requirements; therefore, production methods are used that minimize the risk of failure rather than produce a surplus that can be marketed. The self-sufficiency of each household through crop diversity is stressed. Inter-cropping of annual field plants or of field and tree plants, such as rice, cassava, maize and plaintains, is more characteristic than cropping in pure stands; pure cropping is practised only when the soil is so poor that it can be used only for tolerant plants, such as cassava or millet, or in the opposite case, when the plant is profitable but draws heavily on

soil fertility, such as cotton. The need for an increased food supply is normally achieved by expanding the acreage already cultivated.

There are three elements that are relevant to any famine outbreak and that should therefore be of concern in any attempt to counteract such disasters. The first element is famine-prone areas about which little is known. These areas should be evaluated for such historical data as rainfall, soil characteristics, and production statistics. Such analysis may lead to an improved local infrastructure and/or the reforestation of the area.

The second element to be examined is famine-prone populations. Such demographic information as population density, mortality, and morbidity rates of infants, women, and old people, and epidemiological conditions is valuable. We should, moreover, also look at income, exchange entitlements, employment statistics, etc., especially in urban environments where only certain subgroups may be hit by famine.

We will probably discover that famine-prone populations comprise the poorest groups in the rural areas whose ability to provide an adequate food supply is marginal. It is among these groups that productivity is low, and that traditional techniques to protect crops are often poorly practised.

The third element to be considered in famine prevention is famine-prone crops. This element typically involves food crops such as millet or cassava that are characterized by low productivity, are limited in protein quality, and are possibly deficient in other nutrients. Conditions typical for mono-culture cash cropping, including cotton plantations, would fall into this category also. Here, all the effort is concentrated upon the cash-producing crop, which is hardly ever used for human consumption. A careful look at famine-prone crops appears to be most valuable in fairly large regions where food deficiencies could be overcome by production strategies such as diversification of traditional production patterns, by the reduction of food losses (pre- as well as post-harvest), and by the development of better food reserve strategies.

There are several widely accepted foods which could be instrumental in the building of reserve stocks as buffers against food shortages, These foods, cassava, yam, millet, and fish, have important famine-related characteristics. All except fish have a low protein content, so that any crop failure will rapidly cause a protein shortage. All except yam and millet present serious unsolved storage problems. Millet production is directly dependent upon rainfall. Cassava contains a toxin that has to be eliminated. Fish that is spoiled or insect infested can represent a serious health hazard. Yams appear to be the most likely candidate as a food reserve staple.

Food Losses during Storage

Ray Pariser

The crops on which many African populations depend are mainly cereals supported by starchy fruits and tubers. Generally there is a main crop and a supplementary crop, but there are regions which have only one crop. Such regions must be considered as most vulnerable to famine. The harvest is never very predictable and in most instances pre-harvest food shortages are a way of life. Though there is less than 5% of food loss in some regions, other regions have a post harvest loss of over 25%. The actual spoilage or wastage is theoretically enormous because of the rather early overconsumption of food when the harvest is gathered. The psychology of "eat as much as you can while it is still available" prevails.

If the rural farmer is to survive food shortages, it is essential that strategies be developed to enable him to increase food production, reduce food losses, and to ensure that any additional food produced remains available to him. In spite of advances, it is unlikely that new production techniques will have a major impact on productivity in the near future. Loss reduction and the gradual build-up of buffer stocks could be the most cost-effective approach to famine prevention.

The best approach is to define the famine-prone areas and the famine-prone populations. The famine-prone populations comprise those poorest groups in the rural areas whose ability to provide an adequate food supply is marginal and usually strongly dependent upon environmental conditions. It is among these groups that productivity is low, and that traditional storage techniques are often poorly practised. An appropriate village-level technology is needed to meet the storage problems related to the physical characteristics of the stored crop. Even in areas where losses are relatively low, it may become significant where the amount stored is less than enough to carry a community through a more devastating loss.

The problem of storage losses is at the level of these minute quantities which push people into starvation and populations into famines.

An analysis of such famine-prone areas and their characteristics might lead to the development of an improved intra-structure: roads, markets, water-storage facilities, etc. Even higher losses are reached as the food products are distributed through inadequate means of transportation over poor roads. For these reasons storage at the local level needs to be developed.

Food Distribution and Dependency

Naomi Baumslag

Famine is an acute crisis calling for immediate action. In many countries there exists a state of chronic famine called chronic malnutrition which receives little attention and is not perceived as alarming until some additional factor tips the balance. This chronic starvation then becomes acute and mortality rate rises rapidly. It becomes a media event with political overtones – indicative of the subjectiveness of the definition of famine.

In spite of food aid, chronic malnutrition is still prevalent and infant, child and maternal mortality rates remain high. The incidence of low birth weight infants, an indicator of maternal nutrition, is also elevated, reaching levels of 20-30% of newborns.

Food distribution programs can lead to dependency. Food aid has been given with good intent but in a paternalistic manner, creating a subordinate relationship between the donor country and recipient nation or the agency and the patients.

In feeding programs dependency is created in a variety of ways. One way occurs when there is no calculation of the amount of food needed. Tremendous amounts of food and money are wasted as a result of a mistaken diagnosis. Food aid may be provided for political visibility even when it is not really needed. In Guatemala during the earthquake, there was a threefold increase in food mobilized despite the fact that there had been a good harvest and food was neither needed nor requested. The major effects of these generous food handouts were to drive local food prices down by 30%, and to promote a disincentive to work in the fields.

A second way that food aid can cause dependency is through redundant importation which changes local dietary patterns and social customs. This most dangerous type of food aid acts to replace inadequate food resources with imports instead of supplementing these resources. The classic example of such programs is infant formula feeding. Serious problems arise from inappropriate use and distribution of infant formula. Breast-feeding in the first four to six months is superior to formula feeding in every respect. It is ten times cheaper to feed the lactating mother than it is to formula feed the infant. In times of famine, the cost of supporting infant feeding can contribute to a formidable national debt, which can, in turn, cause a state of dependency. It would be preferable to supplement the diet of pregnant

and lactating women.

Other significant problems may occur from habituation. Highly refined foods may be brought in that have not been fortified, causing new deficiencies that appear later. Unfortified skimmed milk has been blamed for a considerable amount of childhood blindness (vitamin A deficiency) in Indonesia. Lactose intolerance is another factor which decreases the benefit of milk supplementation.

Individuals may acquire a taste for foods they can ill afford, but the net result may be an even lower caloric intake, e.g. substituting costly foods like bread for cassava or imported Norwegian sardines for local fish. This type of dependency on imported foods mitigates against the use of local products.

Food distribution attracts people to the clinics. In fact, it is often the focal point of the clinic. Clinics become food distribution centers where the workers are occupied with food rations rather than educating or treating the cause of the malnutrition.

Food supplementation may also obscure the need for a clinical diagnosis of malnutrition by providing just enough calories to appease the stomach and postpone medical attention. The ultimate result is a more depleted state with a much later and more serious diagnosis of malnutrition.

The importation of foods tends to relieve local governments of their rightful responsibilities for administration (continuous supervision), staff, transport, and provision of other commodities. It places these duties in the hands of temporary relief agencies.

Food for medical purposes such as emergencies and specific nutritional deficiencies for target populations can be effective. Short term food aid is useful in times of disaster and when a proper diagnosis has been made.

The only rational successful method of food distribution is one which emphasizes the following factors: (1) Local self reliance. (2) Decentralization. (3) The strengthening of the regional economy and security. (4) Integration with programs which make full use of education, nutrition, health and hygiene.

Nutrition Surveillance and Famine Relief

Mary Ann Anderson

Nutrition surveillance is the monitoring of various indicators in the nutrition system which directly or indirectly affect nutritional status in order to detect trends in nutrition over time. These indicators include agricultural production, income, food prices, rainfall, food distribution, food consumption, and actual nutritional status data. Particular emphasis is given to monitoring the nutritional situation of vulnerable groups, such as pregnant and lactating women and preschool children. To date, the existing nutrition surveillance systems have concentrated on the collection of anthropometric and health data with the near exclusion of economic and agricultural data.

Nutritional status data can be a very valuable tool in screening communities and individuals to determine the need for food assistance and to evaluate whether a relief effort is having an impact. An efficient nutrition surveillance system is simpler, less expensive, and more objective than other models.

However, there has been considerable debate on what, if any, role nutrition surveillance systems based on anthropometry should play in famine preparedness. The charge that nutritional status indicators are ineffective as predictors of famine is based on the fact that once high rates of malnutrition have occurred, famine is already underway. If we want an early warning system for famine in order to be able to respond before starvation begins to stunt growth, then certainly we must choose indicators with greater predictive capacity than anthropometric measures of nutritional status.

For a complete nutritional surveillance system, health data must be integrated with agricultural data. Yet agricultural production, per se, does not guarantee adequate food consumption by the poor. Therefore, monitoring nutritional status is important for two reasons:

1. Since one of the themes of the Conference is prevention of famine during normal times, monitoring growth in individual pre-school children may be a very effective means of preventing children from becoming severely malnourished. This early warning system allows early intervention so that the population most vulnerable is less at risk when famine strikes. In pregnant women, weight gain for prevention of low birth weight should be monitored. On-going growth surveillance of children and pregnant women

should facilitate the instruction of the importance of diet to mothers.

2. During famine, suitable methods must be adopted for the rapid, objective measurement of nutritional status. The common procedure for measuring malnutrition includes:
   (1) **Initial assessment**, which is a rapid survey of the population before initiating a relief program in order to identify the areas or groups that are most affected.
   (2) **Individual screening**, defined as body measurements which may be used to select the malnourished individuals eligible for relief for themselves or for their entire family.

3. The third reason for nutrition indicators is to monitor the changes in entire communities to determine differences in nutritional status among various population groups over time. Thus, priorities among communities may be made in the distribution of relief.

4. Nutrition indicators provide a means of evaluating the efficacy of relief programs and deciding when to stop relief. In an emergency, acute malnutrition is of prime importance; chronic malnutrition being of less concern. Weight for age is not as useful a parameter as weight for height, but can be used to measure changes over time in individual children. Arm circumference is another good tool to measure wasting. In kwashiorkor-prevalent areas, edema rates are a valuable indicator of extreme protein malnutrition.

Certain other parameters should be monitored in nutrition surveillance. Since protein-energy malnutrition is associated with increased mortality among young children, infant mortality rates should be noted in relief areas. In addition, the presence of diseases associated with protein-energy malnutrition such as measles, diarrhoea, and whooping cough, should be recorded. One should also determine whether the children are being breast-fed or bottle-fed.

Results of surveys and surveillance must be interpreted with caution. They can be misleading unless the individuals measured are representative of the whole population and the measurement techniques are standardized and properly utilized. Data collected weekly at health care facilities indicate changes in the number of cases receiving care, but only represent those patients who feel that they need medical attention and who are physically able to attend the health care facilities.

A random sample survey is needed to test the accuracy and representativeness of nutrition surveillance data in the population at large. Local auxiliaries can be temporarily recruited and trained to carry out the surveillance of simple signs, symptoms and indications of malnutrition at the camp or village level. A great effort should be made to train workers to measure children accurately, as small errors can lead to misclassification of the child's nutritional status. All equipment should be checked for accuracy.

Under most circumstances the nutritional status of preschool children can be taken to reflect the nutritional status of the community as a whole. Exceptions may be found in cultures where the feeding of children takes precedence over that of parents. In those cases, weight for height can be used to evaluate adult nutritional status.

When body measurements are used as criteria for selecting beneficiaries in a relief program, the cut-off points for defining eligibility

must be carefully defined so that the number of people selected for relief is realistic, regarding the resources available. A rough estimate of the proportion of malnourished children in a population can be quickly made by measuring a random sample of 200 children. The population to be screened should be carefully chosen with outreach to homes, because people attending relief centers are not necessarily the most needy.

FAO Early Warning System

Michael Frere and Ram Saran

The impact of most national disasters could be minimized if it were possible to warn the potential victims to take defensive actions. The Early Warning System of the FAO is one which monitors on a continuous basis, the world supply and demand conditions for basic foods and key agricultural inputs such as fertilizer. The system also identifies countries where serious food shortages and deteriorating nutritional conditions are imminent.

The system monitors weather conditions and production prospects relevant to the food situation. Variables to be watched are chosen for each particular food supply system. Such indicators include: climate, rainfall, temperature; water – quality, quantity and evaporation rates; crop production; prices, marketing, stocks, procurement and imports.

In the future, satellite remote sensing may be used to collect data on the areas of interest from developing countries, but for now, more "ground-work" is necessary. Measures must first be taken to improve or establish the early warning system at the national level based on the analysis of the data readily available. It is suggested that regular meetings of a coordinating unit and a monitoring group consisting of representatives of data collection and analysis agencies be held in the countries to plan and pull together data. To improve the effectiveness of the national systems, steps should also be taken to fill data gaps and adopt new approaches of analysis such as agricultural and meteorological crop monitoring and forecasting.

In an effort to improve and strengthen the capability of planning a response, donor countries and international organizations should take steps to improve and strengthen assistance to interested countries to set up national early warning systems. A system which presents information to planners in time for them to take preventive action is made up of: (1) a data generating system; (2) a processing system; and (3) a presentational system.

Decision Support Systems for Famine Prevention and Control

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National programs aimed at preventing and controlling famines depend for their success upon their capability to identify and describe high-risk population subgroups, to determine the characteristics of the target population which are most sensitive to adverse changes in factors affecting nutrition, and to predict the likelihood of such adverse changes. Another success criteria for famine programs is the identification of an intervention strategy appropriate to the circumstances and under the operative constraints of available time, resources, and cost trade-offs.

In practice, the factors which serve to make some population segments prone to famine conditions are the same factors which deter national famine prevention and control programs from working effectively. As the famine-prone population becomes increasingly unresponsive to social-environmental rhythms, their behavior actually becomes less visible through routine methods of surveillance. In addition, as this population approaches a high-risk state, there is increasing uncertainty as to what specific event or combination of events might constitute precipitating factors for a famine. It has been shown that minor fluctuations when combined result in synergistic effects.

Regarding famine as a social phenomenon implies special requirements for a national famine prevention and control program. In addition to information gathering, the interpretive assistance of a formal computer-based model is also needed to provide efficient synthesis of incomplete information for rapid decision-making purposes. These surveillance and analytical components should be explicitly integrated in an action alert framework.

Effective famine prevention rests on such kinds of information as baseline characteristics of significant population clusters, dynamic or discrete sporadic climatic, economic and nutritional events, and combinations of minor fluctuations. However, data on these dimensions will always be imperfect, due to difficulty in surveillance processes, gaps in information, and diversity of observational perspectives. Thus, available information should be supplemented by the interpretive assistance of a formal model, which would contain detailed knowledge on the life-cycle(s) of famine.

The evolution of famine conditions for hypothetical populations can best be represented in the form of mathematical algorithms in a

computer-based model. This form permits simultaneous characterization of multiple complex mechanisms which constitute these conditions. Such a formulation also permits explicit treatment of combinatorial and multiplier effects resulting from gradual changes. Additionally, it provides an instrument for synthesizing approximate descriptions of otherwise invisible populations and events.

Typically, such a model might contain predetermined estimates of parameters and the weight to be given to particular observations and other features. An information dissemination system for national, regional, and global authorities can flow from this model and action alert framework. Such a system can provide disaggregated information inputs to responsible ministries at the national level and critical information to international agencies.

FAO's Global Information and Early Warning System provides a useful point of departure for a national famine prevention and control system. This synaptic surveillance system could be utilized to benefit the famine area if combined with a complementary "bottom-up" information gathering infastructure. The principles characteristics of such an infrastructure include the following: information gathering, analysis, and training centers; trained observers selected from indigenous populations, training and information gathering material, and communication channels for cycling information upwards to national policy-making centers.

Especially in the case of famine, the number of indicators used, the variety of information sources, the role of qualitative judgement, and the criticability of timeliness in analysis time, mark a high level of complexity in analysis. Yet, the resultant analyses must be presented in a form which permits rapid decision-making, on the need for, and type of intervention required. For these reasons a formal computer-based complex model seems most appropriate to famine prevention and control. This model should generate findings in formats that are readily interpretable, allow for fast action, and indicate possible consequences of interventions.

The model may involve a two-stage analysis process which would provide both simple and complex analyses, depending on the extent and character of field reports. The first stage is a preliminary screening of field reports. In the second stage of analysis, the problematic cases reported are combined with other statistical data and related information, to assess the likelihood of a famine risk, in one or several population groups.

An organizationally distinct national program should be developed for efficient and effective prevention and control of famine. Such a program should function as a nationwide information gathering and dissemination infrastructure, with analysis and evaluation of famine risk. It also should serve in an action alert framework to structure the provision of recommendations for action to decision-makers, as well as in an information dissemination capacity to provide feedback to cognizant organizations.

It is recommended that national centers be built for developing nationwide information gathering and dissemination infrastructures. Characteristics of the centers should include the following:

1. A research and analysis component
2. Training facilities
3. Field centers
4. An outreach program for early remedial action
5. Information dissemination and communication.

The centers should also have, among their missions:

1. Identification of critical flash points for the target populations with the use of predictive models.
2. Provision of an interface with other national institutions on necessary and appropriate intervention strategies.
3. Provision of interface with FAO's Global Information and Early Warning System.
4. Development and maintenance of the nationwide information gathering infrastructure.
5. Provision of assessments of the need for specific national or international interventions.
6. Assistance in the planning of such interventions.

The U.S. President's Commission on World Hunger

Tom Stephens

The President's Commission on World Hunger's report deals with the urgency of the world food crisis and the challenge to the U.S. of the elimination of hunger. It emphasizes the point that because of population pressure and mismanagement of resources, in twenty years the food crisis will be greater than the energy crisis.

The major recommendation of the President's Commission is that the United States government make the elimination of hunger the primary focus of its relationship with the developing countries beginning in the 1980's. The major concern of US Development Assistance Programs in the 80's should be towards emphasizing self-reliance rather than dependency or self-sufficiency. The distinction is as follows: Saudi Arabia, because of its oil revenues, would be considered self-reliant in food. This is because they can buy as much as they want. Other nations are also self-reliant, but not necessarily self-sufficient.

Some of the points brought out in the analysis of World Hunger and the role of the United States can be summarized*:

A. The United States should be involved for several reasons:

(1) we have a moral responsibility;
(2) crucial for global and national security;
(3) economic self-interest in avoiding the disruptions in the international economy.

B. The major world hunger problem today is not famine or starvation, but chronic undernutrition.

C. Poverty is the root cause of hunger today.

D. Unjust economic arrangements both within countries and internationally lie behind hunger and poverty.

E. Lasting solutions to world hunger require rapid, equitable, self-reliant and environmentally sound economic growth, with emphasis on a strong agricultural base and the maximum employment of labor.

The Commission then applies these points towards specific issues and recommendations, calling for a United States policy response.

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*From Arthur Simon, A Look at the Report, Background paper #46, Bread for the World Org., June 1980 (52 Union Square E., New York, NY 10003, USA).