Management of Famine Relief

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The history of man is punctuated by frequent famines (*1*). There has been a serious famine somewhere practically every year since the end of World War II (Fig. 1). Nearly every one has been dealt with, nationally and internationally, as if the phenomenon were a totally unexpected crisis to be handled in an improvisational manner, with whatever personnel and supplies might be contributed on an ad hoc basis. It is as if mankind automatically obliterates the memory of famines as soon as they are over.

We cannot continue to proceed on this reactive, improvisational basis. The taut international food situation—brought about by the accelerating population explosion which has added 1 million people in 10 years, the bad crops of 1972 and the consequent elimination of cereal surpluses, the limitation of seafood catches due to overfishing and pollution, and the quintupling of the price of oil (the basis of irrigation and agricultural power and of the manufacture of nitrogen fertilizers, herbicides, and pesticides)—means that any future large-scale crop failure will be that much more difficult to deal with. The improvement in communication and a slow but unmistakable improvement in world ethics also argue for the development of a doctrine to deal with future famines.

Causes of Famine

Almost all recorded famines have resulted from widespread crop failure. (A notable exception was the Great Plague of 1345 to 1348 in Europe in which 43 million people are said to have died. In that instance, the massive epidemic came first, totally dislocating society and bringing on famine.) These crop failures in turn may be caused by drought, crop diseases or pests, the impact of war or civil disturbance, or a combination of disturbances hitting both crops and farmers, such as floods or earthquakes. All of these four sets of causes have been at work in the famines that have occurred since 1950 alone: flood, drought, and civil disorder in India and Pakistan; locusts and earthquakes in the Middle East; floods and dislocation of the agricultural system in China; earthquakes in Latin America (including the recent Peruvian disaster); and drought and civil war in Africa (the Sahel, the Congo, and Biafra) (*2*).

Each of the four primary causes is still operative. It is unfortunately reasonable to expect more famines. For example, in the case of the first and most frequent cause, drought, there are large areas of Africa, South America, India, and China (and, for that matter, North America and Australia) where rains fail periodically. In a dry year, rainfall may be 80 percent less than the secular average. (By contrast, in western Europe or New England, a dry year differs from a wet year by less than 20 percent.) Often, these drought years alternate with years of flood when gigantic continental rivers, swollen by excessive rains in the mountains where they originate, burst their banks and destroy all crops.

In many of those areas of periodic rainfall, the situation has been made worse by erosion. The Middle East and North Africa are examples. In the course of thousands of years extending from the dawn of civilization to the end of the Roman Empire, thousands of small and medium-sized dams were built in that area, which, together with Sicily, was the granary of Rome. With the decay of the Empire, in the course of the Arab invasion, and finally through the ravages of Tamerlane, the dams were destroyed and the irrigation canals abandoned. Desert now covers what had at one time been one of the great cities of the world: the capital of Cyrus and Darius is now a mound of sand. The second largest theater in the Roman Empire stands in the Libyan desert as a reminder of how drought, erosion, and famine can destroy seemingly permanent civilizations. More recently, northwest India and the Sahel offer us striking examples.

Whatever the primary cause of famine, the situation is exacerbated by lack of communication and social inequality. Certain areas such as that bordering the Sahara to the south or the Altiplano of Bolivia are particularly vulnerable to the former. All poor countries are examples of the latter. In as wealthy a country as Britain in 1935, with an average caloric intake of 2000 kilocalories, at least 10 percent of the population received insufficient calories and the diet of 40 percent of the population was demonstrably too low in certain vitamins. Obviously, in a poor country such as Egypt, where biblical farming methods can be seen in operation 3 kilometers from the modern capital of Cairo, social inequalities are even more acute.

Physiological and Psychological Effects of Famine

The first and most obvious effect of starvation is the wasting of fat deposits; both the subcutaneous adipose tissue and the deeper fat pads are affected. Abdominal and thoracic viscera are affected next; the liver size is drastically diminished, the intestinal mucosa is thin and smooth and loses some of its absorptive capacity, with diarrhea resulting. Gastric achlorhydria is generally present; the heart shows a "brown atrophy" characteristic of starvation. Blood pressure falls; in some cases the diastolic pressure becomes difficult to estimate, and the systolic pressure may be as low as 75 mm-Hg. The pulse rate may fall below 40 per minute. Edema generally occurs ("famine edema"), as the amount of extracellular water does not decrease correspondingly as body weight decreases. Causes of famine edema are not yet clearly understood and may be multiple. They may include a disruption of osmotic tension in blood (plasma albumin is generally, although not invariably, decreased); a fall in tissue and intestinal tension, due to lack of elasticity of the skin (which becomes too big for its content); renal disturbances (nocturnal polyuria is a frequent effect of starvation); and endocrine disturbances (failure of production of male hormones and, conversely,

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deficient inactivation by the liver of estrogens and antidiuretic hormone). In women, amenorrhea, and in men, impotence and loss of libido are early effects of starvation. Gynecomastia is seen in young males. Hair is dull and staring; in children, abnormal "lanugo" hair grows on the forearms and the back. The skin acquires the consistency of paper: it is dull, gray, and inelastic and not infrequently shows the irreversible dusty brown splotches that are one of the permanent stigmata of starvation. In extreme cases, cancrum oris appears, destroying the lips and part of the cheeks.

The psychological state deteriorates rapidly, and the individual becomes obsessed with food, mentally restless, physically apathetic, and self-centered to varying degrees, the extremes being murder and cannibalism.

Decreased caloric requirements due to decreases in body weight, basal metabolic rate, and activity may eventually cause a plateauing of body weight. In a sense, one might say that "adaptation" to starvation is as much behavioral and social as it is physiological. A precarious equilibrium (a better description than "adaptation") may thus be created which can endure for several weeks or even months. The terminal event is usually intractable diarrhea generally reported as infectious but in fact due to the gut becoming essentially nonfunctional. Cardiovascular collapse can occur; infections also take their toll of weakened organisms. In infants, progressive starvation is similar to marasmus (*3*).

There is a sharp difference between a state of chronic starvation, which is endemic in some sections of certain populations, and a true famine. However precarious their previous state of nutrition may have been, the people involved feel and act differently in a famine; they become acutely conscious that something of a different order of magnitude is happening.

A true famine is unlike anything else. In statistical terms, it can be defined as a severe shortage of food accompanied by a significant increase in the local or regional death rate. In a chronic starvation area people may suffer or be crippled mentally and physically; in a true famine they die in large numbers.

The number of deaths is a good index of the severity of the famine, and a drop in that number an indication of the effectiveness of the measures employed in combating it. It has been observed repeatedly that in famines old persons and young children die first, and that women and adolescents tend to survive better than men (although adolescents suffering from prolonged undernutrition are particularly susceptible to tuberculosis). For purposes of dealing with a famine, "old age" starts at about age 45 years. From then on, there is a drastic increase in mortality as compared with adult men and women below that age.

A second and dangerous consequence is the state of social disruption, including large-scale panic, that usually accompanies a famine. Generally, people who are starving at home tend to leave if they can and march toward the area where food is rumored to be available. As a result, families are separated and children are lost. The small children often reach a suicidal state of mind from self-inflicted starvation, refusing to eat because of their grief at the absence of

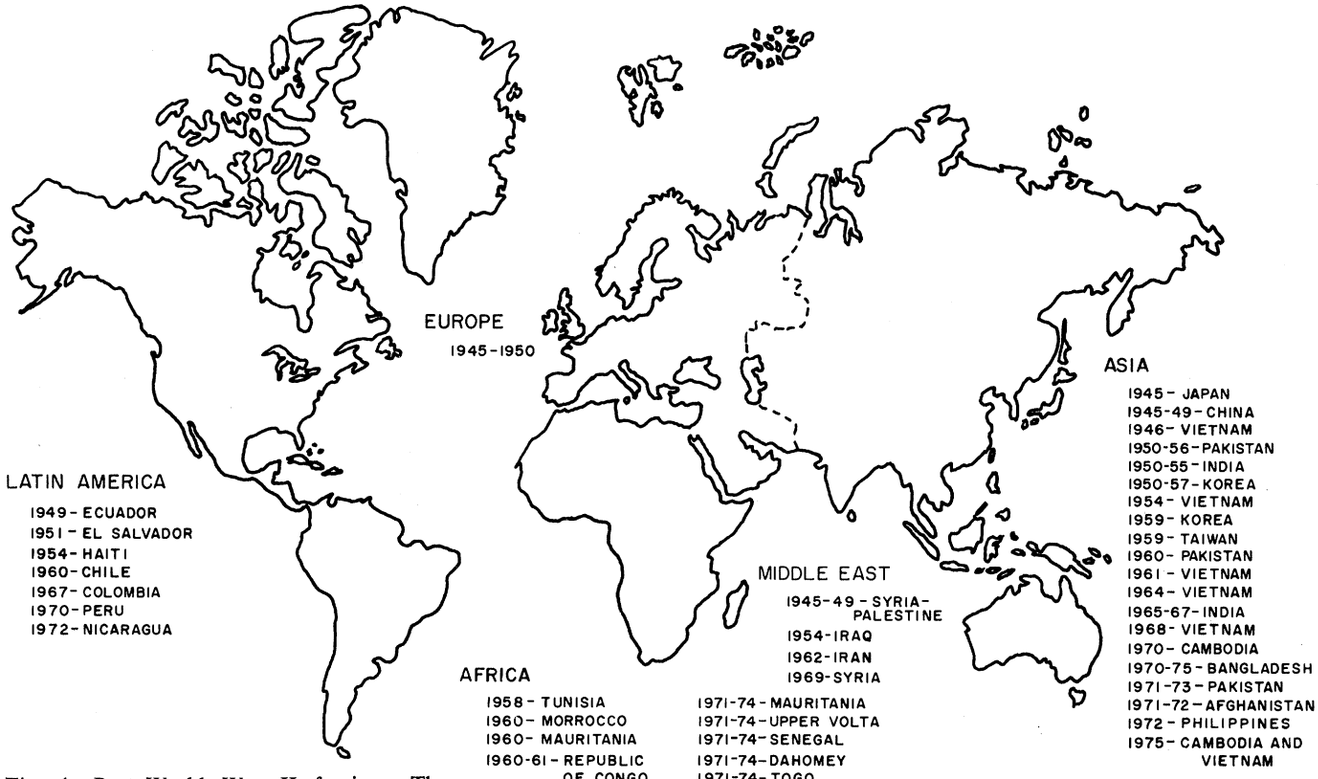

Fig. 1. Post–World War II famines. The names of countries and years where a famine existed are listed. In Europe, 1945 saw famines in western Holland, the Nazi concentration camps, and vast areas in eastern Europe and the Soviet Union. Eastern European famines did not end until 1950.

their parents. Adolescents, finding themselves on their own, band together in foraging gangs that create further disruption. (Prolonged and successful practice of banditry also makes members of these gangs difficult to rehabilitate when the famine is over.) This breakdown of the social order makes any relief measure that much harder to put into effect.

Contrary to popular belief, however, famines (and for that matter, prolonged severe undernutrition) are rarely accompanied by revolution. Gravely underfed people are usually too feeble and too preoccupied with problems of immediate survival to summon up the energy, single-mindedness, and organization required to initiate and follow through with a revolution. The type of disruption accompanying famine is more likely to entail a large number of unconnected antisocial acts or, at most, regional jacqueries. In turn, revolutions are more likely to take place when food has been available for some time, but while the memory of actual or supposed corruption or incompetence shown by the government is still fresh. The experience of flood in Pakistan in 1970 contributed directly to the secession of Bangladesh in 1971.

A third common catastrophic result of famines is the spread of epidemics (*4*). The combination of physiologically weakened human organisms and a disrupted social organism, with the attendant breakdown of public health institutions and crowding, lends itself to the explosive spread of infectious diseases. Louse-borne typhus has been the traditional postfamine disease of Europe, and cholera and smallpox, the postfamine diseases in Asia, although plague, influenza, tuberculosis, relapsing fever, and many other diseases have also followed famine. When famine is due to a drought, malaria is not usually rampant at the same time, but is often deadly on a particularly large scale when the rains finally come.

One last, long-term consequence of many famines is the death of large farm animals, often on a greater scale than that of humans, and the destruction of seeds for future crops, which makes it more difficult for farming to return to normal when the famine is over (*5*, *6*). If one is to speak of coping with famine, one must include the follow-up measures to restore the food supply and rehabilitate the area—or, if this cannot be done, to resettle the population elsewhere.

Famine Relief

The most immediate problem in a famine is to have a clear picture of the situation. With much of the structure of society broken down, with rumors flying (governmental sources generally minimizing the extent of the catastrophe and antigovernmental sources exaggerating it), it is often difficult to know where the most pressing needs are and what the scale of the need is. Certification of causes of death may be incomplete and late. The most enfeebled persons—children and oldsters in particular—may be staying indoors so that the casual observer, seeing only ambulatory adolescents and young adults, may not realize the scope of the disaster. All administrative, medical, and social agencies must be utilized to gather and check statistical information. Hospital and other health agencies must be asked to report causes of death as fast as possible so that any increase in numbers of deaths due to starvation and the appearance of any deaths from epidemic infections can be detected early.

The basis for relief is to obtain and make available sufficient food to stop the developing famine, maintain the population in body weight balance, and eventually rehabilitate the population (*7*, *8*).

An estimation of the duration of the famine should be made as quickly as possible, as its length will influence the type of food policy adopted. In the event of a short-term famine, it may be better to provide whatever food is available, whether or not it is nutritionally ideal. In a medium or long-term situation, the food policy must be based on meeting the needs of the population, with the specific goal of correcting or preventing (or both) the development of deficiency diseases.

The procurement of this food requires not only buying it—or otherwise acquiring it on a governmental level—but also its transportation, safekeeping, and distribution. In spite of the efforts in the late 1940's by some of the leaders of the Food and Agriculture Organization of the United Nations, such as John Boyd Orr and Andre Mayer, a world food bank or regional food banks for emergency situations have not yet come into existence. Although the 1974 World Food Conference recommended a type of international banking system, its actual creation must await the reconstruction of reserves, particularly in the United States and Canada. While there is thus no universal and automatic pathway for famine relief, the potential availability of surpluses of cereals in the United States, Canada, France, and other countries (perhaps as a result of changes in consumption patterns whereby transformation of cereals into animal feeds is reduced) makes relief a possibility. But in spite of the creation in the past of such national organizations as Food for Peace in the United States, and at present of the (paper) U.N. International Disaster Relief Organization, the actual process of relief is still usually slow, cumbersome, and inadequate.

Distribution of available foods has historically been carried out by various means. In the 19th century and the first half of this century, attempts were often made to improve the situation indirectly by making money available to the starving populace through public works projects and by conveying food to the merchants through the normal channels of trade. This policy, consistent with Adam Smith's laissez-faire philosophy, was moderately successful in dealing with local, foreseen shortages. It failed miserably in large-scale disasters such as the potato famine in Ireland or the World War II Bengal famine. It helps least those groups—the very young and the very old—that are most vulnerable. The energy expenditure of men involved in the public works is increased not only through the caloric cost of manual labor but also because such works—usually road-building—take place at some distance from their homes. The work is rarely useful—roads lead "from nowhere in particular to nowhere in general"—because important public roads and other projects necessitate careful planning and can rarely be devised and executed properly on the spur of the moment.

Price control is an essential measure in any famine situation. It has to be vigorously enforced. Otherwise, high prices discriminate against the persons most in need. Furthermore, price inflation creates a motivation for traders to withhold food at what would otherwise be the end of a famine in the hope of perpetuating high prices.

In practice, the distribution of commodities and public kitchens have proved the most valuable, particularly if care is taken to allow such food to be distributed under supervised conditions to the patients too enfeebled to leave their homes.

Medical services must be decentralized as much as possible. The creation

Table 1. Caloric allowances in famine area. The emergency subsistence allowance would arrest the downward program of undernutrition leading to social disintegration and mass deaths. The temporary maintenance allowance would not permit rapid recovery but would maintain the population in a reasonable state of health and permit slow recovery.

Age, sex, and occupation	Emergency subsistence (kcal)	Temporary maintenance (kcal)	Normal and rehabilitation allowances (kcal)
0 to 2 years	1000	1000	1000–1200
3 to 5 years	1250	1500	1300–1800
6 to 9 years	1500	1750	1900–2300
10 to 17 years	2000	2500	2400–3000
Pregnant and nursing women	2000	2500	2200–3000
Normal consumers (sedentary)			
Male	1900	2200	2400–2700
Female	1600	1800	2000–2300
Moderate labor	2000	2500	2500–3000
Heavy labor	2500	3000	3000–3500
Very heavy labor	3000	3500	3500–4000

of small "famine hospitals" in large numbers, even though they may be staffed only with auxiliary personnel and medical students, has proved to be invaluable in checking panic, vaccinating, delousing, disinfecting, distributing insecticides, informing the administration, and taking care of the greater number of the starving sick. The existence of a large but distant hospital is an invitation to migration and makes relief difficult. The utmost attention must be given to preventing and checking epidemics.

Finally, law and order have to be maintained to prevent looting and other abuses. This often means that the police units have to be given preferential treatment with regard to food distribution.

Treatment of Starvation

Any available, acceptable food is suitable in the treatment of cases where diarrhea has not yet set in, although bland foods and skim milk should be given during the first few days, preferably in small amounts. If they are taken well, the patient can progressively be allowed to eat as much as he or she wants. Intakes of 5000 kilocalories a day, with gains greater than 1.8 kilograms (4 pounds) a week with no apparent ill effects, have often been recorded. If the patient is very enfeebled, and particularly if diarrhea is present, bland foods are a must. Skim milk, if available, is an ideal component of such a diet. Frequent small feedings of 100 milliliters at a time are a safe and effective way to use skim milk [skim milk powders are usually reconstituted at 10 to 15 percent solids (by weight)] or such mixtures as CSM (cornmeal, soybean meal, and dry skim milk). In addition, skim milk may be used to raise the protein content in a pap or gruel made of locally available grains such as wheat, corn, rice, or sorghum, or other staple foods such as manioc (cassava). Premature administration of foods such as canned meat and baked beans was responsible for the deaths of many of the World War II concentration camp inmates at their liberation. Fruit juices and glucose solution should be avoided as they are often the cause of intense discomfort. Slightly sour foods such as yoghurt or other curdled milks are usually well accepted and form a good intermediary between reconstituted skim milk and semisolid foods. If edema gets worse with refeeding, salt should be restricted as much as is convenient with the foods at hand. Table 1 gives reasonable suggestions for the caloric ration permitting emergency subsistence and temporary maintenance, as well as the generally agreed order of magnitude for the ideal allowance.

If appetite remains poor in spite of the availability of food, and particularly if low blood pressure and diarrhea persist, the prognosis is not good; intragastric or intravenous feeding must then be attempted. While success does occur and may be spectacular, it is not frequent. It is important to remember also that many treatments and drugs (such as antihelminthics) that are relatively harmless to normal patients may be "the straw that breaks the camel's back" in a starving individual.

Personnel and Organization

Obviously, the type of organization needed will depend on the type of famine: whether it is due to crop failure, breakdown of transport, or war. It is also dependent on the anticipated duration. It must be noted, however, that even under the most advantageous political conditions, in a country at peace and with a stable government, starvation causes intense political pressures. Typically, the opposition says that poor government planning is the cause of the famine, and government incompetence and corruption, the cause of its continuation. Unlike the more distant government authorities, the relief personnel find themselves in the middle of a difficult argument, in which they present the government's side to the victims while they vehemently take the victims' case to the government.

All this means only one thing: no matter what the cause of the famine, it is essential to have one person in charge of relief, and he or she should be of high enough caliber to have the needed authority, nationally and internationally. This individual's staff must reflect the complexity and number of the problems discussed in this brief review.

Intelligence. The rapid acquisition and analysis of information—death rates, hospital admission rates, numbers of persons in relief camps or at relief stations, incidence of diseases, and movement of populations—are essential. This means that enough persons with field training in statistics and epidemiology are needed, and that use must be made of medical and paramedical personnel, teachers, welfare workers, and relief workers to keep the information up to date. Computer techniques can be invaluable in this effort if the computers are manned by alert, practical-minded personnel.

At the same time, economic information is also necessary: food stocks, prospects for harvest, rolling stock and trucks, fuel, repair shops, the state of roads and communications, money in private and government hands, and prices all need to be followed closely.

Medical and public health personnel. It is essential that the key personnel be prepared to work under difficult field conditions, and to diagnose and treat those diseases which arise as the machinery of society breaks down. The main epidemics most likely to follow a famine have been noted. One of the chief reasons why some experience with or specific training for famine conditions is desirable is that physicians in a famine often have to act in a manner very different from that instilled into them by years spent in "normal" hospital situations. Usually, the physician concentrates on the most gravely ill patients first and then takes care of the less affected patients. In a famine, and particularly in an epidemic, the goal is to keep as many alive as possible, and this may mean that a severely limited amount of time and attention can be

given to desperately ill patients. The physician will have to learn to delegate much heavier responsibilities to medical students, nurses, or intelligent laymen than he or she would normally do. Here and all through the relief organization, there should be maximum use of local nationals who are still able to work.

Food and nutrition personnel. Again, practical experience or training and demonstrated imaginativeness in the field are essential. Some nutrition personnel should work closely with the medical personnel and with personnel trained in mass cookery. Others should work with the planning staff; others, with agricultural personnel.

Logistics and communications personnel. Sooner or later, transport becomes the limiting factor in relief. Maintenance personnel are as essential as logisticians and drivers; spare parts may have to take priority over food.

Economists. We have already seen the need for economists in monitoring famine (and the progress of relief). It goes without saying that while relief should never be directed exclusively by economists (to the exclusion of nutritionists and public health personnel), it is equally absurd to plan relief operations without considerable input from different types of economists.

Personnel for liaison with civil authorities. There should be particular emphasis on liaison with the police.

Rehabilitation and Development of the Area

Finally, even when the crisis is at its most acute stage, planning should be going forward for rehabilitation and even development of the area (*8*). We should be fully cognizant that relief is not always enough, particularly when the situation is not transient but is long-standing, as in the case of the Sahel. Long-term rehabilitation and development plans are essential, and it is equally essential that they not be conducted by personnel who are either unfamiliar with the local problems or too highly specialized to take the entire situation into consideration. Rehabilitation and development are interlinked; whereas at the height of the famine both untrained enthusiasts and overspecialized experts can make significant contributions under competent supervision, for these broader tasks we require personnel with a global view as well as those with a specialized competence. People with backgrounds in soil management, development economics, agricultural economics, home management, and employment training can all be useful in the rehabilitation effort.

All in all, a relief operation is an immensely complicated undertaking. In describing what is admittedly an ideal form of organization, I have left out any number of refinements that might have been mentioned. Even the fundamentals listed are extremely difficult to achieve in practice. However, even after it has begun, famine can be contained and crushed if we are prepared to deal with it. An encouraging example of coping with famine successfully is the case of the famine in the Indian State of Bihar in 1966 and 1967 (*9*).

Famine as a Weapon of War

The most tragic and unnecessary are those famines voluntarily induced by the actions of one of the belligerents through siege, blockade, or crop destruction. The fact that in all such recent efforts, the civilian population, and, first and above all, children, have been the chief sufferers without the fighting capacity of the army having been seriously impaired has been documented (*10*) for such instances as crop destruction during the United States Civil War, the Siege of Paris during the Franco-Prussian War, the blockade of the Central Powers at the end of World War I, the Siege of Leningrad during World War II, crop destruction in Vietnam, and the blockade of Biafra during the Nigerian Civil War. The use of bacteriological and chemical warfare has been outlawed by international convention on the grounds that these methods are indiscriminate. Starvation is worse. It preferentially attacks small children, pregnant and nursing women, and the elderly. It should be outlawed as well (*11*).

Conclusion

We have, over the course of time, made discoveries in compassion as well as discoveries in technology. Many problems that had been judged insoluble in the past are no longer tolerable. For many centuries, starvation was inevitable, largely because means of information and means of transportation were not at hand; the fact that there usually was more food available somewhere else on the same or another continent was irrelevant. There was no way of hearing of the famine, bringing the food where it was needed, or distributing it. We now have the knowledge to install early warning systems based on economic and on medical surveillance (*8*). Such data as weather reports, crop forecasts, food reserves and retail prices, height-to-weight ratios, skin fold thicknesses, and height-to-arm circumference ratios in children can warn us in advance of impending famine. We also now have the means to transport the food to the area of threatening or actual mass starvation. Therefore, we have obligations that did not exist in past generations. We are now also in a much smaller world from which some of our contemporaries have stepped out to look at the spaceship on which we are all traveling. The worldwide civil rights revolution of the 1960's has brought about greater realization that all human beings are born equal and must be preserved and helped. All this means not only that we must organize to prevent famines on a worldwide basis, but also that we must use the most modern technology to do so. The fact that famine often occurs in remote areas is no reason why we cannot use computers and other modern technology. The very need for programming computers, with the planned coding and feeding of data that it entails, not only forces preparedness but also obliges planners to examine responses to various contingencies. National and international training courses for policy-makers and managers of famine relief should follow.

Even if mankind brings its resources and its population into balance, a sound organization of famine relief preparation will still be needed to cope with local contingencies. Rapid agricultural advancement, development of innovative food sources, and, above all, control of population growth are necessary if famine is not to stalk all of mankind in the future.

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