

THE PHENOMENON OF FAMINE

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INTRODUCTION

As for all living organisms, the need for food is a fundamental determinant of human behavior. If obtaining food takes all available time and energy, there can be little social or cultural development. Nearly a quarter of the world's population, even today, is unable to obtain enough food for the level of activity they desire (79). Moreover, today, as throughout history, combinations of natural and man-made disasters result in hundreds of thousands and sometimes millions of persons passing through progressively more severe stages of undernutrition, to death. This phenomenon is referred to as famine.

Definitions of famine can be quite misleading if they emphasize inadequate production of food. The essential element is a relatively sudden collapse in the level of food *consumption* of large numbers of people. Starvation refers to peoples' going without sufficient food, and during famines people do so on such a large scale that mortality is high. As this review emphasizes, famine is not just the result of an extreme and protracted shortage of food, but also an economic and social phenomenon that can occur *when food supplies are adequate to prevent it*. Whatever the combination of causes, famine is characterized by suffering, emaciation, and death from a combination of starvation and infectious disease; it particularly decimates young children and the elderly. This article briefly describes instances of the devastating human experience of famine throughout history and briefly describes its causes. Particular attention is paid to the consequences of famine, both individual and social. Also reviewed are issues related to famine prevention and relief and the political dimensions of famine.

FAMINES IN HISTORY

Throughout recorded history famines have occurred with a high frequency in agricultural and urban populations, and the present century is no exception. While many of the areas in which famines were extraordinarily common have largely eliminated that risk, the total number of human beings exposed to the possibility of famine is still large. The available evidence suggests that famines began to occur when people developed the social organization and agricultural technology to live in large groups.

Hunters and gatherers, judged by the scanty archeological records and the examples of surviving primitive peoples such as the Australian aborigines and the African bushmen, were less subject to famine than agriculturalists. Although hunters and gatherers are subject to the same cyclical natural factors that affect food supplies, they have two adaptive mechanisms that are not as available to agriculturalists (83, 84). Hunters and gatherers can vary the area over which they seek their food supplies; they can consume a much greater variety of plants and living organisms when necessary; and they can exist in smaller groups, sometimes breaking their societies up into isolated bands that can range over a large area.

The earliest record, the Stele of Famine, found at the First Cataract of the Nile erected more than 5000 years ago, contains a classic description of famine (19, 26). At this time the Egyptian Ipuwer wrote: "Plague stalketh through the land. . . . Towns are destroyed and Upper Egypt has become an empty waste. . . . He that layeth his brother in the ground is everywhere to be seen."

Inscribed on the tomb of the Egyptian Ankhtifi circa 2000 BC was this comment: "All of Upper Egypt was dying of hunger to such a degree that everyone had come to eating his children" (30). The biblical seven years of famine during which the food stores of Joseph averted starvation for many¹ was about 1700 BC. In addition, ten famines in Palestine are referred to in nine books of the Bible covering a period from 1850 BC to 46 AD, and others occurring in Greece have been described in the writings of Plato, Thucydides, and Aristotle (30).

Famines were frequent in the Roman empire from 500 BC (30). When the empire began to deteriorate after 500 AD, transportation and communication regressed so much that famines increased in frequency and the poor died by the tens and even hundreds of thousands (30). Famine was certainly an important factor in the fall of the Roman empire (93, 107).

Between 501 and 1500, France alone experienced more than 75 famines. They were also frequently reported in England, Ireland, Scotland, Wales, Germany, Denmark, and Sweden. The famine of 1315–1317 affected all of Europe (58). According to Dando (30), a combination of plague, the Black Death, and famine killed one fourth to three fourths of the population of Western Europe in this period.

As conditions improved in Western Europe, they worsened for the peasants of Eastern Europe. Over 500,000 people are estimated to have died in one three-year famine that began in 1601 in Western Russia and the Eastern European countries bordering it (93). However, frequent famines continued in Western Europe throughout the Middle Ages, the Renaissance, and the Industrial Revolution. For example, in Italy in 1347 two thirds of the population are reported to have died (20). In 1438 one third of the population of Paris died. In London 20,000 died from 1257 to 1258 (20).

In Normandy alone famines occurred in 1727, 1737, 1739, 1752, 1764, 1765, 1767, 1768, and 1775. In 1778, 168,000 people died of famine in Bohemia and Poland (20). For the great famine in Ireland from 1845–1850, the best estimates are that some one and a half million persons died and another one million emigrated, mostly to North America (110).

In recent centuries Asia has been the principal famine area of the world. Between 108 BC and 29 AD China experienced 1829 recorded famines. This pattern continued, and the nineteenth century saw some of the most devastating famines of all (105). Four famines—in 1810, 1811, 1846, and 1849—in China claimed nearly 45 million lives, and nine million died in the famine from 1875 to 1878. As recently as 1920, an estimated 500,000 persons starved to death and twenty million were affected (59).

Murton (69) has tabulated the spacial and temporal patterns of famine in India for the 100 years from 1780 to 1880. All states experienced repeated

¹Genesis 47:13–26

famines in this period (41), although the last great famine in India was that in West Bengal in 1943 (43, 70). Lesser famines occurred in Bengal from 1960 to 1961 (12, 88, 89) and in Assam as recently as 1974 (6). The famine from 1974 to 1975 in Bangladesh, part of pre-independence India, was the most recent (28). There are several other comprehensive historical reviews of famine in India (57, 65).

The geography of famine has also been reviewed by Currey & Hugo (29). The worst famines of the past 20 years have been in Africa despite the undoubted capacity of this continent to produce sufficient food and despite sharp increases in the production of export crops (8, 56). The success of export production at the expense of both food production and equity and the creation of national boundaries that prevent the long-established migration patterns of nomads have made much of Sub-Saharan Africa vulnerable to famine in years of unfavorable agricultural conditions (36, 67).

CAUSES OF FAMINE

Complexity of Famine Etiologies

Contrary to popular impression, the causes of famine are varied, multiple, and complex, and not necessarily dependent on the availability of food (73, 75, 88, 98). Famines are not necessarily associated with natural calamities and often occur when overall or even local food supplies are adequate. In fact, most famines for which good historical information is available have been man-made through the effects of inequitable social systems, perennial poverty, wars, civil disturbance, transport failure, blocked migrations, political misjudgments or incompetence, panic, and food speculation. Even when droughts, floods, blights, and rodent and insect plagues precipitate the events that result in famine, they are not necessarily sufficient cause.

Famines imply starvation, but starvation occurs without famine as part of the grinding poverty of many populations. Endemic poverty and starvation are the basis on which other factors commonly act to precipitate the explosive increase in starvation-related deaths that characterize famines. Sen (89) contends that it is the loss, by reason of poverty or landlessness, of the ability of people to obtain food to which they are "entitled," that is responsible for most famine, not overall shortage of potentially available food. The reasons for this assertion become more apparent with an examination of the multiple factors involved in some of the historical famines that have been commonly attributed to natural disasters. Those associated with war, civil disturbances, and deliberate political policy are described in a later section.

Examples of Specific Famines

THE IRISH FAMINE OF 1846–1847 This great famine came after years of chronic poverty and annual hunger for the Irish peasantry, who were almost

completely dependent on the potato (37). When the blight struck in 1846, they had neither food nor money and no means of obtaining either. Individuals with money suffered no food shortage and, in fact, substantial exports of wheat, barley, oats, and oatmeal to England continued undiminished along with shiploads of cattle, pigs, eggs, and butter (110). Even those peasants who produced wheat, oats, or barley could not consider the grains to be food for themselves because selling produce to pay rent to their landlords was their first necessity, even if their families went hungry. The harsh truth was that the poverty of the Irish peasant and the power of his landlord to demand rent under the threats of eviction and subsequent death by starvation prevented the peasants from benefitting from homegrown food or from stopping its shipment under armed guard.

THE GREAT BENGAL FAMINE OF 1943–1944 This is probably the best documented and analyzed of all famines (74, 88, 89). The standard explanation of the Bengal famine at the time was “a serious shortage in the total supply of rice for consumption” (34). However, the current supply for 1943 was only about 5% lower than the average of the preceding five years and 13% higher than in 1941, with the combined rice and wheat supply 11% higher. When adjusted for population growth, the per capita availability index was about 9% higher in 1943 than in 1941. The Bengal famine was essentially a rural phenomenon associated with sharp price increases while rural wages were actually falling. The most affected groups were fishermen, transport workers, paddy huskers, agricultural laborers, craftsmen, and nonagricultural wage earners, not the peasant cultivators or share-croppers. Sen concludes that this was a boom famine associated with powerful inflationary pressures attributable to government procurement of food for the war effort, uneven expansion of incomes and purchasing power associated with war activities, subsidized prices for the population of Calcutta, and a wartime prohibition on shipping foods from other provinces. Without serious food shortages, the death toll from famine was at least 1.5 million (4).

ETHIOPIAN FAMINES The great Ethiopian famine of 1882–1892 that killed a third of the population (72) was due to the superimposition on a feudal society of (a) a cattle plague, *Rinderpest*, which killed 90% of the cattle and wild animals as well; (b) harvest failures due to excessive heat and drought and the lack of draft animals; and (c) more severe damage from locusts and caterpillars than usual (72). Like this earlier famine, the Ethiopian famine from 1972 to 1974, which reached its peak in Wollo and Tigray in 1973 and in Harergh in 1974, also counted drought as the precipitating cause. The drought so reduced the earnings of agriculturalists and pastoralists that they could not afford to buy food. However, even in normal seasons, many had to give as much as 75% of their produce to the landlord (25). There is very little evidence of a

dramatic decrease in food availability in Ethiopia at this time (89) even though there were local shortages of food in the affected areas. Despite the number of people dying from starvation, there was no or little change in food prices in these areas because purchasing power was so limited.

From 1984 to 1985, once again, there was mass famine in Ethiopia with millions of refugees fleeing to the Sudan and Somalia. Although drought triggered the famine, it was also due to primitive cultivation methods, an archaic land tenure system, overgrazing, exploitation of peasant farmers, lack of transport systems, and heavy bureaucracies (7, 33). The resulting impoverishment of farmers and pastoralists in the affected areas prevented them from obtaining the needed food.

BANGLADESH While initiated by floods, the immediate cause of the famine in Bangladesh from 1971 to 1974 was a sharp price increase because of hoarding and speculation. Famine resulted because a significant proportion of the population did not have the purchasing power to obtain the food that was in fact available within the country (77, 92). During the famine period, per capita food availability actually increased from 14.9 to 15.9 ounces. Despite this increase in supply, rice prices doubled in some of the affected areas (89). Moreover, the government did not cut the statutory ration for priority foods that benefitted primarily the urban population. Had they done so, the food released would have served to feed the destitute in the most severely affected areas. The famine could have been prevented by strict rationing (1, 68). Approximately 50% of the rural population of Bangladesh is without cultivable land and another 25% have insufficient land to ensure subsistence. The primary cause of the famine was their lack of entitlement.

MOZAMBIQUE 1983 While drought was a major factor, this would not have been a sufficient cause for the magnitude of the famine. Also required were a collapse of the rural infrastructure and the resettlement of large numbers of people with few resources who had previously been under insurgent control (80).

THE SAHEL There is no question but that the group of countries south of the Sahara including Mauritania, Senegal, Mali, Upper Volta, Niger, and Chad are dry and very poor. In the period of low rainfall during 1968 to 1973, both the pastoral and the agricultural economies of the region were severely affected. There is also no doubt of the severity of the suffering and the famine conditions that developed in the region. However, as Sen points out (89), the decline in food availability was nowhere near as marked as that in income and purchasing power. Yet, in most cases people were obliged to pay taxes despite the drought and loss of job opportunities. Moreover, before the

political division of Africa, the nomads could endure more severe droughts by migrating from one region to another and thereby avoiding overgrazing their herds. When rainfall again underwent downward fluctuations from 1984 to 1985, within a range that might have once been considered normal, famine occurred. Food entitlements again decreased for both the pastoralists and the nomads (54).

CONSEQUENCES OF FAMINE

Starvation in Individuals

Many literary descriptions of famine depict the effects of complete or partial starvation that are both graphic and accurate but beyond the scope of this review (35, 44, 101). Both literary and scientific descriptions concur that as famine or starvation conditions develop individuals show weight loss and enfeeblement, compounded by apathy, depression, inability to concentrate, loss of initiative progressing to cachexia, diarrhea, anorexia, immobility, and finally death (18, 23, 49, 78).

Some remarkable and horrifying descriptions have also come from trained individuals experiencing severe hunger. Sorokin (93) wrote such an account during the great Russian famine of 1919–1921, as did the Jewish physicians condemned to die of starvation in the Warsaw ghetto in 1940 (108). Their complaints included constant thirst and dryness in the mouth, increase in urinary output, rapid weight loss, and a constant craving for food.

In individuals who are starving, physiological and anatomic changes occur in successive stages (103). Once surplus fat has disappeared, the individual looks increasingly old and withered. In Caucasians the skin develops brown pigment, and eventually the face becomes cachectic (93). Hair growth is abnormal and the fingernails are dull, claw-like, and striped. Anemia gradually becomes severe and may be either normocytic or microcytic. There is a tendency to osteomalacia, with spontaneous fractures and slow healing. Although the skin is dry, the underlying tissues become waterlogged.

With increasing severity and duration of food deprivation, edema may become evident around the face or on feet and ankles and may involve the scrotum or labia. In addition, there is hypersensitivity to both sunburn and frostbite. Body temperature is lowered and bradycardia is evident. Skeletal muscles are slack and atrophic, and weakness and diminished appetite occur. In the late stages of starvation, the victims look very old because the skin becomes thin, atrophic, wrinkled, and devoid of elasticity and turgor. The intestinal walls atrophy and become transparent. The mucous membrane of the intestines ulcerates and the glands concerned with digestion atrophy (5). Diarrhea, secondary to the deteriorative changes in the digestive system and/or to infectious diseases such as cholera and dysentery, may become severe, portending death. In the terminal stages the voice becomes hoarse.

Experimental Studies of Semistarvation

The scientific literature contains a number of experimental studies of long-term food deprivation in volunteers. The results help to distinguish the effects of semistarvation from those of the social, sanitary, and disease problems that are part of the phenomenon of famine. In the classic studies of Benedict et al (11) with 12 young men experiencing a weight decrement of only 10.5% over four months, general weakness and tiredness were reported. The subjects complained of weakness in the knees, poor tolerance to cold, and reduced endurance.

The best known and most comprehensive experimental study is that of Keys et al (53), who maintained 32 subjects on a diet averaging 1578 calories, only 23 calories per kilogram of body weight, for six months. Over this time they lost an average of 24% of their original body weight. Complaints of the subjects were recorded systematically in regularly scheduled interviews by three staff psychologists. After three months of deprivation, tiredness, muscle soreness, irritability, and hunger pains were the most prominent complaints. Loss of ambition, self-discipline, and concentration were also noted. Symptoms of moodiness, depression, and lack of drive increased as the study progressed.

The physical changes in the study subjects were marked. Emaciation occurred with gradual wasting of muscle and subcutaneous adipose tissues, and by the twelfth week edema became common on the knees, ankles, and face. Nails grew more slowly, hair fell out, and shaving was needed less frequently. The physical ability to laugh heartily, sneeze, or blush was reduced, and muscle cramps and soreness were frequently reported. Increased pigmentation, thinning, and roughening of the skin occurred; tolerance to heat was increased and that to cold markedly impaired. Transient visual disturbances were reported but not confirmed by objective measurement. Decreases in heart rate and blood pressure were also marked.

As is true in famines, food in all its ramifications became a preoccupation of the subject's conversation, reading, and day dreams. Other behavioral changes observed also followed closely those observed in actual famine situations. The cumulative stresses of the semistarvation resulted in emotional instability and either transitory or protracted periods of depression.

Keys et al (53) state that the persistent pangs of hunger distracted the subjects when they attempted to pursue cultural interests, manual activities, and studies, with a frustrating discrepancy between desire and ability to achieve. Personal appearance and grooming also deteriorated, along with the ability to make decisions, plan activities, or participate in group action. The subjects became more self-centered and spent more and more time alone. Sexual feelings were virtually extinguished. After 12 weeks of rehabilitation, the desire for more food and a feeling of tiredness continued.

Subjective ratings did not return to normal until 33 weeks, although by 20 weeks they were largely recovered. During the early weeks of recovery many grew argumentative, negative, and aggressive—all evidence of increased energy and recovery from apathy.

While the findings in experimental semistarvation are similar to those reported during famine, they do not give the entire picture. In famine situations, the victims of starvation undergo more devastating physical and psychological deterioration. Moreover, the poor sanitary conditions, crowding, and exposure to inclement weather combined with lowered resistance to disease leads to a high prevalence of diarrhea, pneumonias, and other infectious diseases that are severely debilitating in themselves and that further worsen the malnutrition. In the study of Keys et al (53), no diarrheal symptoms occurred, and respiratory symptoms were not increased over those of control subjects.

Famine and Pestilence

Throughout history, famine and pestilence have occurred together (3, 9, 74). Many of the body's generalized defenses against infectious disease are reduced by relatively mild degrees of nutritional deficiency (22, 52, 96, 97). These include, among others, cell-mediated immunity, phagocyte function, complement function, and delayed cutaneous hypersensitivity. One manifestation of the increased susceptibility to infection is anergy to common antigens. For example, individuals with pulmonary tuberculosis do not react to tuberculin. With the more severe deficiencies of famine, specific humoral antibody defenses and capacity to produce phagocytes are also weakened (87).

Few people die directly from starvation alone because infectious diseases, particularly pneumonia and dysentery, intervene. In fact, the lower resistance to infection caused by malnutrition—together with overcrowding, breakdown of environmental sanitation and personal hygiene, and the movement of populations—leads to epidemics of infectious disease that cause high mortality rates and further worsen nutritional status. For example, in the Warsaw ghetto in 1940, not starvation per se but typhus, diphtheria, and virulent tuberculosis were the great killers (108).

Starvation and Protein Deficiency

Well-nourished individuals withstand short periods of starvation quite well (112). For such individuals breakdown of skeletal muscle is sufficient to provide amino acids for both gluconeogenesis and the synthesis of essential proteins. The endocrine mechanisms mediating these metabolic adaptations have been well described (16, 112). The same adaptation prevents the child with marasmus from developing the signs of protein deficiency that

characterize kwashiorkor (78, 85, 86). There are apparent paradoxes in this relationship. The edema of famine is rarely seen in cases of total starvation but is common in semistarvation. Moreover, the survival of a semistarved child is reduced by feeding only carbohydrate calories because they prevent the mobilization of amino acids from lean body tissue and result in the biochemical and clinical changes of severe protein deficiency.

Once adipose tissue is exhausted and lean tissue breakdown must furnish energy for survival, death is near. Because, as already indicated, famine victims are usually chronically undernourished, their ability to withstand starvation is much more limited than that of obese or normal subjects in experimental studies. The metabolic adaptations that prolong function and survival when normal individuals must undergo acute deprivation of food are of little help to famine victims. For poorly nourished individuals any combination of calorie and protein deficiency, especially when synergistic with infections, may lead to death.

In the earlier stages of famine, edema of the extremities is common in adults although the mechanism is not well understood (42). While the predominant type of malnutrition in young children is marasmus, there are circumstances that can produce kwashiorkor. The latter was common in Biafra in 1969; children there were given cassava as an energy source but received no protein (64).

Social Effects of Famine in Populations

It is impossible to understand fully the hideous reality of famine without seeing or experiencing it, but there are many vivid descriptions of its social consequences. Initially, there is likely to be mutual help among kinship groups or friends and attempts at preferential concern for the vulnerable, especially children and the elderly. However, as famine progresses in severity and duration, normal social behavior gradually disappears, including personal pride and sense of family ties, leaving only a struggle for personal survival. In society as a whole, the pattern of family breakdown is seen in magnified form, with increasing disintegration of social structure, lawlessness, and abandonment of cooperative efforts as famine reaches its later stages.

A remarkable book called *Hunger as a Factor in Human Affairs* was written in 1919–1922 by Pitirim Sorokin, a sociologist who was himself suffering hunger (93). It brilliantly examined the historical record and analyzed the effects of hunger on human behavior, including riots, insurrections, revolutions, and mass migrations. Depending on the degree of starvation and on social and political factors, there may be attempts to change social structures through riots, insurrections, and revolutions that vary in degree and kind of organization. If people have been severely deprived of food for a considerable period, they become incapable of the energy expenditures and the organization required for rebellion. In France during the

eighteenth century, social disturbance increased with the worsening of the economic situation of the masses and the deterioration in their diets. Riots resulting directly from the high cost of bread were recorded in 1725, 1737, 1739, 1764, 1765, 1767, 1788, and 1789. Serious crises occurred in 1831–1832 and 1847–1848.

During the 1768–1770 disorders in Limoges and L'Auvergne, which were directly attributable to food shortages, bread storehouses and markets were attacked and even the granaries of peasants were sacked. Twenty-five thousand soldiers were required to suppress the riots of 1775. In 1789 conditions became much worse and on July 14, 1789, the Bastille was stormed and the French Revolution began.

ASSOCIATION WITH NATURAL DISASTERS The origins of the great Irish famine of 1846–1847 in a feudal social and economic structure were discussed above. In Ireland in the years preceding the famine more than two million people suffered from hunger *every* year. A contemporary account (110) provides this description: "This hopeless, wretched multitude already starving, already diseased, unemployed beggars, dispossessed squatters, evicted persons, penniless widows, starving children snatched at every offer of relief, swamped every relief scheme, and formed a hard core of destitutes whose numbers could be reduced only by death."

After the fungal blight in Ireland destroyed the potato harvest in the summer of 1846, famine developed in October and deaths increased sharply (110). Before it ended in the four provinces of Ireland most affected, population losses ranged from 16% to nearly 30%. "Hordes of half-starved men, women, and children, totally unfit for manual labor, roamed the cities and surrounding countryside begging for food." As the autumn and winter of 1846–1847 went by, the potato crop totally failed and starvation and pestilence increased, the terrified and desperate people began to flee a land that seemed accursed.

By the spring of 1847, starvation had so scourged the people, that they appeared to be walking skeletons. Osborne (in 110), later one of Florence Nightingale's helpers in the Crimea, wrote "When dead bodies were found lying supine, the abdomens were so sunken in that the articulations of the spine could be counted. Among those still living, the skin, rough and dry like parchment, hung in folds; eyes were sunken back into the head, and faces and necks were so wasted that they looked like the skulls of the dead."

ASSOCIATION WITH CIVIL STRIFE AND WAR The social consequences of famines caused by civil strife and war have been recorded to include cannibalism. Hoover (46) described the absolute famine affecting 25 million people in the Volga valley and Ukraine of Russia in 1921 when death for the whole population was estimated to be only a few months away. Malnutrition and

starvation were evident everywhere, and the dead were seen lying in the streets of the cities and upon roads leading into towns, where they soon became prey to dogs and birds. The dead were described as piled naked together to be transported later to the cemetery, where great pits, 10-feet deep and accommodating several hundred bodies received the city dead. In Orenburg alone 800 deaths a day were reported for a time.

By January of 1921, the bodies of those who had died of typhus and other diseases were too numerous to bury and were piled in heaps in buildings. They were often stolen for their flesh, which was boiled for food. Typhus and typhoid fevers were epidemic, with a child fatality rate of up to 50%. Bread was being made from leaves, the barks of the birch and elm, sawdust, nut shells, rhubarb, rushes, peanuts, straw, potato peels, cabbage, beet leaves, and even horse manure. Dead animals became luxuries.

By the summer of 1921 the fight for life extended to eating dogs, cats, rats, roots, skins, bones, and all manner of refuse. Infectious diseases were rife. "The exhausted, sick, and naked starved people dragged themselves hither and thither seeking the larger towns and villages in the hope of finding food. One met at every step living skeletons, scarcely able to move, or already completely exhausted, and dying where they lay."

FAMINE AND MIGRATION When food prices rose in ancient Rome, mass deportation of foreigners was the favored method of eliminating food shortages. As recently as 1985 Nigeria used deportation as a response to food shortages.

During the Middle Ages an important consequence of periods of starvation was that the people were forced to leave their homes. After their meager reserves were exhausted, the peasants had no recourse except to try to find food supplies elsewhere. Pursued by hunger, large masses of people often crossed great distances in medieval Europe. Entire villages, towns, and monasteries were abandoned.

Hunger had much to do with the release of manpower for the Crusades (93). During the eleventh century, France had more than eleven widespread famines, and many people joined the crusades to be fed. When Belgium experienced a great famine in 1095, an unusually large contingent of Crusaders came from that region. A very severe famine in 1145–1147 swelled recruits for the second crusade (110).

During the late 1650s and through most of the next two centuries, recurrent famines in Europe gave impetus to the settlement of the New World. For example, Russian immigrations to the United States between 1890 and 1905 rose and fell with crop failures and famine (93), and the Irish famine resulted in migrations that significantly increased the population of North America (110).

Mass migrations are the usual accompaniments of famine. There are likely to be long streams of refugees fleeing from famine areas, clustered around relief centers, or descending upon towns in search of food. Most still cling to a few possessions and remain in pathetic family groups. The unburied dead may be seen along the roadsides, often a major disposal problem for whatever authority is still functioning. The most recent example is the 1984–1985 Ethiopian famine, which caused mass migrations of villagers with their resources totally exhausted traveling thousands of miles under incredible hardships and en route mortality and overwhelming all relief efforts (110).

Permanent Effects of Famine

Since famine is most likely to occur in populations with permanent undernutrition, it is not possible to distinguish with certainty between the effects of their chronic status and those of relatively acute episodes of famine (55). By analogy with studies of the long-term effects of an episode of kwashiorkor on cognitive performance and growth (21), it is chronic rather than acute undernutrition that is most consequential for survivors (15). There is good evidence that stunting of adults due to childhood growth retardation reduces work capacity and productivity (11, 31, 48, 81, 85, 94, 99, 102, 104).

There is one exceptionally well-studied famine that supports this assumption, the Dutch Hunger Winter of 1944–1945 already referred to. In this situation, a previously well-nourished and healthy population suffered an average calorie intake of 670–740 for six months and a deficient diet for the preceding year (95). However, rehabilitation was prompt, effective, and permanent. A scientifically rigorous comparison of cohorts exposed to famine prenatally with those who escaped the famine was conducted in 1970–1971. The effects of prenatal nutritional deprivation were apparent in those who reached adulthood, with the sole exception of anomalies of the central nervous system that were not diagnosed until military induction. It should be emphasized that all other major famines in this century have involved already undernourished and underprivileged populations, and famine effects have been more severe because they are superimposed on chronic undernutrition and a high prevalence of infection.

FAMINE PREVENTION

There has been a mistaken assumption in many past recommendations and programs that the prevention of famine is simply a matter of increasing food production (2, 32). Others have placed reliance on a world-wide warning system to identify regions or populations in which famine is imminent (51). The implicit assumption of this approach is that governments and the international community will then mobilize food and organize relief efforts in

time to avert most human suffering and deaths. There are recent examples of both successes and failures of this strategy. Unfortunately, the gross indifference and negligence of some governments or their refusal to admit to famine because of national pride may thwart surveillance to detect the early signs of famine. As discussed in the following section, political factors prevented effective response to early warning of impending famine in Ethiopia in 1985, and both political and logistic factors prevented effective food shipments to refugees in the Sudan. On the other hand, prompt international food shipments supported by government cooperation in their distribution undoubtedly prevented much suffering.

Moreover, for famine-prone countries there is much that can be done in advance of a possible famine, including storage of food reserves, plans for mobilization of transport, and training of civil servants in disaster relief (13), but all of these measures are difficult to achieve in the countries that need them most. Relief efforts also need reliable prior information on the availability of local foods, local food tolerances and preferences, transportation available for the distribution of food relief, quality of the civil infrastructure for the latter, and the nature and extent of the food shortage (66). The lack of such prior information has been responsible for much confusion and inefficiency in the early organization of relief efforts to prevent famine.

The prevention of famine requires a food supply system that takes into consideration food production, distribution, and consumption for populations at risk and requires the combined efforts of agriculturalists, economists, nutritionists, and planners (45). However, to the extent that famines occur because groups of people become too poor to obtain food by production, exchange, or purchase, preventive measures should strike at the causes of such loss of entitlement (89).

Measures that may be required include changes in the patterns of land ownership and tenure, an increase in government resources devoted to rural development and the encouragement of agricultural production, as well as taxation and price policies that bring greater equity. For example, it has been suggested that the most important prerequisites for famine prevention in Africa are changes in agricultural pricing policies to create added incentive for food production, improvements in land tenure policies, and the availability of credit for land improvement and needed agricultural inputs (56).

FAMINE RELIEF

In today's world there are abundant reserves of food in North America, Europe, and even in a number of developing countries. Moreover, transport is possible by sea, air, and trucks on land. There should be no reason why good surveillance cannot be followed by prompt and effective relief measures. As we have seen most recently in Ethiopia, political factors may handicap relief

efforts (38). The lack of an adequate food distribution system including transport is another common within-country barrier to relief. Donor factors affecting relief measures include delays on the part of donor countries in recognizing the problem or arranging for food shipments, confusion and conflict among relief agencies, and also between relief agencies and efforts of the host government (39).

The explosive spread of epidemics is a common catastrophic result of famines. There is usually a breakdown of sanitation and public health services and overcrowding.

The rehabilitation of victims of starvation must proceed slowly because of the effects of famine on the intestines. Too much food at once can be lethal (5). Several good manuals exist for the organization of famine relief (60, 61, 76).

Experience has indicated that in addition to relief food suitable for adults, there must also be weaning food or preschool mortality will remain high (40, 82). Possibilities are dried skim milk and various vegetable protein mixtures. There must also be a special effort to identify the malnourished children and to ensure that they receive the food since they will not be brought to a central point for feeding when they have diarrheal and other infections (82, 106). A good system of data acquisition and analysis of information on other topics of major concern, including death rates, numbers of people in relief camps, incidence of disease, and population movements, is essential.

If relief policies become operative only after all land, animals, and other assets have already been sold, they will not stop the pauperization that will impair recovery and worsen the effects of future famines in drought-prone areas (50).

It is always preferable to provide assistance in forms that enable the people to help themselves and that contribute to the infrastructure so as to lessen the impact of future famines (109). If introduced early before the people have lost the will and capacity to work, these can include food-for-work building roads, bridges, and drainage systems or for constructing irrigation facilities. However, these cannot be effectively introduced unless such projects have been planned far in advance by the country or district concerned. The establishment of organized shelters for refugees from famine should be regarded as a temporary measure and resettlement programs should be initiated as soon as possible (10). Subsequent efforts should be made to improve the food production systems in the famine area in ways that will make future famines less likely (27).

POLITICS OF FAMINE

The preceding analysis of the causes of famine has made it clear that regardless of the role of natural causes, most famines occur ultimately because of the

policies of governments that affect equity, entitlement, or free movement, or that lead to civil strife or war. However, in addition, starvation has not infrequently been a deliberate policy instrument of governments. Throughout history, starvation has been used as a weapon against besieged cities, populations, or nations. Nor is it necessary to look beyond the present century for examples.

From 1916 to 1918 the allied blockade of Germany was so successful that, despite all efforts, the men and women of the German home front had a diet deficit of approximately 1000 calories per day. The rate of tuberculosis doubled and the agony of hunger reached critical proportions (100). The food deficits were more severe but fortunately of shorter duration in the Dutch Hunger Winter of 1944–1945 (95). This resulted when the German Occupation forces cut off food supplies coming into the densely populated western part of the country in retaliation for a strike by Dutch railway workers. An attempt to use starvation as a weapon was also made by the US during the Vietnam war, when tens of thousands of acres were sprayed to destroy crops, mostly rice (62, 63).

When the federal forces in Nigeria used hunger as a weapon against the secessionist state of Biafra in 1968, thousands of children died of kwashiorkor (64). Similarly, the government of Ethiopia had political motives both for neglecting the development of their provinces of Tigre and Eritrea (91) and for obstructing the flow of relief supplies to this region when drought precipitated the famine of 1984–1985. The government was more concerned with starving out the resistance forces than with the sufferings of the civilian population.

The Khmer Rouge of Kampuchea, in their tragic efforts to destroy what were seen as Western forms of social structure, tried to eliminate everyone with managerial or technical background and they destroyed the equipment needed by agriculture and industry (71). One consequence was death from starvation on a massive scale.

DEMOGRAPHIC CONSEQUENCES OF FAMINE

Demographic effects of famine are mediated through both biological and behavioral adjustments. As a result, measures of mortality, fertility, and population growth all undergo major deviations (14, 24). Moreover, famine mortality is usually distributed very unequally among different economic and demographic groups in the society. Infant mortality increases but the greatest effect is on preschool children. Mortality among the elderly increases markedly but the effect on overall mortality rates is limited because they have been such a small proportion of the total population in countries affected by famine.

When ten million died in West Bengal and Bihar in 1770 (5), 25 million in the Ukraine in 1921 (5), and 10 million in 1960 alone in China (17), the short-term demographic effects could be readily calculated. However, the long-term effects depend on other factors. Birth rates return to normal or may even increase a year and a half to two years after a famine, but many years may be required before the population reaches prefamine proportions (111). Moreover, the permanent emigration, the rural-to-urban migration, and sometimes the settlement of new agricultural areas have long-term consequences (47). There are important demographic as well as political consequences for countries permanently accepting large numbers of refugees.

SUMMARY

Famines are sustained, extreme shortages of food among discrete populations sufficient to cause high rates of mortality. Signs and symptoms of prolonged food deprivation include loss of fat and subcutaneous tissue, depression, apathy, and weakness, which progress to immobility and death of the individual, often from superimposed respiratory or other infections. The social consequences of famines are disruption from mass migrations of people in search of food, breakdown of social behavior, abandonment of cooperative effort, loss of personal pride and sense of family ties, and finally a struggle for individual survival.

Famines have been common ever since the development of agriculture made human settlements possible. Food shortages due to crop failures caused by natural disasters including poor weather, insect plagues, and plant diseases; crop destruction due to warfare; and enforced starvation as a political tool are by no means the only causative factors.

Many of the worst famines have been due to poor distribution of existing food supplies, either because of inequities that result in a lack of purchasing power on the part of the poor or because of political interference with normal distribution or relief movements of food. Europe and Asia, which in the past experienced frequent severe famines, sometimes with deaths in the hundreds of thousands or millions, have now largely eliminated famines through social and technological change. However, in Africa, political and social factors have destroyed the capacity of many populations to survive drought-induced variations in local food supplies and prices. Thus, famines are due to varying combinations of inadequacy of food supplies for whatever reason and the inability of populations to acquire food because of poverty, civil disturbances, or political interference. Despite the role of natural causes, the conclusion is inescapable that modern famines, like most of those in history, are man-made.

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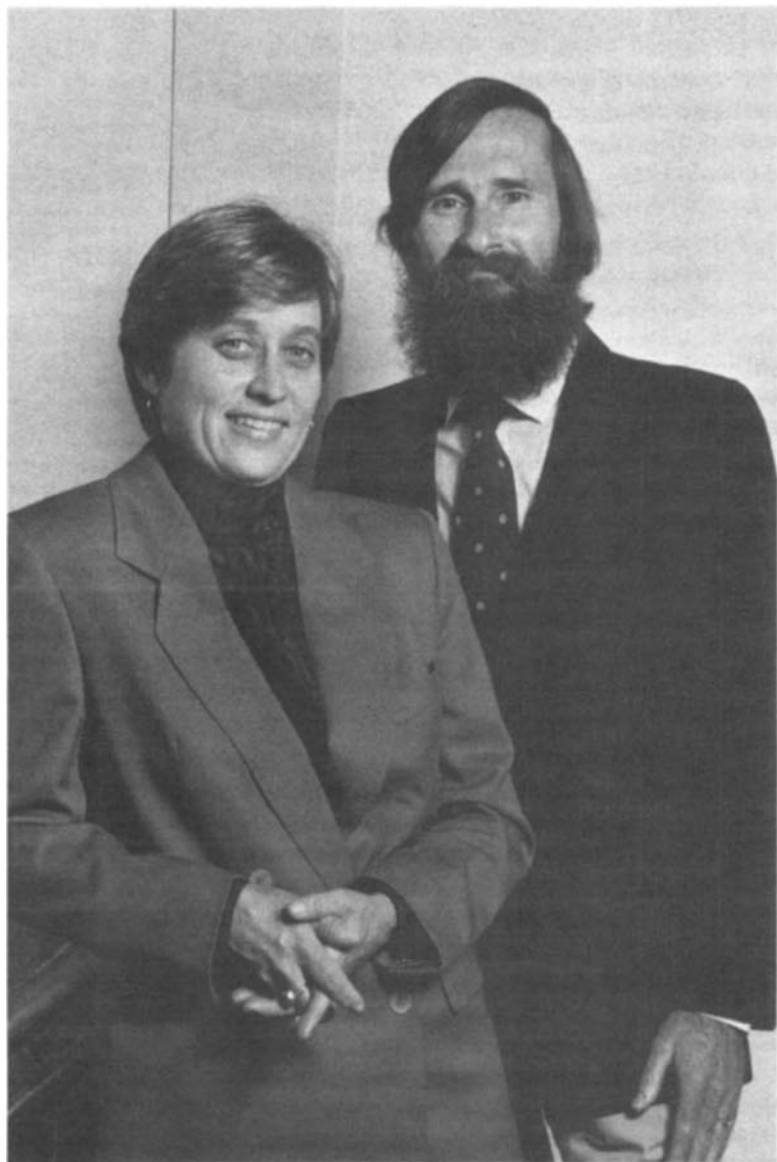
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