THE EFFECTS OF STARVATION ON THE FUNCTION OF THE FAMILY AND OF SOCIETY

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The biological and psychological consequences of communal starvation on the function of the family and society plainly vary with many inter-connected circumstances, including initial causes (crop failure, war, severe disruption of communications), the community’s nutritional background (previous general level of nutrition and health, population pressure, prevalent forms of malnutrition), the culture pattern (rigidity of food habits, concepts concerning life, death and causation of the disaster, family, kinship and political systems), aggravating factors (degree and duration of food shortage, lack of water, single or multiple epidemics in man and domestic animals, loss of shelter and adverse climate, “secondary disasters” (e.g. floods after drought), loss of human and animal working power, degree of family disruption (males in army, migration), breakdown of law and order, hoarding of food, with speculation and very high prices decreasing availability to the poor), and ameliorating factors (availability of national regional or global food reserves or surpluses, transport facilities, large scale emigration, effect on morale of likelihood of relief and availability of accurate news and information).

Plainly, the circumstances found in the siege of Leningrad (1941–1942) (Antonov, 1947), the refugee situation in cassava-eating populations in the Kasai, Congo (1960) (Lowenstein, 1962), the families of the Donner Party snowed-in in the Sierra Nevada Mountains (1846) (Keys et al., 1950), the Irish Potato famine (1846) (Edwards and Williams, 1956), the Nigerian Civil War (1967–1970) (Aall, 1970; Miller, 1970), and the most recent Bengal famine (1943) (Bhatia, 1967), all vary greatly.

In addition, observers and relief workers are usually concerned with trying to deal with overwhelming problems with limited resources in chaotic social conditions. The over-riding need for action makes detailed collection of statistical information difficult and somewhat of a luxury. Likewise, the human emotional need to deal with the suffering found may make the collection of data psychologically repugnant, unless gathered quietly as an integral part of relief operations. Unfortunately, there is rather little reliable detailed statistical information on the effect of starvation on communities, but techniques need be built into future relief operations.

Nevertheless, despite very contrasting circumstances in the thousands of famines and disasters that have plagued mankind throughout history, and despite the usual lack of precise numerical information concerning the effect on the function of families and society in most of them, certain overall generalizations appear warranted.

(1) Biological effects
As would be expected, communal starvation initially affects the physiologically vul-
"Frightful and fearful is the havoc around me—the aged and the young—almost without exception swollen and ripening for the grave" (quoted from Edwards and Williams, 1956).

As the famine becomes more prolonged, older children and adults also become affected (Lowenstein, 1962; Yarom and Mc Fie, 1963; Bennet, 1969). Among these older age-groups, as in young children, malnutrition presents initially with decreasing weight, with wasting of body reserves of calories, in form of subcutaneous fat, and protein, in the form of muscle, especially apparent in the thin limbs (Bennet, 1969; Gurney, 1969; Arnhold, 1969; Davies, 1970). Ultimately, severe, fatal syndromes of PCM develop, including variants of

Fig. 1. Moderate PCM in two-year-old ("secotrant") displaced from mother's breast (Kigezi, Uganda). This "normally" vulnerable age-group is early and severely affected in famine.

...—young children (in the "weaning" or transitional period), the aged, the sick, and pregnant and lactating women.

Different forms of protein-calorie malnutrition of all kinds of severity (Jelliffe, 1959)—including marasmus and/or kwashiorkor—increasingly affect and kill among these groups, particularly the young children, especially the highly "at-risk" seco trant (two-year-old) (Jelliffe, 1969).

For example, in war-time Athens (1941-1942), Petrides (1948) recorded a high rate of "hunger oedema" in young children, 60% of whom were between 1-3 years of age; while Lowenstein (1962) has described an epidemic of kwashiorkor, mostly in young children, in African refugees in Kasai, Congo, in 1960.

Similarly, eye-witness accounts of the Irish potato famine also stress the age distribution of "famine dropsy":

Fig. 2. Moderate and severe PCM in older children and adults (E. Nigeria).
kwashiorkor and marasmus. The clinical appearance of the latter has been well described by Digby (1878) (quoted by Edwards and Williams, 1956):

"The head looked unnaturally large by contrast with the emaciated trunk, the shoulder blades projecting as if they had been inserted by mistake in too small a carcass, the arms and legs shrivelled to the size of their bones, except at the knees which are swollen."

In the earlier stages of communal starvation, human lactation usually appears to be relatively little affected, so that breastfed babies are nutritionally protected. For example, in war-time Athens, Petrides (1948) found no "hunger oedema" in infants below 6 months of age, and was of the opinion that babies either received no breast milk and died, or obtained "basal" amounts of mother’s milk and escaped.

This protective effect of breast feeding has also been noted in Rotterdam towards the end of World War II (Smith, 1947), in the Congo (Lowenstein, 1962) and in the siege of Leningrad, where Antonov (1947) observed that "as long as the mammary gland received sufficient physical stimulation, milk continued to be secreted, although the quantity might be reduced and the length of lactation shortened".

The relatively normal—or only somewhat reduced—levels of proximate principles, especially protein, in the breast milk of mothers early in famine or semi-starvation (Gunther and Stanier, 1951) parallels results obtained from lactating women in habitually poorly nourished communities (Gopalan and Belavady, 1961; Bailey, 1965; Underwood et al., 1970).

However, as well recognized, the capacity to lactate is as much related to psychological factors as to nutrition, and, in large scale disasters, maternal anxiety and the necessity of breast feeding for her offspring’s survival are opposing emotional forces.

More usually, mothers are able to lactate well in early famine circumstances. The incidence of breast feeding is reported to have increased during the siege of Paris in 1876, with a decline in infant mortality, despite rising mortalities in other age groups (Newman, 1906). Similarly, in Japanese internment camps, European and American women all breast-fed their babies successfully for about one year (Williams, 1947).

However, when severe chronic maternal malnutrition has developed, lactation declines and eventually ceases, so that young infants cease to be protected, and become highly vulnerable to marasmus and diarrhoeal disease (Kerpel-Fronius, 1947; Lowenstein, 1962).

Biologically famine also leads to widespread amenorrhoea, and to increased rates of stillbirths and of low birth weight babies (and hence neonatal deaths) (Antonov, 1947; Smith, 1947).

Starvation amenorrhoea has been described as a "convenience" (Grieve, 1946) and certainly has protective functions in that the "nutritional loss" of menstrual blood is conserved. It is also accompanied by infertility and, especially as it is associated with decline in libido, results in a marked drop in birth rate (Hyttten and Thomson, 1965; Aall, 1970).

The prevalence of overt vitamin deficiency disease in the community depends in considerable measure on the customary background diet—and, hence, physiological stores. Initially, vitamin deficiency diseases are usually not a major feature. However, ultimately scurvy, pellagra, beri beri etc. may add to the nutritional misery. For example, in the Irish famine, scurvy occurred as a result of the severe shortage
of potatoes, the main local source of ascorbic acid as well as calories.

Paradoxically, in some communities customarily living on a limited, monotonous diet, the intake of some vitamins may even be increased, at least initially, as the range of foods taken is widened to include various wild berries, fruits and green leafy plants.

Also in children, the growth failure characteristic of all degrees of protein-calorie malnutrition may mask shortages of vitamins, such as vitamin A. This should be borne in mind during rehabilitation as the recommencement of growth and normal metabolism may lead to clinical avitaminoses—as, for example, keratomalacia and blindness—unless covered by adequate vitamin intakes.

In famine circumstances, the resulting malnutrition, together with various consequences of social disorganization—such as overcrowding, breakdown of sanitation, increase in vermin (rats, lice), inability to bury the dead, and uncontrolled movement of population—favour the outbreak of epidemics of infectious diseases, such as classical “famine or road fever” (typhus and relapsing fever), dysentery and other forms of diarrhoea, typhoid, tuberculosis, etc. as well as so-called childhood infections, including measles and whooping cough.

Malnutrition in a community not only lowers resistance to infection, but infections also make existing malnutrition worse. Nutrition and infection are, in fact, inextricably interwoven, with resultant increased mortality (Scrimshaw et al., 1968)—for example, Mayer (1970) has noted a 50–70% death rate in measles in children in Eastern Nigeria.

(2) Psychosocial effects

In famine-prone countries, even the apprehension of widespread food shortage leads to predictable behaviour—hoarding of food, rising prices, and movement of population towards areas considered less likely to be affected.

Despite great differences in circumstances, human starvation always produces a similar general pattern of change, present to some extent in the volunteers in the Minnesota starvation experiment (Keys et al., 1950) as well as in real life famines.

Initially, biological enfeeblement, related to a lowered metabolic rate and to wasting of muscle and fat, is compounded by apathy, depression, lack of initiative, decreased libido, dulling of emotions and poor concentration.

In the course of famines, individual, or even mass, suicide may occur, but according to recorded accounts, appears to be surprisingly rare, perhaps especially in Oriental countries.

In the final stages, the “immobility of the starved” becomes extreme, with gross wasting (with or without oedema), diarrhoea, loss of appetite, exhaustion and death.

During the earlier phases of starvation, all remaining energies and ingenuity are concentrated on the seeking of food to deaden “the persistent clamour of hunger” (Keys et al., 1950).

There is an extreme narrowing of interests, so that food is the sole focus of thoughts, ideas, interests and activities. The major part of the waking hours are concerned with food gathering, particularly for the community’s “cultural super-food” (Jeliffe, 1968).

Even in the most conservative societies, the range or items eaten is widened to include usually unused foods. European pris-
Fig. 3. Food-gathering the exclusive activity in famine, especially the ‘cultural super food’, as with the potato in Ireland.

The captives of war in Japanese camps consumed rubber tree seeds, pine needle tea, melon and pumpkin rinds, and grass and leaf extract (Smith and Woodruff, 1951), while in past famines in various parts of the world, anything potentially edible has been eaten, including seed stores, wild roots, weeds and tree bark, rats an exhumed animal carcasses, sawdust, earth, manure and human flesh.

Necrophagia appears to be less common in Oriental countries, especially India, perhaps because of deep rooted religious fatalism and vegetarianism.

Various forms of extending—or increasing the bulk of—foods will be employed. For example, the Minnesota volunteers adopted the habit of “souping” their diet, with hot water to increase its bulk and warmth (Keys et al., 1950); while bread—the main food in the siege of Leningrad—was based on defective rye, extended with malt, bran and cellulose (Antonov, 1947).

Severe food shortage is accompanied not only by rising prices, but also by revaluation in general, so that assets are valuable only in relation to their ability to procure food.

The pressure by famine towards purchasing and eating the normally unacceptable, even at exorbitant prices, is stressed historically by the famine in besieged Samaria when

“...an ass's head was sold for four score pieces of silver, and the fourth part of a cab of dove's dung for five pieces of silver” (Kings II. 6. 25).

Any activity which can obtain food may be employed ultimately, including theft, riots, prostitution and the selling of children. At the same time, the geographical range of food-seeking activities will be increased, leading to the movement of population, with the further spread of infection and with decreased possibility of agriculture, and with the progressive abandonment of the sick and the immobile, including children.

The psychosocial effect of famine on the disorganization and deterioration of the family and society is progressive. Initially, there will be mutual help between kinship groups or friends, and attempts at preferential treatment for the vulnerable, including children.

However, as famine progresses, normal social behaviour disappears increasingly, including personal pride and family ties, leaving only increasingly self-centred “survival of the fittest” activities.

The breakdown of normal human relations and deviation from customary mores occur in all severe famines particularly so in the planned terror and degradation of concentration camps (Mollison, 1946).
The war is over

Fig. 4. The major victims of famine—a cartoonist’s summary.

The 13th century account of famine in the Chronicle of Novgorod, although much quoted, deserves repeating, as it so vividly portrays the family disruption (from Keys et al., 1950):

“A brother rose against brother, a father had no pity for his son, mothers had no mercy for their daughters; one denied his neighbour a crumb of bread. It was a bitter sight, indeed, to watch the crying children begging in vain for bread and falling dead like flies”.

In the society as a whole, the pattern of family breakdown is seen in magnified form, with “anti-social” activities to obtain food, such as theft and “grain riots”, only held in check by existing law enforcement (if such exists) and, ultimately, constrained by lethargy and weakness, by enfeeblement and death due to starvation and infection.

Accompanying famine, there will be a varying degree of breakdown or overwhelming of social services, including health care, water supplies and other aspects of environmental sanitation, and communications.

The community is also likely to have been disrupted by movement of population in search of food, by the breakdown of families, and by military activity or civil disturbance.

Also, as is well-known, “famine breeds famine” (Masefield, 1963), and food production in affected regions is secondarily diminished by many factors, including the decreased and enfeebled human and animal work force, the movement of population and the loss of seed stores.

CONCLUSION

Widespread famine can lead to a devastatingly high general mortality, as in Ireland in 1845–1849, when over a million died (Edwards and Williams, 1956; Woodham-Smith, 1962), or, even worse, in the various huge disasters over the centuries in India and China (Passmore, 1951).

Often details of the age groups most affected are not given in historical accounts of famines. However, recent evidence clearly confirms that the major brunt of both biological and psychosocial effects of communal starvation falls earliest, most severely and most extensively on the physiologically vulnerable—the aged, pregnant and lactating women and especially young children (Mayer, 1970).

Protein-calorie malnutrition of early childhood of increasing severity and mortality becomes so prevalent as to be termed “epidemic” (Lowenstein, 1962), and, in severe famine, selectively erases the young child segment of the population. Thus, late in the Nigerian war, Aall (1970) comments that “one hardly sees children aged between 6 months and five years”.

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The long-term effect on survivors of such widespread family disruption, disorganization of schooling and severe malnutrition in early childhood on the subsequent mental and physical development and ability of whole communities is speculative, but alarming (Winnick, 1969; Widdowson, 1970).

Conversely, it follows that the nutritionally vulnerable groups, especially young children and pregnant and lactating women, need special and priority attention during relief operations in large scale disasters and famines.

The prime need is for the selective distribution of appropriate foods, rich in calories, protein and vitamins (Jelliffe, 1969) for young children and for pregnant and lactating mothers. The latter are a priority group because of their own nutritional vulnerability, and because of the need to permit mothers to continue the production of the most vital emergency food for young babies—breast milk.

Also, as deaths in famine usually result from a mixture of malnutrition and infection, it will be necessary to set up a simple system of adaptive MCH services (Jelliffe and Jelliffe, 1970) as soon as possible, capable of the recognition and basic treatment of the main infections present and appropriate immunization, as well as the issue of emergency supplies of food to those principally in need.

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References


SUMMARY OF DISCUSSION

Rapporteurs: K. E. Knutsson and Y. Hofvander

The discussion was opened by Mayer who stressed four points of importance based on impressions from Eastern Nigeria. He first stressed the enormous rate of lost children along the roads and the element of grief which naturally comes in here. There may be near suicide by self-inflicted starvation. The small children won't eat because the parents are not around. Mayer would suggest some type of emergency identity disks which would help to identify and bring back lost children.

Secondly he stressed that one could remember that adolescents play a very special role. If social disintegration sets in and there is shortage of food, gangs will be formed to forage for food. Rehabilitation after the famine may be very difficult.

The third point concerned vital statistics under disaster circumstances. It is even more difficult to get some data on birth-rate down to less than half of the normal in the Nigerian crisis.

The final point referred to Dr Aykroyd's words about the victimized situation of the elderly. It should be remembered that old age for purposes of a famine starts in most cases at about 45 years. From that age there was in the Nigerian situation a drastic increase in mortality as compared with adult men and women below that age.

Ihekwunigwe confirmed that lost children constituted a great problem in the Nigerian crisis. One had tried to use identification disks laid out in various ways. The best one was a plastic identification disk hung around the neck or wrist. By this it was possible in some or most cases to identify children who were too young to identify themselves. Ihekwunigwe also confirmed that the decreasing birth-rate was visible and was due to many factors, among them malnutrition leading to amenorrhea and also to crowded conditions in the camps, not suitable for reproductive activities. When pregnancy took place the incidence of miscarriages was also markedly raised.

The question of the chemical composition of mother's milk during starvation was raised by Malmros. Jelliffe stated that he thought the last word had not yet been said. As far as he could see, in fully nourished communities the protein and perhaps the fat content of breastmilk remained remarkably constant whereas vitamins seem to depend on the mother's diet and her immediate stores. In situations of more severe malnutrition we know less. There is increasing evidence that there is further decrease from normal to below that as far as protein and calories are concerned. In moderate malnutrition the composition remains relatively normal. In severe famine there tends to be a drying up of mother's milk although it is not known of any recent investigations on the composition of breastmilk in very severe starvation. This last statement was also confirmed by Ramanigasuami.

Ihekwunigwe said that in Nigerian crisis the breastfed children under one year were initially protected. Later these also became malnourished because the mothers slowly became victimized and not able to produce enough milk. The next group to suffer were the people over sixty. It was not unusual to find in some institutions that the majority of patients were very old. Referring to Jelliffe's description of the breakdown of the social structure Ihekwunigwe thought that the traditional system to start with contributed to protect the children but slowly this protection broke down as the traditional responsibilities of parents and kin broke down. One conclusion is that one cannot rely on the parents to administer the assistance in the form of food etc. because they are also in need.

Forman emphasized that we had to identify carefully the type of disaster we are talking about.

1. The emergency disaster due to a national calamity of some kind which occurs rather suddenly.
2. The creeping disaster due to famine when there is time to prepare for a counterattack.
3. A combination of the two which was often seen in Nigeria.

We know enough about cultural differences, about the esteem in which children are held, about the size of families and the distribution pattern within families and so on. How-
ever, Forman asked whether we really know enough. It seems that we keep repeating the experiences of some few disasters. Do we know enough to make generalizations? He recommended the building in the future of a systematic type of system that makes it possible for collection of further information. There is a need for guidelines for collecting this type of information.

Jelliffe agreed to this point. He thought we had sufficient approximate information but we need to know more. And further documentation is obviously needed. For instance, how long would a famine continue before the people in this particular part of India (Bihar) did eat millet or would they never have eaten it?

Ramalingaswami confirmed that people would rather starve than eat millet in the Bihar famine. He also stressed that usually the very young and the elderly suffer most. But if the famine is severe this age differential may be wiped out and young adults and old children may also be affected. The working class adults who go for “food for work” programs and work all day long would show hunger oedema in the evenings. One major problem had been that people had been asked to come to a relief centre. The poor will go there. The middle class may also suffer because they do not want to go to the relief centre together with people who are regarded as socially inferior.

Forman again stressed the importance of collecting much more information. There is an average of 40 disasters a year and a wealth of data and information could be gathered.