Sustainability beyond Starvation

Sir—To find oneself, towards the end of a long tropical career, writing on entrapment, because nobody else can bring themselves to do it, although many have little doubt as to its reality, is, to put it mildly, a very unhappy task indeed. Particularly for an outsider, born in South Asia as I was. Yet it has to be done. I continue to be impressed both by the rationality, and by the good humour of the debate, which is as least as relevant to the North as it is to the South.

Mother decide
Who will go without today?
Will it be Ram?
Who is the strongest?
And does not need it so much?
Or Raj, who is the weakest,
And will not need it so long?
Or Sita, who is a girl anyway?
Decide Mother. And kill,
Part of yourself.

(An Indian poem)

Professor Banerji catalogues India's impressive achievements in providing food, water, clothing, fuel and work for its increasing population. He notes that this is becoming steadily more difficult to achieve as the number of people who are added to the population increases every year. He then wonders why Malthus' gloomy forecast of population outgrowing food supply has yet to come to pass in India?

Before answering him a formal definition of human entrapment is necessary, and since this is defined in terms of carrying capacity, this has to be explained first. The carrying capacity of a particular ecosystem at a given time is the maximum number of a given species that it can support indefinitely without causing environmental degradation. In the case of man two important qualifications have to be added—

1. Increases in agricultural productivity. India's green revolution is a good example, but there is no reason to think that these increases can be extrapolated indefinitely.

2. The time factor. According to the above definition: 'a population is trapped if it has exceeded, or is projected to exceed the carrying capacity of its ecosystem...'. Unfortunately, India appears to be going to do this, since its 843 million people have all but exhausted the potential of its 'first green revolution', in that the rate of increase of food production is now slowing down, due to decreased fertilizer productivities and long-term mining of soil minerals. The index of food production increased 46% between 1985 and 1989, but the per capita increase was only 20%. Although Professor Banerji may be right that there is less acute malnutrition than there was, there is much chronic malnutrition in that 'there is grave cause for concern in that current nutritional levels are not adequate even at the present time'—despite the recent per capita increase.

But what of the future? India can expect almost another billion people before its population is assumed to stabilize at 1.7 billion in 2060 unless it adopts one-child families. In India it is fed to its expected population from its own production, and avoid a population crash, there must be: (1) A 'second generation green revolution' involving multiple technological productivity breakthroughs in its non-irrigated monsoon-fed 'dry' coarse grain agriculture, which has not yet had a green revolution, and where water shortage is a major problem. (2) These breakthroughs must be disseminated widely, rapidly and efficiently. (3) They must be taken up by the villagers. (4) There must be no serious snags. (5) They must eventually feed nearly another billion people. (6) They must be implemented quickly enough. (7) They must start becoming effective immediately. (8) They must be sustainable. Concurrence of all these conditions seems unlikely.

This gloomy prognosis as to local production is supported by Norman Borlaug, the Nobel Laureate who developed the rice strains that produced the first green revolution. In 1970 he warned that these had given India 30 years of grace. In 1990, with 10 years left to go, he said he saw no reason to change his mind. It is also reported that several non-governmental organizations are expecting a severe starvation in India (and Africa) in the 1990s.

Gloomy forecasts for India have been wrong—in the past. Thus Ehrlich's The population bomb was largely based on India, and was written in 1968, just before the first green revolution proved it wrong—in the short term. Apart from what would seem unreasonable optimism over prospects for a second green revolution in 'dry' agriculture, the main arguments advanced against a gloomy prognosis are: (1) That if Kerala can reduce its fertility so dramatically, surely the rest of India can too. Yes, if it still had time; social progress in Kerala goes back at least to the 1950s. (2) Some indicators, particularly life expectancy at birth, have been increasing. Unfortunately, it would seem perfectly possible for life expectancy to fall until the time that the increasing pressure of people on land causes it to rise, especially if much of the recent fall had been due to improved technologies for child survival, rather than to improved socio-economic conditions.

3. Connectedness, by enabling goods and services to be exchanged for food, has enabled populations which have long exceeded the carrying capacity of their own ecosystem, Hong Kong for example, to live off the products of other people. By definition, adequate connectedness, including adequate migration, can make up for the lack of carrying capacity in a particular ecosystem, either by trade making it possible to purchase the products of other people's, or through emigration.

Optimists, Preston, for example, look particularly to the food imports that such exports could buy, and forecast that India will be an 'economic miracle like Hong Kong or Japan in 30 years'. This requires that its 'high-tech' exports compete successfully with those of Japan and Taiwan, and its 'middle-tech' exports with those of China. Considering the present export dynamism of the Far East, this seems unlikely. Whereas the rate of growth of China's exports has recently been rising, India's...
has been falling. The view of the Indian economy as a 'caged tiger' has been somewhat dimmed by the fact that, although Mannohar Singh's long overdue economic reforms were introduced in 1991, there has been no rush of foreign capital to invest in India. Optimists argue that it is still too early to see much change.

4. Migration, initially from one rural area to another or from city to town, has so far been able to ease some of the severest entrapment and prevent the rise in mortality that might otherwise have occurred. The hope that migration might be possible on a sufficient scale to ease India's entrapment seems unlikely.

5. Aggregated data may be hiding rising mortality in the most disadvantaged groups, such as the child in the opening poem.

6. Poor data. Data are likely to be worst in just those areas, particularly in Africa, where mortality might be expected to rise.

7. Recent technological advances, particularly oral rehydration for diarrhoea, may have helped to hide the increase in mortality that might have occurred otherwise.

8. Food aid seems likely to have prevented a Malthusian rise in mortality in just those populations which might otherwise now be showing it. It is also needed in many non-Malthusian situations, as following wars, but persistent food aid, as for example in Egypt which now imports about half its cereals, 17% of them as food aid, may well be preventing a Malthusian rise in Egyptian mortality.

Food aid is ultimately limited by: (1) what the world could produce, (2) what it will produce given all the constraints, and (3) what it is prepared to give away as aid. What it could produce sets the theoretical limit on what 'connectedness' could do to diminish global entrapment. It is not proposed to discuss the vexed question of whether the world could feed a population that will double and could triple, except to quote the agronomist Willem Beets who writes: 'Yes the planet can produce two or three times more food, even under a medium level of technology. But the potential cannot be exploited on account of unsurmountable human, institutional and political constraints. This has the ring of truth, since unfortunately, it is a very human world, and plans have to be made in a human world.

The key question which trapped communities have to ask themselves is: How much food is the world actually going to distribute free indefinitely as food aid, given all the constraints, especially the human ones? The answer to this does not look so hopeful. Alas, plans have to be made, not on the basis of what ought to happen, but on what probably will happen. Some food aid there certainly will be, but it will always be enough for huge populations and especially for much of India's expected additional billion?

The indefinite support of large populations which can no longer feed themselves, and have nothing to buy food with, has so far been ignored by the UN agencies. Unfortunately, it seems likely to become one of their major concerns in the not too distant future. To take a near worst case scenario and assume that it might be necessary to feed a billion people, this could be done for 0.45% of the 1992 GDP of the G7 group of countries (Canada, France, Germany, Italy, Japan UK and USA), assuming they are fed with wheat at $187 a tonne (the overall 1989 traded price), 3000 kcal daily, and neglecting other costs. Although 0.45% may not seem a large percentage, it is more than the 0.31% of GNP that the G7 gave in all forms of aid in 1990. If the position is ever reached when a billion people need rescue from starvation, the price of cereals might be higher.

In short, optimists see great hopes of India increasing its carrying capacity with a second green revolution, and of exports being able to pay for its food imports; pessimists are more wary. A gloomy prognosis puts India's Malthusian ceiling at about a billion, which is its expected population in the year 2000. Its carrying capacity can only be guessed at, and is likely to be less than this. The likely scenario for disaster is a bad year, or a series of bad years in India, some time in the next 10 or 15 years, accompanied by similar bad years in the North American grain belt which reduce world grain stocks, and thus the possibility of substantial food aid. There might be a steady decline in population, a single sudden fall, or a fall in a series of steps, or a mixture of all three. At 3000 kcal a day, and assuming a grain-only diet, the average person needs about 300 kg annually, and India needs 263 million tonnes. Professor Banerji is comforted by the thought of buffer stocks. Unfortunately, even a million tonnes will only feed India for little more than a day. Overall, India presently appears to be in approximate cereal balance, with imports and exports that are less than 1% of its annual needs.13 Although the quantities of grain moved may seem large, they are only a small percentage of the massive quantities needed annually. But what of the future with nearly a billion more people to feed?

Emergency disentrapment

In view of what he had so recently proposed, Rajiv Gandhi's untimely death was indeed an incalculable loss to India's prospects for controlling its population. He was insistent about the need to decentralize administration, to dismantle giant bureaucracies and to coordinate development programmes. But why is Professor Banerji so against a 'Population Commission', some powerful central body there surely has to be? There also have to be targets, or rather an overall target which is a reduction in the birth rate. The sub-targets, or how this is to be achieved, by what category of sex and by what methods, have to be decentralized.

A successful programme requires a highly visible political purpose which expresses a particular idea. If India is indeed trapped, that idea has surely to be entrapment—the possibility, even the probability of starvation. Both carrying capacity and entrapment need to be debated nationally. Professor Banerji avoids both. A recent paper which did so is said to have 'disturbed a hornets' nest in international health, and particularly among the aid agencies'. Alas, demographers are reluctant to discuss carrying capacity, and although some aid agencies will discuss it, entrapment is still officially taboo to all of them. Even so, entrapment has been discussed informally for years. Had it not been real, the hornets would probably still be asleep.

There are two key questions: (1) How far down the national pyramid can the debate on entrapment usefully go? Can it be made meaningful to the general public and the illiterates? (2) Can it be used as an incentive for family planning and particularly for one-child families? This is an awesome question to ask, but asked it must be.

It is sometimes said that to recognize entrapment is to 'write off' that population. Alas, not to do so is to write off a trapped population even more certainly by default. If it is not to be written off, what is to be the message to it? If the pessimistic scenario for India is correct, with carrying capacity about to be exceeded, connectedness (exports and migration) probably inadequate, and food aid sometimes insufficient, the only message can be—sustainability beyond starvation. It is that a population reducing crash or a slow decline by famine is likely, and that after that the long term objective has to be sustainability—a population which, with due consideration of connectedness, remains below the carrying capacity of the Indian ecosystem. India has a literate middle class of 200 million and 600 million illiterates. The unhappy task of conveying such a message is made perhaps a little easier by the fact that it will primarily be to the middle classes who will not starve. It is surely better that those who are likely to survive beyond a probable famine should be encouraged to hope for sustainability beyond starvation, and to make all the preparations they possibly can, particularly those for ultimate sustainability.

Fatalism is currently out of fashion; man is supposed to be master of all things, and the right programmes are expected to control everything—even entrapment. So let us resolve to do everything possible, comforted that the rest is indeed in the lap of the God(s). One such possibility is surely one-child families. They are certainly difficult, but the alternative is worse.

Postscript. In a discussion after a recent meeting in Oxford, John Seaman, Director of the British Save the Children Fund, agreed that he thought India probably would starve—but that it need not. This is the sure right note to end on. Meanwhile only in 1992 did the government decide that 'the public interest requires that the advertisement of chemical contraceptives for oral use should be permitted'.

15 December 1992

Maurice King

The Institute of Epidemiology

The University of Leeds

Leeds

UK

REFERENCES


3 King MH, Elliott C. Human entrapment. Proceedings of a conference on the demographic trap
48
in Oslo. The Centre for Environment and Development (SUM), Box 1106, Blindern, N-0316 Oslo, Norway (in press).


6 FAO. The state of food and agriculture. 1990:167.


11 Preston S. BBC television Horizon 'Dodging doomsday' 1990 Jun 1.

12 UNDP. Human development report. 1992, Table 4.11.

13 UNDP. Human development report. 1992, Table 13.


**Classics in Indian Medicine**

Sir—Dr Gopalan's paper, 'Kwashiorkor and marasmus: Evolution and distinguishing features', first published in 1968 and reprinted under the column 'Classics in Indian Medicine' in your journal, emphasizes some points which are relevant even today. Broadly, the paper deals with the dietary basis of the evolution and pathogenesis of kwashiorkor and marasmus. Professor Waterlow, while discussing the impact of Gopalan's paper, has stressed that the author's observations were against the generally accepted view at that time. It was held that kwashiorkor resulted from protein deficiency with excess of energy intake from carbohydrates and marasmus from energy deficiency.

Gopalan found that the dietary pattern of children who developed kwashiorkor or marasmus was not qualitatively different from that of other children in a South Indian community, but both kwashiorkor and marasmus were the end results of severe degrees of the same type of protein-energy malnutrition predominant in the rest of the community. He also observed that the quantity of diet was low and some weeks prior to the onset of kwashiorkor even smaller quantities of the same diet were consumed because of diarrhoea and infections. Hence there was a quantitative difference in the diet leading to kwashiorkor or marasmus. The contention that the main bottleneck in the diet was energy deficiency stressed the importance of this factor in the aetiology of kwashiorkor and the irrelevance of searching for protein-rich vegetable foods to reverse the condition. It was suggested that simply increasing the cereal-based diet by about 30% would mitigate protein-energy malnutrition in children. However, the increase in the intake of a poor quality diet, deficient in vitamins and minerals, is not likely to result in growth with an optimal body composition as Gopalan has subsequently asserted.

Gopalan's observations need careful appraisal in the light of current knowledge on the subject, as considerable confusion still seems to exist on the dietary background of kwashiorkor and marasmus. There is a need for clarity in textbooks on the subject. The fact that regional variations do exist, as Gopalan cautiously pointed out, is often ignored. Protein deficiency leads to kwashiorkor and marasmus varies not only from country to country but also from area to area within the same country. For instance, our observations in hospital patients in Calcutta also showed that there was protein and energy deficiency both in kwashiorkor and in marasmus but there was a quantitative difference because we observed that those developing marasmus had been on smaller quantities of the same poor diet than those who developed kwashiorkor.

A review of the literature shows that kwashiorkor and marasmus in children may result from protein and energy deficient diets, where the energy supplied by protein is proportionately adequate or inadequate on the basis of standard dietary recommendations. In some areas, kwashiorkor has been observed in children subsisting on diets deficient in protein but containing adequate or excess energy derived from carbohydrates. The protein is mostly supplied by cereals. Balanced under-nutrition as observed in exclusively breast-fed babies classically leads to marasmus but may occasionally cause kwashiorkor. However, in most of the countries where kwashiorkor and marasmus are prevalent, the dietary deficiency is probably both of protein and energy, and there is usually a precipitating factor responsible for further reduction or restriction of the diet before the onset of kwashiorkor. Of the children on an apparently similar diet some may develop kwashiorkor and others marasmus. The reason for this apparently confusing fact is that the dietary factors in the aetiology are intimately mixed with the stress of infection, sociocultural factors influencing child feeding and rearing and the changing demand for growth with changes in age.

It is practically impossible to isolate the 'causative' dietary factors from the other factors. It is the nutrient available at the cellular level rather than the food consumed that is all important. Due to the combined action of the aetiological factors, which may vary from day-to-day, children on the same poor diet may not only develop kwashiorkor, marasmus or marasmic kwashiorkor, but a number of other syndromes after different time periods. It is mostly because there have been changes in the factors other than the diet over time that the pattern of kwashiorkor and marasmus has changed in India.

In the other part of the paper a hypothesis on the evolution of kwashiorkor and marasmus was put forward. On the basis of some biochemical and experimental observations, it was suggested that there is an attempt at adaptation to the availability of protein and energy by restricting body growth and maintaining the structure and functions of the liver, pancreas and intestine at the expense of the muscles. This adaptation is mild in nutritional dwarfism, extreme in marasmus and its failure results in kwashiorkor. Dysadaptation probably results from feeding excess carbohydrates or from a 'sudden further exaggeration or by prolongation of the stress of protein-calorie deficiency' which causes failure of hormonal mechanisms. The adrenocortical hormones play a very important role. This 'adaptation hypothesis' has not been proved; there is controversy as to what should be called adaptation and what dysadaptation and the reaction to biological stress and dietary requirements may be different in different subjects for unknown reasons. There are other hypotheses too, notably the one of 'free radical damage' proposed more recently. Thus, the aetiology of kwashiorkor and marasmus is almost clear but the pathogenesis is not.

Gopalan's article is widely quoted although the book in which it was published is not available in many parts of the world. It is, therefore, often quoted from secondary sources and not consulted in the original. Thus, the adaptation hypothesis which is comparatively less important is discussed more frequently than the more important original observations on the dietary background of kwashiorkor and marasmus which do not receive their deserved attention. When I reviewed this subject, I had to depend on Gopalan's other papers discussing the adaptation hypothesis and did not find enough information on evolution. Later, with considerable difficulty, I consulted the original article and found that I had missed some very important observations. The reprint of this classic paper in your journal has served a very useful purpose.

26 December 1992
A. K. Bhattacharyya
Former Professor of Nutritional and Metabolic Diseases
School of Tropical Medicine
Calcutta

**REFERENCES**


Another Viewpoint

Sir—Considerable disillusionment and even anger has been expressed by doctors who wish to return to India after several years of training abroad. This is because of their inability to secure appointments with facilities and remuneration in keeping with their ‘latest’ technical know-how and the status that goes with it.

While failing to provide basic health care for the masses, India has nevertheless developed a very high level of specialized medical care though this is chiefly utilized by the urban rich. There now exist well-developed centres for training ‘foreign’ experience over in medical colleges especially those in the large metropolitan cities. The chief beneficiaries of this lopsided system are the medical profession and the burgeoning pharmaceutical and medical instrumentation industry. Together they have converted medicine into a lucrative business even though adequate public’s (poor man’s) expense choose to go elsewhere. Here they will be taught under conditions more akin to their own and not suffer the two-way culture shock which is almost inevitable if they go to the West.

18 December 1992

N. H. Antia
Tata Department of Plastic Surgery
J. J. Group of Hospitals
Bombay

Fraud in Biomedical Science

Sir—I read with considerable interest Arvind Kumar’s letter and L. K. Sharma’s. My impression is that when their article, after being accepted, was returned for ‘minor corrections’ to the corresponding author, the number of patients was increased from 128 (admitted between January 1981 and December 1986) to 155 (by adding cases seen between December 1986 and December 1987), and the names of co-authors and their sequence was also changed. Whereas, Arvind Kumar considers this to be a fraudulent practice, L. K. Sharma, the corresponding author denies it. The letter, however, certainly arouses suspicion and the truth should be sought by a fair investigation.

Unfortunately, scientific misconduct and unfair practices in research are common in India. Giving authorship to heads of departments is usual in our medical colleges; the inclusion or deletion of names of co-authors is decided entirely by the departmental heads who may not have been involved in the research.

There is a need, therefore, for the editors of our medical journals to highlight such malpractices and the unfair treatment of persons who may be of considerable ability. There is often a thin line between misconduct and misunderstanding, and I advise you to follow the example of the Indian Journal of Medical Research, which demands the written concurrence of each author if there is any change in either the names or the sequence of the co-authors.

I view this episode as an encouraging sign. Such incidents must be brought to the notice of the public and to the actual health and socio-economic problems of our country, we have devised remarkably simple and elegant techniques for use in hand surgery, leprosy and burns. Some of these have now even been adopted in western countries.

The offering of time-bound ‘training’ posts in countries such as the UK for postgraduates from ‘need-based’ countries like ours is primarily to attract personnel, trained at our cost, to serve in the lower rungs of their health system while reserving the consultant appointments for their own doctors. This is another form of cheap labour indented from the poor countries.

Students from other Asian and African countries where there are no facilities for undergraduate or postgraduate training in medicine should come to India for training. Here they will be taught under conditions more akin to their own and not suffer the two-way culture shock which is almost inevitable if they go to the West.

10 December 1992

S. S. Sikora
Department of Surgical Gastroenterology
Sanjay Gandhi Postgraduate Institute of Medical Sciences
Lucknow

Indian Medical Journals

Sir—I think it is a shame that we apply double standards and continue to criticise the content of Indian medical journals. On the one hand, candidates for faculty positions are asked to specify the number of articles published in foreign journals separately (because such articles must be good to be accepted by them) and on the other, we blame Indian medical journals for publishing articles of inferior quality. Thus, anyone who wishes to pursue a successful academic career would be foolish to send a good article to an Indian medical journal. How, then, do we expect the standards of Indian medical journals to improve? In fact, a few years ago, a high powered review committee assessing the work of the All India Institute of Medical Sciences asked each department to list the publications in foreign and Indian journals separately.

All-of us who criticize the quality of Indian journals send our best work abroad. The only articles we send to Indian journals are those which are unlikely to be accepted by foreign journals or which have been rejected by them. I completely disagree with Dr P. N. Tandon’s statement ‘as is your science, so are your journals’. I will wager that even his best papers have been published in foreign journals. Indian journals do not represent the best of science in India. The quality of Indian medical research would be better assessed if all articles resulting from work done in India which had been published in foreign journals were collected. If we want the standard of Indian medical journals to improve we have to first change the attitude of our policy-makers.

14 December 1992

R. Tandon
Sitaram Bhartia Institute of Science and Research
New Delhi

REFERENCE


REFERENCE