

Child malnutrition and deprivation - observations in Guatemala and Costa Rica

Leonardo J. Mata

Traditional populations consisting of small tribal groups living in close contact with nature may be virtually free from endemic malnutrition owing to the relative absence of infectious diseases. Transition toward modern ways of life and population growth, leading to crowding and underdevelopment, favours endemic malnutrition due to the interaction of malnutrition and infection. Although important features of the traditional culture — breast-feeding, protective child rearing — may remain intact, they are not enough, and such populations exhibit high rates of infectious disease, malnutrition and premature death. In modern industrialized societies, malnutrition often appears related to child abuse and neglect. Organic and metabolic forms are observed but social pathology appears to be the main determinant of most malnutrition observed.

Prevention and control of malnutrition requires improvement of the environment and interventions applied in a holistic manner. Emphasis should be given to education and maternal technology, and to promotion of mother-infant interaction, breast-feeding, adequate weaning procedures and detection of factors that may lead to child deprivation and abuse. Improvement is feasible for most developing nations if social forces become conscious of the needed changes, but positive elements of traditional culture should be preserved.

Feral animals living in small groups in their natural setting enjoy a varied diet and are relatively free from pathogenic infectious organisms. Malnutrition does not readily occur under these conditions. Such is the case of primates living in the wild and probably of man the hunter-gatherer. The evolution of human society from the traditional small tribal group to the crowded city-state, had to overcome logistic difficulties such as the feeding of large numbers of people. At the same time it increased the opportunities for the spread of endemic and epidemic diseases. The socio-evolutionary process also brought in its train endemic chronic and severe protein-energy malnutrition (PEM) (Mata and Mohs, 1978).

SATISFACTORY NUTRITION IN A TRADITIONAL SOCIETY — GUAYMÍ ABORIGINES

The author recently had the opportunity of studying an isolated traditional society living in harmony with its environment. In Villa Palacios, in Costa Rica, the Guaymí live in dwellings scattered in the forests and jungles bordering Panamá. Women deliver babies at home in the traditional way, effective mother-infant interaction begins at birth, and breast-feeding is customary. These circumstances seem to ensure an adequate level of nutrition and health disturbed only by occasional epidemics of infectious diseases following the arrival of visitors or travel outside the village. Weaning was not studied in detail but the healthy condition and stocky build of mothers would indicate that an infant's supply of human milk is adequate in the first year of life. Weaning begins after six months with the introduction of poorly prepared traditional foods.

Dr Leonardo Mata is Professor and Director, Instituto de Investigaciones en Salud (INISA), University of Costa Rica, Ciudad Universitaria 'Rodrigo Facio', Costa Rica.

The diet is monotonous and, by western standards and international dietary recommendations, poor in quality and quantity, consisting mainly of rice and plantain.

The prevalence of stunting of infants (deficit in height for age greater than 10 percent), which is probably influenced by small size at birth, was doubled in the second year of life. However, wastage (deficit in weight for height greater than 20 percent) was not observed (Figure 1), a situation contrasting with other Indian populations such as the San Blas of Panamá and Cakchiquels of Guatemala. There is no adequate explanation for this phenomenon of progressive stunting without development of wasting, but it may be due to a subtle nutritional deficiency.

The marked isolation of Guaymí dwellings contrasts with the crowded situation of other Indians. It is apparent that better nutrition and health may result from adequate child-rearing practices in an environment relatively free of stress, especially infection, even in the absence of abundant and well balanced diets. Child mortality among the Guaymí may be high, however, due to epidemics of communicable disease that result after infectious agents are introduced into the community.

MALNUTRITION IN A TRADITIONAL SOCIETY — CAUQUÉ INDIANS

The genesis of PEM in a traditional society was observed during a study of infants from birth until school age in Santa María Cauqué, a Maya-Cakchiquel Indian village located in the Guatemalan highlands (Mata, 1978a).¹ This traditional village is in slow transition toward modern ways of life, and resembles many other crowded and poor communities of Latin America. The dominant features of the village are socioeconomic underdevelopment, preservation of traditional ways of child birth and child-rearing (Figure 2), and subsistence on traditional agriculture.

The present health problems have their roots more in the widespread poverty, low state of community development, and high demographic growth, than in the innate culture of these Mayan Indians. More than

40 percent of infants are of low birth weight and four-fifths of them experience foetal growth retardation. Foetal maturity influences postneonatal infant and preschool mortality, but malnutrition/infection is the most important factor. Deficits in physical growth are correlated positively with birth weight and gestational age, and with high rates of infection and dietary deficiency.

Cultural and ecological factors determine that all children are breast-fed to some extent for the first two or three years. Supplementation of breast-feeding begins at two to six months with fluids and gruels of low nutritional value and low level of hygiene; solid foods such as tortillas, beans and vegetables, are introduced later. The change from breast milk to an adult type of diet is protracted. Mothers do not have the knowledge or facilities to prevent infection. Cultural factors also account for the limited knowledge of food preparation and hygiene, and of foods to complement the caloric intake of children. Bulky and low-nutrient foods coupled with infection result in weanling diarrhoea and growth retardation of infants and toddlers. By age two years, most children are stunted and more than one half have a deficit of weight for height (wastage). Nevertheless, the diet of young Cauqué Indians appears better than that of the Guaymí aborigines (among whom wastage was not observed).

Infection, particularly enteric, stands out as a main determinant of PEM as it injures or alters the functioning of the intestinal mucosa, inducing malabsorption, nutrient loss, growth retardation and wastage. Infection in Cauqué was excessively high when compared with more advanced societies. The small infant is relatively protected from infections through transplacental immunity, factors in breast milk, and the indigenous microbiota. After the first months of life, however, resistance fades and the child begins a series of debilitating episodes. The effects of the interaction of infection and deficient diet are weanling diarrhoea and repetitive acute respiratory disease, with longer duration of disease, frequent weight loss and ensuing growth retardation. The critical period is from six to thirty months, when PEM, growth retardation, and mortality are most evident.

After the child has become immune to

¹ The author's book is reviewed on page 51.

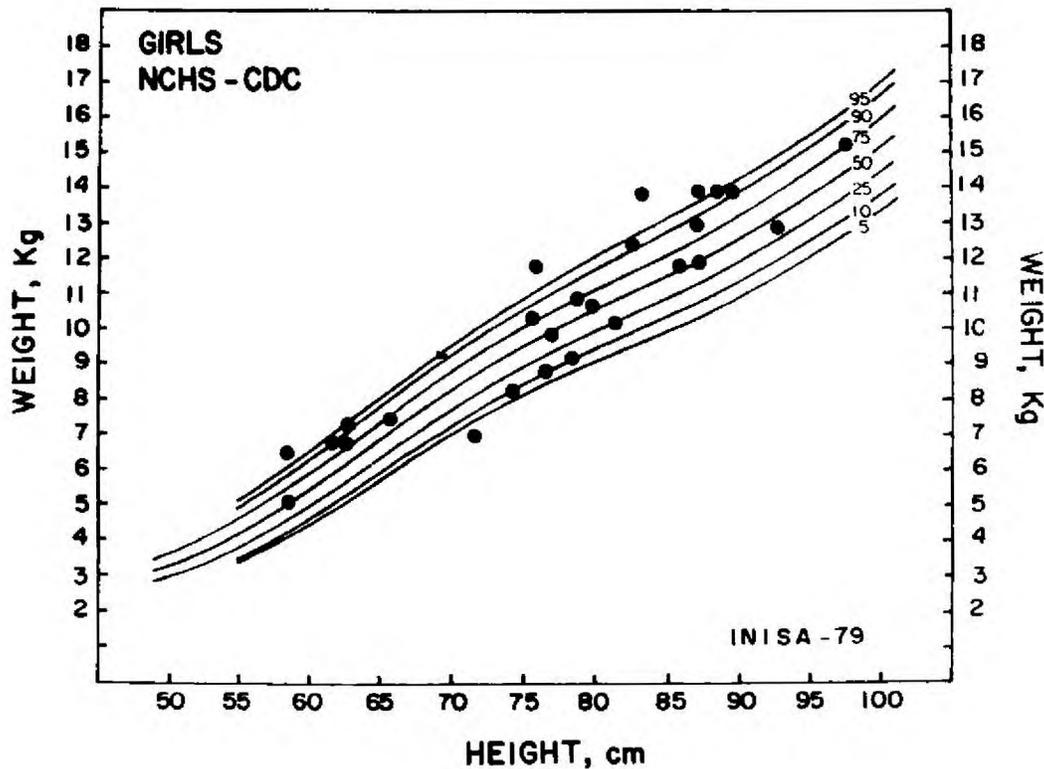


Figure 1. Weight for height, all Guaymi girls less than five years old, Villa Palacios, Costa Rica. The girls had an adequate nutritional state according to the NCHS-CDC growth charts (National Centre for Health Statistics, Rockville, Md - Centre of Disease Control, Atlanta, Ga). The situation for boys was similar.

the commoner infections he does better with the local diet. Around three years, he replenishes his bodily reserves and improves growth; however, stunting and wastage often remain. Older children, adolescents, and adults are seldom affected, but severe malnutrition may appear in old age, primarily due to a limited ability to obtain food.

While infection plays a major role in the genesis of malnutrition, the ultimate causes are the low socioeconomic development, deficient education, and low environmental sanitation. In this regard 'maternal technology' is a distinct determinant of the malnutrition complex (Mata, 1979). Maternal

technology pertains to practices, traditions and beliefs relating to food preparation, feeding techniques, child care during illness and convalescence, handling of drinking water and of faeces, and personal hygiene. It is important to note that some mothers exhibit an innate high level of technology, independent of their upbringing or schooling. Thus, they keep drinking water in a separate container or boil it, they breast-feed through a child's illness and convalescence, and they prepare nutritious and wholesome porridges, purées and mashes from foods available locally. That is why some infants and young children in a community thrive well under village conditions.



Figure 2. A Cakchiquel mother and young child from Santa María Cauqué, Guatemala. The mother prepares tortillas from corn dough while nursing. A large earthen jar stores the all-purpose water. (Author's photo)

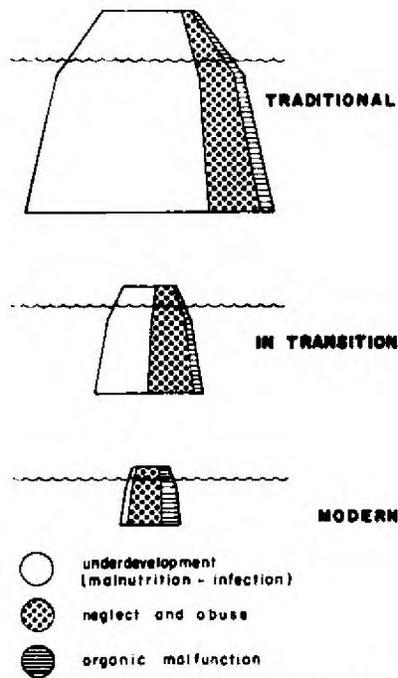


Figure 3. Schematic representation of the 'iceberg of malnutrition'. The iceberg decreases in size and changes in composition as society evolves from the poor traditional to the affluent modern way of life.

No intentional child abuse was documented in Cauqué during the ten-year period of observation. However, the possibility that social pathology induced some malnutrition in this village, cannot be ruled out. Abnormal maternal behaviour, described in Colombia by Wray and Aguirre, 1969, as lack of 'maternal competence', results in neglect and aggression to the child. It leads to improper feeding and care of children and may account for increased mortality.

Improvement of the living conditions in Cauqué (particularly in health services) resulted in fewer deaths, no corresponding decrease in births and a population growth rate of more than 3 per cent per year. Demographically the land is now saturated, a situation applicable to Guatemala as a whole and other Central American countries. In this connection Scrimshaw's (1978) view that population pressure alone is an important determinant of child deprivation and malnutrition, is relevant.

MALNUTRITION IN A SOCIETY IN RAPID TRANSITION — COSTA RICA

The origin of PEM in societies in transition is often different from that described for traditional communities. First, characteristics such as early mother-infant attachment and ensuing breast-feeding have been disturbed by obstetric practices and artificial feeding. Secondly, there is a pronounced increase in social pathology, i.e. stress and anxiety, alcohol and drug consumption, family disruption and aggression (Mata and Mohs, 1978).

In Costa Rica, national health indicators are favourable: infant mortality is 23 per 1000, diarrhoeal disease death rate is 11 per 100 000, no cases of poliomyelitis or diphtheria deaths have been recorded in the last seven years and life expectancy at birth for women is 73 years. Chronic and severe malnutrition are clearly decreasing rapidly and are practically confined to the first months of life. On the other hand, most malnourished cases have a widespread background of low birth weight, failure to breast-feed, hospitalization, family disruption, alcoholism in the family, and other forms of social pathology. The reasons for this can scarcely be unavailability of food as many mothers of malnourished children are overweight or

obese. Inadequate maternal technology and competence must be cited as a dominant feature in this society which is rapidly moving from the extended traditional to the nuclear- and often stressful- family of modern times. This is clearly apparent in the large urban centres, slums and 'misery rings', and is becoming noticeable also in semi-rural and rural areas.

A recent analysis (Mata, 1979) of battered children brought to the National Children's Hospital in Costa Rica in 1977, revealed that low birth weight was four to five times more frequent among them than in the general population. There were four to seven times more cases of wastage in battered children. The majority had not been breast-fed, and many had a history of recurrent hospitalization. Overt malnutrition was far more prevalent among abused children compared with the general population. Since a prolonged period is required to induce the above conditions, it can be postulated that deprivation and neglect led to malnutrition, and that the battering that resulted in hospitalization of the child was the culminating event of an earlier nutritional deprivation. It can be inferred that nutritional deprivation without battering occurs even more frequently in transitional societies. The role of deprivation in the syndrome of 'failure-to-thrive' and other forms of malnutrition in modern societies is important and is being increasingly recognized (Kempe and Kempe, 1978; Pollitt, 1976; Pollitt *et al.*, 1975).

THE 'ICEBERG' OF MALNUTRITION

Child malnutrition can be visualized as an 'iceberg' that changes in size and composition according to the degree of evolution of the society from traditional to modern ways of life, (Figure 3). (The Guaymí are not represented in the figure since malnutrition is not prevalent among them.)

The largest iceberg corresponds to traditional, rural, crowded and poor populations like Cauqué. Chronic malnutrition (represented by the area 'under the water') is due to underdevelopment and poverty, which favours malnutrition/infection interactions; severe PEM (area 'above the water') is precipitated by infection, lack of maternal competence and technology, and deprivation. The organic causes of malnu-

trition (e.g. inborn errors of metabolism) are important but are masked by other etiologies.

In transitional societies the iceberg is markedly smaller. As the population attains a higher level of income and development, chronic and acute PEM of the classical type tend to decrease, making more obvious the forms due to neglect — deprivation and abuse. Malnutrition of organic origin becomes a subject of public attention but its relative importance is small.

In modern industrialized countries most of the malnutrition observed is due to neglect and deprivation. Since its overall prevalence is low, malnutrition of organic origin acquires prominence; for instance that associated with cystic fibrosis or metabolic and immunological abnormalities. Nevertheless, some malnutrition due to poverty can occasionally be observed in modern societies.

INTERVENTIONS

Historically, poverty and underdevelopment have been attributed to a tendency of rural populations to remain entrenched in their traditions, customs and beliefs, and to an inability to assimilate progress effectively. However, it would be illogical to consider the historical background of the Mayans, for instance, as responsible for their slow progress. Traditional cultures offer positive features for child growth and survival, enabling them to thrive under adverse environmental conditions and develop into individuals who are healthy in body and mind.

The trained observer cannot avoid diagnosing village health problems and asking if feasible solutions can be evolved and implemented. The most pressing problems are related equally to population increases (with the attendant restricted availability of land), poverty and child deprivation, and a low level of education and lack of technology; the last is accentuated by different rates of cultural development of urban and rural groups, and by ethnic prejudice.

To recommend interventions capable of improving health and growth of village children calls for responsible and careful analysis.

The medical conscience places undue emphasis upon hospitalization and nutrition recuperation in the management of malnutrition; such measures commonly fail to grasp the nature of the problem, and lack information or adequate logistics for implementation and evaluation.

Successful intervention in populations like Villa Palacios and Cauqué is difficult because practically every variable susceptible to individual modification is related to some other; the change in one will not necessarily be associated with benefits in another, or even may result in long-range deleterious effects. In practice, interventions by international, governmental or scientific organizations in terms of family planning, nutrition supplementation, immunization, and even agricultural extension have often failed to improve nutrition and growth significantly when implemented individually in the absence of improved education and living standards.

In societies in transition isolated interventions, which emphasize the therapeutic instead of the preventive aspect as opposed to the holistic approach, have attracted most attention. But failure to recognize the origin and nature of the problem and to implement holistic measures has resulted in an enormous waste of resources with little change in the overall health situation (Mata, 1978 b). Emphasis on clinics, hospitals, and of research centres for malnutrition, abandoned children or alcoholism, often results in 'institutionalization' of the problem, rather than its understanding, control and prevention.

RECOGNITION OF HEALTH PRIORITIES

Traditional and transitional societies would no doubt benefit from an overall improvement of their environment. This should comprise better opportunities for education; an increase in food availability; and better child care, family planning, environmental sanitation, and hygiene.

Education is the most pressing single need for development. Difficulties encountered in improving education stem from an inability to cross the cultural barrier. Limited knowledge exists as to how people think and what they should learn and in what way. Teaching systems among the Mayan Indians, for example, are those introduced from the capital cities after being

imported from Europe or the United States. The curricula consist of orthodox educational programmes that fail to grasp problems. For instance, there is no consideration of the elements to enhance maternal competence, appropriate technology and rural life.

Food supply is intimately related to land distribution. With population growth the amount of land per family in villages is becoming insufficient as emphasized by Eckholm (1978). Ameliorative measures such as rational crop planning, improved agricultural production, or even alternative activities are not always instituted as soon as they should be. Land saturation is responsible for increased migration to the cities, and enhances poverty and deprivation.

Community development is an important factor, since the process of transition to modern ways of life is inevitable in today's world. Community development should be a planned activity comprising improved health services, environmental sanitation, and organization of villagers to promote higher levels of living and wellbeing.

Research is clearly essential but

there is a need for a better definition of priorities — nutrition, infection, child neglect, deprivation and abuse, childhood mortality, population growth — and a reorientation of effort. In the past too much support has been given to clinical and laboratory studies of severe PEM, and too little emphasis has been placed on long-term epidemiologic studies of its causality and preventive aspects.

IMPLEMENTATION OF INTERVENTIONS

To the question of how interventions should best be carried out, answers will not be immediately available in most instances. Individuals responsible for advice on specific actions commonly do not know enough about the origin and nature of the problem (Mata 1978 b). Furthermore, there has been a neglect of methodology pertaining to transfer of available knowledge to target population groups.

Measures applicable to various situations are outlined in Table 1. The need for a holistic approach is again emphasized.

National and international redefinition of priorities and of the avenues of required

Table 1. PRIORITIES FOR PREVENTION AND CONTROL OF MALNUTRITION

Aetiology	Priority	Community status	Preventive and control measures, by priority
Natural disaster	1	Traditional to modern	Relief services; resettlement of population.
Socioeconomic underdevelopment	1	Traditional, transitional	Education; agrarian reform; increase in income; health services; nutrition programmes.
Social pathology	1	Traditional to modern	Hospital norms; protection to mother; increase in income and employment; health and welfare programmes; family rehabilitation and counselling.
Alteration of ecosystem	2	Traditional to modern	Protection of environment; rational use of land and water; reforestation; resettlement of population.
Organic, metabolic	3	Transitional, modern	Early treatment; genetic counselling.

action should be a continuous process. Problem solving at the level of the different kinds of population requires changes in some areas along with strengthening of traditional elements. This is possible only when all social improvement forces work together toward that goal.

A QUESTION OF ALTERNATIVES

It is a matter for debate as to how rapidly measures should be taken, or whether it is in fact possible to implement them under conditions of civil harmony. While the general impression may be that many developing countries are evolving all too slowly some observers feel that further progress and development can be expected within a few generations. However, population saturation of the land, maintenance of high infection levels, increase in child neglect and violence, and economic depression could bring more malnutrition and deprivation in the future to some countries, or at best maintain the present levels in others.

The question is not whether change should occur but whether sufficient progress will be made before population numbers become too great. To continue at the present rate appears dangerous. The solution is in the hands of national leaders, scientists, health workers, and the population itself.

A degree of international cooperation is definitely required. This should be oriented towards more intensive distribution of economic benefits, and of firsthand technology and scientific knowledge to the less developed nations through extensive programmes for leadership training, through cooperation in the world balance of prices of trade goods, and through aid in implementing plans considered important by the recipient countries.

The studies reported have identified health and growth problems of children and their causes, and have led the author to realize that any attempt to provide answers to at least some of the questions must recognize cultural and socioeconomic factors. The governments and nations, must apply such current knowledge as is essential to an effective national policy of development, without significantly depreciating the positive values of the inherent social culture.

Acknowledgment

Support for the studies reported has been received from the 'Food and Nutrition Project', Office of the President, Costa Rica; and from the Vice-Presidency of Research Affairs, University of Costa Rica, Costa Rica.

(Manuscript received October 1979)

REFERENCES

- Eckholm, E. *Losing ground. Environmental stress and world food prospects.* 1978 W.W. Norton & Co. Inc., New York.
- Kempe, R.S. and Kempe, C.H. *Child abuse.* 1978 Fontana/Open Books, London.
- Mata, L.J. *The children of Santa María Cauqué. A prospective field study of health and growth.* The MIT Press, Cambridge, Mass.
- Mata, L.J. The nature of the nutrition 1978(b) problem. In: *Nutrition Planning. The State of the Art.* Joy, L. (editor). IPC Science and Technol. Press. Ltd., Surrey.
- Mata, L. The malnutrition-infection complex 1979 and its environmental factors. *Proc. Nutr. Soc.*, 38: 29-40.
- Mata, L.J. and Mohs, E. As seen from 1978 national levels: Developing world. Chapter 23 in *Progress in Human Nutrition*, vol. 2, Margen, S. and Ogar, R.A. (editors). Ari Pub. Co., Inc. Westport, Conn. p. 254-264.
- Pollitt, E. Behavioural disturbances among 1976 failure-to-thrive children. *Arch. Am. J. Dis. Child.*, 130: 24-29.
- Pollitt, E., Eichler, A.W. and Chan, C-K. 1975 Psychosocial development and behaviour of mothers of failure-to-thrive children. *Amer. J. Orthopsychiat.*, 45: 525-537.
- Scrimshaw, S.C.M. Infant mortality and 1978 behaviour in the regulation of family size. *Pop. and Develop. Rev.*, 4: 383-403.
- Wray, J.D. and Aguirre, A. Protein 1969 calorie malnutrition in Candelaria, Colombia. 1. Prevalence, social and demographic causal factors. *J. Trop. Ped.*, 15: 93-97.