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As Seen From National Levels: Developing World

The grim realities involved with the solution of such world problems as food, energy and pollution make it difficult to address such issues with optimism (Meadows *et al.* 1972; Mesarovic and Peste! 1974). On the other hand, these challenges to man's survival stimulate the search for explanations, causes and corrective strategies.

The evolution of nutritional concepts over the past twenty years demonstrates that well-established principles have broken down while unorthodox ideas have been embraced with almost religious fervor. Until recently, malnutrition was thought to be caused solely by a lack of food; to cure it, one merely provided additional foodstuffs. In the past, the emphasis was on protein, with little regard for calories. It was also believed that some kind of development was needed to improve the quality of life; more often than not, this meant industrialization.

We now know that culture plays a decisive role in the appearance of malnutrition, whatever the society. We shall attempt to describe the cultural and biological changes which have affected health and nutrition, using concepts and examples which can be applied to the inhabitants of the Americas (particularly those living in tropical and subtropical regions). Our emphasis will be on the evolution of our own country, Costa Rica.

EVOLUTIONARY CHANGES AND THE ORIGINS OF MALNUTRITION

∇ The more we work in the field, the more we come to realize that malnutrition is a disease caused by man himself, and more specifically, by human society. Apparently primates (like other animals living in the wild) do not suffer from malnutrition unless handicapped by a birth defect or postnatal injury, or exposed to natural or man-made disasters. Such events generally eliminate the individual (Morris 1967; van Lawick-Goodall (971), or result in increased mortality, thus exerting control over population growth and the accumulation of defective biological attributes. While the reasons for this general absence of malnutrition in wild animals are not entirely clear, one may presume that their highly diversified diet is a determining factor. Moreover, primates constantly move away from defecation sites; when coupled with relatively low population density, this behavior makes it difficult for pathogens to persist within the community.

During man's early history in the Americas, he lived in small buntinl

and gathering groups. Breast-feeding was widely practiced (as it still is today among the Indians of the American Highlands). It seems likely that malnutrition was not very prevalent among such groups because their diet was diversified and infectious agents which entered the colony were eventually eliminated.

However, man was so successful in terms of reproduction that large, dense populations came into being. Such a demographic accomplishment presented logistical problems in terms of feeding the larger community. Villagers and city dwellers began to rely more heavily on maize and other domesticated plants. There were other complications as well, such as depletion of wild life, the destruction of forests and the deterioration of the la- " (Recinos 1950; Struever 1971).

Two important changes occurred during this process:

(1) Man shifted from a diversified diet to one consisting of a cereal and a complementary food (maize and beans, for example); and

(2) Human society evolved from tribal groups composed of a few families to communities embracing a large number of individuals.

The first shift involved a deterioration of the diet; the second increased the probability that diseases would spread, and more important, that pathogens would persist in the community and be enhanced. These social and biological changes probably marked the appearance of malnutrition as an endemic disease: before that time, the diet of early Americans seems to have been adequate (Coe 1966; Von Hagen 1970).

European involvement in the Americas, beginning at the turn of the 15th century, introduced differing food habits into aboriginal cultures. At the same time, many hitherto unknown viruses and bacteria were also introduced, causing much suffering, malnutrition and death among these susceptible populations (Dubos 1959).

There is good reason to believe that malnutrition was not very prevalent in Spain itself during this period. Writing from the 17th century describes well-balanced diets, and often manifest an innate knowledge of good nutrition (de Cervantes-Saavedra 1965). Strangely enough, the emphasis on a rich and diversified diet persisted among the Spanish descendants. For example, inhabitants of rural Costa Rica characteristically eat *olio de CIUM* (meat pot), a steaming casserole of vegetables, cereals and meat. When recorded some 25 years ago, the descendants of the Spaniards and the Chorotega Indians had a good diet (Wagner 1958). On the other hand, the Spanish often had to adopt such unknown foods as maize, and at times experienced hardships and famine.

The Spanish presence in the Americas seriously disrupted Indian culture. The aborigines were robbed, exploited and killed; their civilization was undermined in nearly every respect. The results of such a collision of cultures can be seen today among the Indians of the American Highlands

and among the Plains Indians of the United States (Mata 1976; McLuhan 1971). It seems likely that the spread of malnutrition among Indian populations was largely the result of the social disruption brought about under European domination.

Spanish and mestizo populations were somewhat better off than the Indians, but malnutrition nonetheless occurred as the result of poor diet and infectious disease. From colonial times up to the present, malnutrition has appeared as a consequence of seasonal changes, war, or natural disasters affecting food availability.

WORLDWIDE GAINS IN NUTRITION AND HEALTH

In 19th century Europe, improvement in the way of life reduced the mortality rates in respect to many important infectious diseases (Kass 1971). It is important to note that European nations at that time were as underdeveloped as the Central American countries are today. These improvements in health were recorded before either the etiology or measures for the control and prevention of such diseases were known, thus pointing up the role of social determinants as a causal factor.

A recent analysis of the nutritional situation reveals improvement in nearly every part of the world, except where natural or man-made disasters have occurred (Mesarovic and Pestel 1974; Turnbull 1972). While such a trend points toward bettered socioeconomic conditions throughout the world, the level of improvement seems too modest to cope with current and expected projections of food availability and energetics.

Observations in a typical Guatemalan village showed that many Mayan traditions and beliefs have been preserved (Coe 1966), and that these relate principally to childbirth, infant feeding and family or communal organization. However, other features, such as ruralism and traditional agriculture, have deteriorated. In the past few decades, there has been a consistent decrease in the mean gross domestic product throughout most of rural Guatemala. In many nations, the lack of satisfactory land reform and social justice programs has caused a progressive saturation of the land, without alternative employment for the young (Mata 1976). Demographic pressure, poverty and slums have been the result. It is difficult to predict the future for nations displaying this pattern, but it is safe to say that disaster seems inevitable unless significant social transformations are effected and considerable international cooperation employed to alter present conditions (Mata 1975).

(Countries like Cuba, Jamaica and Costa Rica seem to be better off, but it is not certain whether present trends will continue, or even if the observed changes are wholly desirable).

Costa Rica is an agricultural nation of some 2 million inhabitants located 10° north of the equator. Its economy is based on the export of

coffee, cattle, bananas, sugar and cacao. At the end of the 19th century, its capital city, with some 25,000 people, was described as one of the filthiest cities in the world, with a death rate (Table 23.1) of 41 per 1000 (Jimenez and Jimenez 1901). Since then, there has been a progressive decline in mortality due to diarrhea and other communicable diseases. As seen in

TABLE 23.1
DEATHS PER 1000 IN CITIES AROUND 1894

Berlin	16.3
Stockholm	16.9
London	20.0
Rome	27.6
Venice	30.1
San Jose, C.R. ¹	.407
Alexandria	52.9

¹Crude death rate for Costa Rica in 1974 = 5.3.

Table 23.2, the rates of mortality from diarrhea and dysentery were 82 and 157 per 100,000 respectively. The rate of death from diarrheal disease was reduced by half within 70 years; a further 50% reduction was effected in only 4 years (Moya 1975). A similar situation can be noted in regard to communicable childhood diseases and malnutrition (Table 23.3). An infant mortality rate of 250 per 1000 live births in 1920 had dropped to 84 per 1000 by 1953, and then remained stable for a decade. In 1974, the rate had declined to 38 per 1000. Even more significant is a reduction in the second year death rate from 12 per 1000 in 1953 to a mere 2 per 1000 in 1974.

These improvements in mortality statistics are particularly significant, since they were accompanied by a decline in the birth rate to 30 per 1000 in

82

TABLE 23.2
DEATHS PER 100,000 DUE TO DIARRHEA, GASTROENTERITIS AND COLITIS. SAN JOSE (1900) AND COSTA RICA (1970-1974)

Year	Diarrhea (0091)	Gastroenteritis and Colitis (0092)	All
1900	82.0	157.0 ¹	
1970	18.4	51.5	70.7
1971	18.7	36.5	56.4
1972	24.1	29.9	55.4
1973	18.7	25.6	45.2
1974	12.1	14.2	27.4

¹The figure 157 likely included codes 0049, 0060, 0069, 0083, 0090, 0091, and 0092.
²Dysentery

TABLE 23.3
HEALTH INDICATORS IN COSTA RICA

	1953	1964	1973	1974
Births per 1000	48	44	29	30
Infant deaths per 1000	84	82	43	38
Deaths 1-4 years per 1000	12	7	3	2
Total infant ¹ deaths				
Malnutrition	346	290	52	57
Diarrhea	937	1500	600	402
Lower respiratory disease	276	609	191	161
Immaturity	172	782 ₂	556	626

¹Deaths under one year.

²A change in definition of certain causes of death affected this category.

1974. In that year, there was enough room for all children entering school, and some rural schools registered fewer first grade pupils.

Until 1971, the reduction in infant mortality was primarily due to decreased mortality in the postneonatal period (Table 23.4). In recent years, however, both neonatal and postneonatal mortalities have declined, indicating improvements not only in the environment of the child, but also in that of the mother and neonate.

The gains shown in these health indicators parallel several national interventions. For example, in 1968 Costa Rica reached the 1970 goals for water supplies which had been set at the Conference of Punta del Este: the 1980 goals of the Santiago Conference were achieved by 1974. At the present time, piped water is available to nearly all city dwellers, and to a large number of rural citizens as well. The eradication of malaria has demonstrated similar success: in 1974, there were fewer than 150 reported cases of the disease, and half of those had been imported from neighboring countries. Moreover, in 1975 we had raised our per capita income to about

TABLE 23.4
NEONATAL AND POSTNEONATAL INFANT
MORTALITY RATES¹, COSTA RICA 1965-1974

Year	Neonatal (0-28 days)	Post neonatal (29 days-II months)	Infant (0-11 months)
1965	27.2	48.9	76.0
1967	24.3	38.0	62.3
1969	25.4	41.7	67.1
1971	28.7	27.8	56.4
1973	20.8	24.0	44.8
1974	17.7	19.8	37.6

¹Per 1000 live births.

\$800. Food production has increased, with a record bean crop in 1974 and a record rice crop in 1975. We now produce an excess of both calories and proteins, a good part of which are exported. GAFICA projections suggest a favorable food situation in Costa Rica.

The interrelationship between malnutrition and mortality in Latin America has been well-documented (Mata 1975; Mata 1976; Puffer and Serrano 1973). Thus, it is no surprise that better nutrition and growth in children has run parallel to the control of infectious diseases and improvements in the quality of life. We have already mentioned the significant drop in deaths due to malnutrition, and in the communicable diseases often associated with malnutrition. Surveys conducted by INCAP (1966) and the Ministry of Health (Dial. 1975; Moya 1975; Villegas 1975) have provided a good deal of nutritional information. A representative sample of children under 5 years was examined in 30 rural communities. The comparative results (similar methods of data collection were used in each survey) showed marked changes in child nutrition over the nine-year period. Using the weight for age relationship and *the* Iowa standard, 41% of the children under one year in 1966 had weight for age deficits of 10% or more (Mata *et al.* 1976), as compared to only 28% in 1975 (Table 23.5). Moreover, the

TABLE 23.5
PREVALANCE (%) OF OVERWEIGHT¹ AND UNDERWEIGHT¹ CHILDREN
IN 2 SURVEYS OF 30 COSTA RICAN RURAL COMMUNITIES

Age (years)	1966 Survey (n = 791)		1975 Survey (n = 1910)	
	Over	Under	Over	Under
<1	10.6	40.9	19.7	28.3
1	2.8	56.7	6.5	47.1
2	1.7	58.1	8.4	53.4
3	2.4	54.5	5.4	50.4
4	2.8	63.9	4.1	63.8
Total	3.8	57.1	8.3	49.6

¹Overweight = > 110% for age.

¹Underweight = < 91% for age.

number of children displaying excess weight for age more than doubled during that time (3.8% in 1966, 8.3% in 1975).

Even more significant changes have occurred among infants. In this case, height is a better indicator of nutritional status. As seen in Table 23.6, 7% of the children under 5 examined in 1966 were stunted (i.e., showed a deficit in height of 10% or more) when compared to the Iowa standard (Mata *et al.* 1976); in 1975, only 7% were stunted. Again, the most dramatic changes occurred in the first year of life.

TABLE 23.6
PREVALENCE (%) OF STUNTING¹ IN CHILDREN
IN 2 SURVEYS OF 30 COSTA RICAN RURAL COMMUNITIES

Age (year)	1966 Survey (n = 791)	1975 Survey (n = 1910)
<1	4.6	1.3
1	14.8	5.8
2	20.4	9.2
3	20.6	9.1
4	21.1	9.5
Total	16.9	7.2

¹Stunting = <91% height for age.

But while these data unquestionably demonstrate an improved nutritional status over the past nine years, they also reveal that a good many children still fail to reach their optimal growth potential. Current inflationary trends could cause this situation to worsen, and might well interfere with the consolidation of present gains. Inflation seriously affected wages and food prices in the Guatemalan village (Mara 1975), and a similar phenomenon is taking place in Costa Rica.

How can we explain this progress in Costa Rica, an agricultural society which was originally one of the poorest nations in Central America? This is, of course, an area of much speculation, but three factors seem to have played a decisive role:

- (1) A relative homogeneity in the population which prevented the marked class distinctions so prevalent in other Latin American nations;
- (2) Governmental emphasis on education over the past century, leading to a present illiteracy rate of only 14%; and
- (3) Peaceful social reform which began in 1940 with the passage of labor legislation, the creation of a social security system, the development of housing, and the initiation of an income tax and other forms of income redistribution. In 1975, the government distributed \$40 million obtained from sales taxes levied on high income groups among the rural population under the terms of the *Asignaciones Familiares* (Family Allowances).

The most important fact is that the improvements in health and nutrition were based on social reforms, better environmental sanitation and a rise in the standard of living. There is no apparent relationship to scientific developments in nutrition; in fact, few papers on nutrition have been written by Costa Ricans. Little nutritional research is being conducted, and the nation's twenty nutritionists are engaged either in applied governmental activities or collective alimentation programs. Nor does it appear that the improved health and nutrition is related to any of these applied nutrition

programs. Thus, it would appear that social determinants and poor health are the most important components of malnutrition.

RELATION OF CULTURAL CHANGES TO HEALTH AND NUTRITION

No matter how strong a society's traditions and beliefs might be, Western culture is very successful at neutralizing or altering them. We do not know if cultural changes occur at different rates in capitalist or socialist industrial societies; in view of our geographical location and historical background, we prefer to refer to the former.

Cultural influences on developing nations have modified food habits, hygienic practices, family and social organization, productivity, mental and moral attitudes and health and welfare. While the results have been positive in many respects, there has also been considerable damage, much of it irreversible. A greater variety of foods in greater quantities has become available to certain sectors of the population, but the diet of the poor remains deficient. The breast-feeding period has been shortened primarily in urban populations, but the villages have not been spared. Adoption by the young of such foods as potato chips and carbonated beverages represents an economic waste which contributes to malnutrition. (Any increase in protein or calorie intake beyond that required by adults favors obesity and certain degenerative diseases.)

Consumerism is not confined to food habits, but affects every aspect of life. An emphasis on the acquisition of material goods fosters waste. This trend toward an exaggerated utilization of resources and greater environmental contamination has become increasingly evident in underdeveloped countries. To assess our responsibilities in regard to cultural evolution is beyond the scope of this paper. Nonetheless, it is evident that it is both unrealistic and dangerous to follow the model of the developed industrial nations.

ON MODELS OF DEVELOPMENT

The leaders of developing countries tend to favor models based on the United States and Western European nations. As a result, we came to believe that schools and universities would solve the problems of education, that hospitals and physicians would eliminate health deficits, and that machinery, chemical fertilizers and highways would take care of the food situation. The failure of these utopian schemes led to despair and frustration among scientists, planners and politicians.

While these concepts are still being reviewed (Wade 1975), we realize that there must be alternatives to that orthodox approach. For example, some distinguished contemporary philosophers have pointed out that the apparent health in some modern societies is a mirage (Dubos 1959; Illich

1975}. And one wonders about the connections between industrial development and recent increases in prematurity, mental disorders, urban violence and drug abuse.

Referring again to Costa Rica, we are concerned that certain undesirable cultural, economic and biological changes are occurring along with the improvements in health indices, but at a faster rate. There is, for example, a marked tendency toward less physical activity. We find increases in stress and anxiety, alcoholism and drug dependence, obesity, diabetes and degenerative diseases. There is a greater dependence on imported foods such as wheat, and an increase in the export of both calories and high quality ... roteins (sugar, rice and meat) in order to satisfy the society's material demands.

We can see that development is not entirely relevant to health by comparing mortality statistics from Shanghai and New York (Sidel 1975). Social measures in Shanghai have cut infant mortality to 9 per 1000 live births, half of that found among Caucasians in New York. Moreover, the mortality rates of Switzerland and Sweden are lower than those of the United States and Germany. It seems clear that industrialization and increases in material wealth cannot always be equated with improved health and welfare for all sectors of the society. Unlimited growth is neither logical nor desirable.

We can learn an important lesson in community organization from the example of the Rural Health Program in Costa Rica. As malaria progressively disappeared, the infrastructure of the National Service for the Eradication of Malaria was shifted over time to the Rural Health Program (Villegas and Vargas 1975). Targeted toward 600,000 people (31% of the national population) found, for the most part, in communities numbering less than 500, the Rural Health Program began to revolutionize health delivery in 1971. At present, 60% of this population group is handled by "health workers with shoes" operating out of 135 regional headquarters. Using jeeps, motorcycles, horses or boats, these workers take the census, control communicable diseases such as malaria and intestinal parasites, vaccinate against tuberculosis, measles, tetanus, whooping cough, diphtheria, poliomyelitis and smallpox, carry out maternal and child health programs involving family planning, maternal care and infant nutrition, treat or refer selected diseases, work to improve environmental hygiene in regard to water supply, latrines, waste disposal and education, and engage in community organization. Although this program has not as yet been evaluated, mortality trends related to certain communicable diseases indicate that the rural area is being well-covered. In Table 23.7, for example, we find a marked decrease in deaths preventable by vaccination which closely correlates with the establishment of the Rural Health Program in 1971.

TABLE 23.7
DEATHS DUE TO DISEASES PREVENTABLE BY VACCINATION
1965-1974

Year	Polio- myelitis	Diphtheria	Whooping Cough	Tetanus	Measles	Total
1965	8	26	131	239	186	190
1967	11	19	86	202	260	580
1969	22	19	36	164	322	563
1971	2	19	48	137	84	290
1973	1	5	50	103	61	220
1974	0	0	39	93	12	144

Community organization has also brought encouraging results. Some communities have established aggressive committees which, under the spur of "better health and welfare," have branched out into agriculture, road and bridge construction, and similar projects requiring greater capital and effort. In this way, "health for the people, by the people" (Newell 1975) may become "development for the people, by the people." This program has demonstrated that any intervention should incorporate subprofessionals and involve substantial community participation. It also offers an alternative to the increasing number of physicians and engineers needed to satisfy the demands of an industrial society. While such elements should be granted rational attention, what is needed is a holistic approach in the movement toward improved development, health and welfare.

While it is true that relative improvements have been made in the small nation of Costa Rica without following orthodox models, it is also true that we are experiencing certain deleterious cultural and economic transformations while still at some distance from our optimal goals. What seems to be of paramount importance at present is a review of the entire concept of national and international development in order to define exactly what we want in terms of human health and welfare without resorting to large-scale industrialization or a "growth race."

It seems quite evident that the present models of advanced nations are not appropriate for the underdeveloped nations. In this light, some of the problems discussed at this symposium by nutritional planners and other intellectuals may turn out to be mere academic exercises. The answer to the question "Can man's biological adaptation cope with cultural change, especially as regards nutrition" can be "Yes," if nations begin to work now, in full cooperation, to find alternatives to the orthodox models of development; *if* the developing nations effectively implement systems of social justice; *if* the wealthier nations can make significant contributions to the poor nations; and *if* most nations decide to control consumerism, unlimited growth and distortions of human nature. Since these conditions are quite

utopian, a negative answer to the question may be unavoidable after all, at least for many countries in the not too distant future.

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