

Readers' Forum

Diarrhoeal diseases—how Costa Rica won

Sir—The progress made by Costa Rica in overcoming diarrhoeal diseases may be instructive to health authorities in other countries.

During the early part of the century, Costa Rica, like most developing nations, had a very high mortality attributable to diarrhoeal diseases. The death rate from this cause for the country as a whole was of the order of 400 per 100 000. The high rates recorded in the quinquennium 1928-32 are comparable to those observed in modern times in several Asian and African nations that are seriously affected by malnutrition and poverty.

The first reduction coincided with the beginning of social and economic reforms in the period 1940-48. After stagnation during the following 15 years (a period marked by civil war, followed by a population explosion) diarrhoea deaths again declined steadily until the present (t).

It is difficult to assess the reasons for the phenomena described. Probably the main determinant was the rapid change in living conditions in Costa Rica resulting from an emphasis of most governments on social development. Over the last 20 years, there has been a significant increase in *per capita* income (\$1690 in 1979), and personal hygiene has markedly improved as evidenced by sales of clothing, soap, and toothpaste. Water supply, a political weapon in Costa Rica, has been used by candidates and Presidents alike, resulting in sustained programmes of aqueducts. At present, 98% of the urban population have piped water in the home, and 70% of the rural population enjoy a similar service. Striking improvements in the availability of latrines and toilets have been recorded.

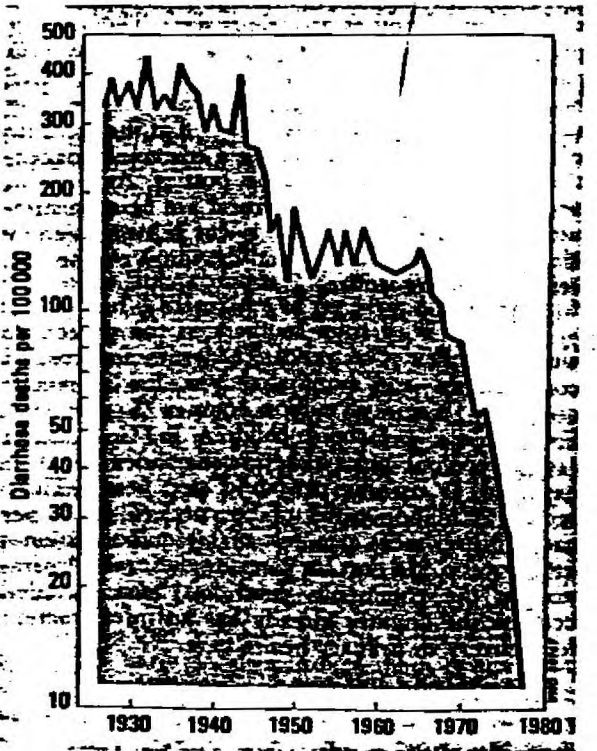
Concomitantly, education has improved steadily and the present literacy rate is about 88%. Teaching emphasizes the concept of disease transmission and the role of hygiene in preventing disease, including diarrhoea and intestinal parasitism. Coverage is, at present, virtually universal. A greater availability of roads and transport, coupled with more aggressiveness and collaboration by physicians and the public and the adoption of good methods for rehydration, have resulted in a sharp decrease of diarrhoea deaths in the last few years.

There is a correlation between diarrhoeal diseases and malnutrition and between diarrhoeal diseases and infant mortality.

Even in recent years, more than 95% of all diarrhoea deaths in the country have occurred in infants. Thus, it is to be expected that the decline in diarrhoeal disease mortality will be reflected in a marked decrease in infant mortality. Furthermore, mortality due to severe malnutrition decreased by 65% from 1970 to 1976. It is not surprising that the hospital ward for malnourished children had to be closed two years ago owing to the virtual disappearance of kwashiorkor and the sharp reduction in the number of cases of marasmus.

Early investigations in 1959-61 in the general population revealed the same agents found elsewhere, namely *Shigella*, *Salmonella*, and enteropathogenic *Escherichia coli*.

Death rates from diarrhoeal disease in Costa Rica. The first decline (1940-48) occurred after the depression and coincided with significant social and economic reforms. A revolution, social disruption and population explosion marked a period of stagnation (1948-64). Stability and social and economic development coincided with the last decline (1965 to now)



With the characterization of enterotoxigenic *Escherichia coli* and the discovery of human rotaviruses, new studies began in Costa Rica in 1976. By means of the enzyme-linked immunosorbent assay (ELISA), and confirmation of a subsample by electron microscopy (2), rotaviruses were found to be the most common agents associated with diarrhoeal diseases in Costa Rica. The monthly prevalence ranged from zero to 89%, and the overall mean for the surveillance period was 40.3%.

While the prevention of diarrhoea is the desired goal, much has been accomplished regarding treatment, as evidenced by the sharp reduction of mortality, especially in hospitals.

At present, about 200 diarrhoea deaths, mainly in infants, occur each year in Costa Rica. Thus, a joint decision was taken by the Ministry of Health and the Social Security System to use oral rehydration on a national basis and to transfer the technology to the home, aiming at preventing or correcting the dehydration of children, particularly those in the rural areas. Before the technology of oral rehydration could be transferred to the homes, it was necessary to test the capacity of mothers to learn the procedure at the hospital outpatient department, the clinic, and the health post.

Surveys in different parts of the country revealed a scarcity of 1-liter containers but the existence of a wide range of bottles of various sizes. This finding precluded the use of the original UNICEF-WHO pack of electrolytes. However, more than 98% of homes had 8-oz bottles for formula feeding (230 ml). A new pack was designed at the Institute of Health Research containing a corrected concentration of salts for the 8-oz bottles. At present, several million packs of Sueroral are being distributed by the social security services accompanied by clear written instructions and drawings on the oral rehydration procedure.

The plan is to train mothers in the procedure within the next two years. The estimated cost of consultations and hospitalizations for diarrhoea during 1977 was 30 million colones (\$3 500 000). For 250 000 preschool children in Costa Rica (1977), 500 000 cases of severe diarrhoea could be expected (2 attacks per child per year). These require 3 million packs of Sueroral (6 packs per case of diarrhoea) at a cost of 1.5 million colones or \$174 400. No cost for carrying out oral rehydration at the community level has been included because the country already has an infrastructure for delivery of primary health care.

The total cost of the oral rehydration programme is \$232 000, which, at a conservative estimate, will avoid about 50% of hospital admissions

and consultations. Apart from a significant saving of lives, the programme will benefit the nutritional state of the child and the wellbeing of the family, not only psychologically but economically.

Costa Rica has not slackened its efforts to prevent diarrhoeal diseases. The programmes of water supply, latrines, and education have continued, now with promotion by television and radio, posters, and the press. Water supply has been extended to the sparse rural population by means of water pumps and will reach 95% of them by 1985.

One aspect that deserves special mention is the situation with regard to breast-feeding. In this regard Costa Rica is in a critical position since, according to two nutrition surveys conducted in 1975 and 1978 by the Ministry of Health, about 30% of newborn infants were not put to the breast at all, and by 5 months of age 61% had been weaned. One reason for this situation might have been the common hospital practice of drastic separation of mother and infant *post partum*.

However, a long-term prospective cohort study being carried out by the Institute of Health Research shows a very different picture in a typical rural mountainous region. Preliminary results reveal that almost all infants receive the breast in the first few days, 95% are at the breast by age one month, and 84% by 3 months. Even at 8 months, 68% of infants are being breast-fed.

It is important to note that diarrhoeal disease has been minimal in these rural children during the first six months of life, the attack rate being less than 0.5 episodes per child per semester.

The prophylactic effect of human colostrum and milk has been emphasized; anti-rotavirus factors and antibodies were detected in most colostrum and breast milk specimens.

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1. MATA, L. ET AL. Diarrheal diseases: a leading world health problem. In: *Cholera and related diarrheas. Forty-third Nobel Symposium, Stockholm 1978*. Basle, Karger, 1980, p. 1.
2. SIMON, A. ET AL. *Boletín de la oficina sanitaria panamericana*, 86: 391 (1979).

The PHC puzzle—how does malaria fit in?

SIR—Twenty-five years have gone by since the Eighth World Health Assembly passed a resolution urging governments to launch malaria eradication programmes.