maturity has decreased for several other reasons. These include many changes in obstetric practice, and it is not possible to summarise the effect that all of these would be expected to exert on perinatal mortality, gestational age, and birth weight. Nevertheless, the broadly parallel trends in elective delivery and the incidence of preterm delivery or low birth weight tend to confirm the hypothesis put forward previously that the high rate of induction of labour during 1970-4 was the major reason for the high incidences of low birth weight and preterm delivery during that period.

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Excess mortality among children discharged from hospital after treatment for diarrhoea in rural Bangladesh

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Abstract

Five hundred and fifty one children aged between 3 months and 3 years were followed up at home for 12 months after treatment of diarrhoea in a rural treatment centre of the International Centre for Diarrhoeal Disease Research, Bangladesh. During follow up the children were found to have a significantly higher mortality than generally observed in the community. The first three months after discharge appeared to be crucial, some 70% of the deaths occurring in that period. Severely malnourished children (nutritional state below 56% of the American National Center for Health Statistics (NCHS) standard of weight for age ratio) had a risk of death 14 times that of their well nourished counterparts (nutritional state 66% or more of the NCHS standard). The highest mortality occurred in 2 year olds, one in three of the severely malnourished children dying compared with one in 10 of the moderately malnourished. This pattern was not seen in children aged under 2 years.

Immediate priority should be given to providing nutritional rehabilitation for malnourished children who contract diarrhoea.

Introduction

Diarrhoea and malnutrition continue to be the two most important factors associated with high mortality among children in developing countries.[1] Several studies, based mostly on lay reporting, have shown a gross association between malnutrition and mortality.[2] [3] To our knowledge there has been no longitudinal study to establish the role of malnutrition and its severity as a risk factor for increased fatality rates. Death, however, is a comparatively infrequent event in any community, and it is difficult to keep a large number of children under surveillance for nutritional state.

In Matlab, a rural area in Bangladesh, demographic surveillance has been continued since 1966. This offered an opportunity to determine the nutritional state of children discharged from

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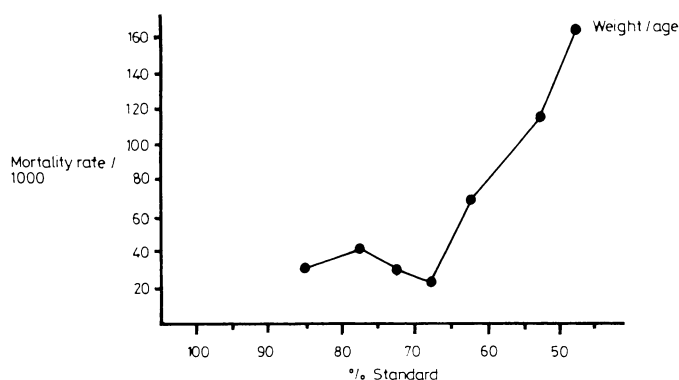
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hospital after treatment for diarrhoea and to monitor this during follow up. We report such a study, which was designed to discover whether the nutritional state of children recently recovered from diarrhoea and sent back to their unprotected home environment plays a part in subsequent mortality due to reinfection during 12 months after discharge.

Patients and methods

The study was carried out in the rural area of Matlab, Bangladesh. In 1966 a longitudinal mandatory registration system was begun, which since 1978 has covered 177 000 people living in the surrounding 149 villages. Detailed field techniques of demographic surveillance and the role of the diarrhoeal health service have been reported.[4] A small fleet of speedboats is used to transport patients from their villages for treatment of diarrhoea.

We studied 551 children aged between 3 months and 3 years who in 1979 were admitted to Matlab treatment centre with the complaint of diarrhoea. Each child was weighed on admission and at discharge using an accurate balance (Toledo, USA). The children with diarrhoea were rehydrated with oral and intravenous solutions. Accurate age of the population was known from the special birth registration system in the area,[4] so that estimation of nutritional state was expected to be free of the age related bias commonly encountered in developing countries. Nutritional state was determined by comparing actual weight at the time of discharge with the National Center for Health Statistics (NCHS) standard of median weight for age.[5]

The children were classified into three categories of nutritional state: normally nourished—those whose weight was 66% and above of the NCHS standard; moderately malnourished—children whose weight was 56-65% of the standard; and severely malnourished—children whose weight was below 56% of standard. Classification was based on a study of subsequent risk of mortality in children assessed for these anthropometric values in a rural community of Bangladesh.[3] Data from that study (fig 1) showed that there was a threshold of about 65% of standard weight for age above which mortality was low and constant but below which mortality increased sharply. Use of the classification in this study was expected to have more functional value for Bangladesh than the traditional approach.

TABLE I—*Distribution of children by age and nutritional state*

Nutritional state (% NCHS standard)	Age (months)				Total
	1-11	12-23	24-35	36-47	
≤55	10	27	25	2	64
56-65	39	85	29	7	160
≥66	142	135	39	8	324
Not known	2			1	3
Total	193	247	93	18	551

NCHS = National Center for Health Statistics.

FIG 1—Mortality rates/1000 in children assessed for percentage of Harvard standard of weight for age. (From Chen et al.[3])
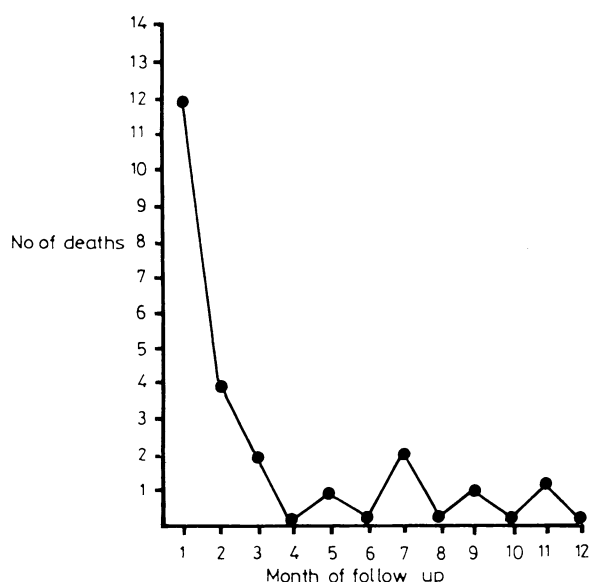

FIG 2—Distribution of deaths during 12 months of follow up.

TABLE II—Comparison of observed and expected numbers of deaths by age of children

Age (months)	No of children studied	Population death rate 1979	Expected deaths in 12 months	Observed deaths during 12 months
1-11	193	43·3	8·4	6
12-23	247	33·3	8·2	6
24-35	93	23·0	2·1	11*
36-47	18	16·0	0·3	

*Z = 6·13; p 0·001.

Results

Table I shows the age and nutritional state of the 551 children at the time of discharge. A total of 64 (12%) were below 56% of the NCHS standard. This group accounted for 5% of all children aged under 1 year, 11% of those aged 1 year, and 27% of children aged 2 years.

Table II gives the observed and expected numbers of deaths of the children in each age group during the 12 months after discharge from the treatment centre. The expected numbers of deaths were calculated from the age specific mortality rate of the community in the same year.[6] Only a slight difference was observed between expected and actual deaths among children aged less than 12 months and 12 to 23 months. In children aged 24 to 35 months (2 year age group), however, mortality was five times higher than that of children of similar age in the community (Z = 6·13; p < 0·001). There were only 18 children in the 3 year age group (36-47 months), which was considered too small a sample to reflect any definite pattern.

In the study group as a whole, 23 of the children (4·2%) died during the follow up period. Sixteen of these deaths (70%) occurred in the first three months, which was therefore identified as a "high risk" period (fig 2). Figure 3 shows the yearly mortality rates (per 1000) observed in the children under study according to their nutritional states. Mortality declined exponentially from 140/1000 in children with a nutritional state of 55% of NCHS standard to 10·5/1000 in those with a nutritional state of 75% and over. This gave a relative risk of 14 for severely malnourished children compared with their well nourished counterparts.

Table III shows the mortality rates by age (2 years or less) and nutritional state. No deaths were reported in the 3 year age group. In children aged less than 2 years nutritional state had only a slight effect on mortality. By contrast, in the 2 year age group one in three of the severely malnourished children and one in 10 of the moderately malnourished children died during the follow up period. Table IV gives the lay reports of the causes of death in the severely malnourished children in the 2 year age group. These reports, which are collected independently for the registration system, showed that in every case in which a report was available the child had died after prolonged sickness. This shows that severely malnourished children with chronic enteric illness are likely to die.
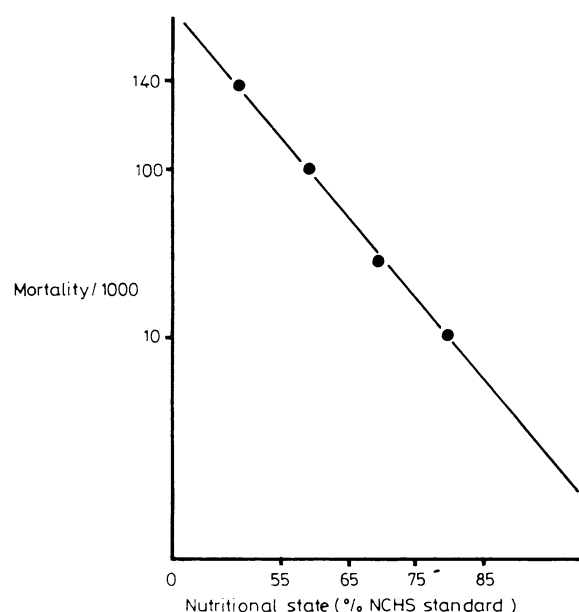

FIG 3—Yearly mortality rates (per 1000) of children with various nutritional states. (Log scale.)

TABLE III—Mortality rate and nutritional state of children

Nutritional state (% NCHS standard)	Children admitted aged 2 years	Mortality/1000 for children aged 2 years	Children admitted aged 2 years	Mortality/1000 for children aged 2 years
≤55	37	27·0	25	320·0
56-65	124	48·4	29	103·4
≥66	277	21·7	39	0
Total	438		93	

TABLE IV—Ages and nutritional states of eight severely malnourished children who died and lay reports of causes of death

Case No	Age	Nutritional state (% NCHS standard)	Lay report of cause of death
1	2 years 3 months	33	Diarrhoea
2	2 years 4 months	47	Dysentery with mucus and fever
3	2 years 4 months	49	Measles for four days followed by dysentery and diarrhoea for one month
4	2 years 6 months	50	Dysentery with mucus; became weak day by day and died
5	2 years 6 months	48	Blood dysentery for two months
6	2 years	50	Unknown
7	2 years 2 months	49	Chronic dysentery for two months
8	2 years 6 months	50	Fever for a long time

Discussion

This study provides a clear relation between the mortality rate after recovery from diarrhoea and the nutritional state. Severely malnourished children had a 14 times greater risk of death than their nutritionally better off counterparts. More of the excess deaths occurred within three months after discharge from hospital. Chen et al, in their study of children aged 13 to 23 months followed up for two years in a similar rural community, also found a relation between anthropometric measurements and subsequent mortality.[3]

Interestingly, in our study the excess deaths were confined to the 2 year age group. In children aged less than 2 years there were no excess deaths, nor was mortality affected by nutritional state. By contrast, in the 2 year age group all the deaths occurred in lower nutritional categories. An explanation for these differences might be that nutrition in children aged under 2 years is related to birth weight, whereas malnutrition in children aged 2 years and over is related to food. Also breast feeding is universal and prolonged in this area,[7] which might have protected the children aged under 2 years against reinfection and contributed to nutritional rehabilitation. Children aged 2 years or more are dependent on other types of food and are neither protected against reinfection nor have sufficient or appropriate food to be rehabilitated nutritionally. Therefore, when a population is universally breast fed, classification of children by single years or even half a year will be methodologically better for nutritional studies.

Another finding, based on lay reporting of causes of death, shows that even in severely malnourished children death occurs after a prolonged illness, mostly of an enteric nature. This would allow enough time for treatment of the disease as well as for nutritional rehabilitation to prevent such deaths.

Our findings indicate a need to integrate diarrhoeal treatment with nutritional rehabilitation and home follow up care for children aged 2 years and severely malnourished. Since death is not immediate, the programme should be implemented easily and successfully.

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Comparison between penicillamine and sulphasalazine in rheumatoid arthritis: Leeds-Birmingham trial

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Abstract

Sulphasalazine was first formulated by Svartz in the early 1940s, specifically for use as a remission inducing drug in rheumatoid arthritis. After the publication of an unfavourable trial, however, the drug was restricted to patients with ulcerative colitis. In the late 1970s sulphasalazine was re-examined in rheumatoid arthritis and favourable results reported in "open" trials. A double blind controlled trial was therefore conducted comparing enteric coated sulphasalazine and D-penicillamine in patients with active rheumatoid arthritis.

A total of 63 patients were recruited in two centres; 31 were treated with sulphasalazine and 32 received penicillamine. After 16 weeks' treatment both drugs had produced significant improvements in clinical score, pain score measured on a visual analogue scale, grip strength, Ritchie articular index, erythrocyte sedimentation rate, and serum C reactive protein concentration. Nausea was the major side effect in the sulphasalazine treated group. No potentially dangerous effects of sulphasalazine were encountered in contrast with those seen in the penicillamine group.

The results suggest that sulphasalazine is an effective and safe drug capable of producing remissions in active rheumatoid arthritis. They also lend confidence to the use of preliminary "open" trials as a means of screening for remission inducing drugs in rheumatoid arthritis.

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Introduction

In 1938 contemporary medical thinking held that rheumatoid arthritis was an infection and therefore potentially responsive to antibiotics. Attempts to treat the disease with sulphonamides (the only antibiotics then available), however, had failed. Salicylates were widely used for relief of symptoms but had little