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Better prospects for child survival

Infant and childhood mortality rates in São Paulo fell by about 50% and 70% respectively between 1973 and 1983. However, surveys in 1973-74 and 1984-85 showed no change in the prevalence of protein-energy malnutrition, nor were there marked changes in the socioeconomic characteristics of the population. Improvements in water supply and the duration of breast-feeding possibly accounted for a 20% decrease in the infant mortality rate. It is proposed that the markedly improved coverage of health services may have played a large role in explaining the rest of the decrease. The control of malnutrition may not always be essential for lowering infant and child mortality in developing societies.

Infant and child mortality has fallen markedly in many areas of the Third World during recent decades. The reasons are not clear, although it has been suggested that health technologies have had an influence. It has proved difficult to show that the reduction is due to factors more directly related to the quality of life, such as nutrition, purchasing power, housing, water supply and sanitation.

Health surveys

In the city of São Paulo, infant and child mortality has fallen by more than half since 1973. Health surveys of children under 60

months (5 years) of age were conducted in 1973-74 (1,2) and 1984-85 (3). In the first, a random sample of households registered at the local electricity board was stratified into five income groups, and 100 with children were selected from each, giving a total of 754 children. The results were weighted according to the size of the groups in the general population.

In the 1984-85 survey, 60 blocks in each of the city's 56 boroughs were randomly selected, as were a number of households in each block proportional to the total number it contained. Of 1308 children aged up to and including 59 months who were located, 312 could not be studied because participation was refused by their parents. The analysis below is restricted to 929 children aged 6-59 months, the same age range as was included in the 1973-74 survey. A comparison with a recent census showed that the proportion of children from low-income areas was as expected in the survey (47% observed against 48% expected); children from middle-income

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areas were over-represented (38% and 31% respectively), and those from high-income areas were under-represented (15% and 21%). These biases proved to have virtually no effect on the outcomes under study.

The children in both surveys were weighed and measured at home by physicians. Recumbent length was measured for children under 24 months, standing height after that age. The Brazilian Santo Andre growth standards (4), based on data for high socioeconomic strata, were used to classify nutritional status. The children were further stratified according to the Gomez weight-for-age criteria (5). Using height-for-age and weight-for-height, the prevalences of stunting and wasting were also estimated. Because it was not feasible to return to raw data collected in 1973-74, comparisons between the surveys were restricted to the anthropometric cut-offs used in the earlier study: 92% of the median for height-for-age and 90% or 80% of the median for weight-for-height. In the case of height-for-age, the cut-off corresponds approximately to the median minus 2 standard deviations. In the case of weight-for-height, the cut-offs correspond to the median minus

nearly 1.5 and 2.5 standard deviations respectively.

In both surveys, blood samples were taken for haemoglobin determinations and thorough clinical examinations were performed. Information was also collected on several other nutritional, socioeconomic and environmental variables, and mortality data were obtained from the city's official statistics.

Table 1 shows that whereas infant mortality decreased by one-half between 1973 and 1983, child mortality fell by two-thirds. With respect to age, the largest fall in infant mortality occurred between 1 and 5.9 months. With respect to causes, the most marked reduction, from 23.2 to 4.3 deaths/1000 live births, was observed for infant deaths due to diarrhoeal diseases. Such deaths in childhood also showed an important fall, from 0.19 to 0.05 deaths/1000. These cause-specific data should be

Table 1. Infant and child mortality, São Paulo city, 1973 and 1983

Mortality rates	1973	1983	Reduction (%)
Infant ^a	87.1	41.6	52.2
neonatal	40.2	23.4	41.8
post-neonatal	46.9	18.3	61.0
1-5.9 months	36.1	13.6	62.3
6-11.9 months	10.8	4.7	56.7
Child ^b	3.5	1.0	71.3

^a Per 1000 live births.

^b Per 1000 children aged 1-4.9 years.

Table 2. Prevalence of malnutrition according to Gomez classification in children aged 6-60 months, São Paulo city, 1973-74 and 1984-85

Age (months)	Sample		Prevalence of malnutrition (%)			
			Any degree ^a		Second and third degrees ^b	
	1973-74	1984-85	1973-74	1984-85	1973-74	1984-85
6-24	287	300	27.2	30.3	1.7	4.0
24-60	467	629	35.4	39.3	4.6	4.9

^a Equivalent to weight-for-age less than 90% of median (approximately 1 standard deviation below median).

^b Equivalent to weight-for-age less than 75% of median (approximately 2.3 standard deviations below median).

Prevention

treated with caution as they were based solely on information given on death certificates.

Table 2 shows that there was little change in the prevalences of malnutrition between the two surveys; if anything, the situation seemed to get worse. Both surveys showed that moderate and severe cases of malnutrition were relatively rare. The prevalence of severe cases, below 1%, was so low that specific estimates would not have been accurate enough. Table 3 shows that both stunting and wasting tended to increase, although the prevalence of severe cases remained very low.

The possible deterioration in nutritional status is apparently supported by the finding that the proportion of children with less than 11 g/dl of haemoglobin increased from 23.1% to 35.5%. However, the fact that it was possible to take blood samples from only 56% of the children in the 1973-74 survey, as opposed to 90% in 1984-85, renders comparison difficult. Except for anaemia, clinical signs of vitamin or mineral

In so far as other urban areas of Latin America, and possibly of Asia, have conditions similar to those in São Paulo, the city's experience could help to explain recent falls in mortality there also.

deficiencies were rarely observed in either survey.

Table 4 shows that there were only minor differences in socioeconomic and demographic variables except for the proportion of migrant mothers, which

Table 3. Prevalence of growth deficits according to different anthropometric indicators in children aged 6-60 months, São Paulo city, 1973-74 and 1984-85

Growth deficit	1973-74 (n=754)	1984-85 (n=929)
Stunting		
Height-for-age < 92% of median	5.5%	6.4%
Wasting		
Weight-for-height < 90% of median	19.0%	22.7%
< 80% of median	1.1%	2.2%

increased from 40% to 50%. More than half of the migrants came from poverty-stricken areas of north-eastern Brazil. The proportion of households with piped water increased markedly from 68% to 96%. All health care indicators showed an improving trend. By 1984-85, virtually all deliveries took place in hospital and about 90% of children were fully immunized. Regrettably, the proportion of babies delivered by caesarean section increased from 23.7% to 47.3%. On the other hand, the proportion of infants fully or partly breast-fed at 3 months of age increased from 36% to almost 60%.

Causes of declining mortality

Overall, the children in the 1973-74 survey probably belonged to slightly wealthier families than those in the 1984-85 study, but the difference seemed likely to be small. The most striking finding was that the pronounced fall in mortality among children less than five years of age was not accompanied by any substantial change in the prevalence of malnutrition. A similar phenomenon has been reported elsewhere in Latin America (6, 7). Thus a reduction in the prevalence of malnutrition may not always be essential for the lessening of death rates in developing countries. On the

other hand, it appears that the use of trends in infant and child mortality rates as indicators of socioeconomic development and the quality of life may not be justified.

In assessing the possible impacts of other factors on mortality, we have used data on relative risks for infant mortality derived from two recent studies in similar urban areas. The first was a cohort study of risk factors for overall infant mortality (8), the second a case-control study of infant mortality due to infectious diseases (9).

Socioeconomic factors

The purchasing power of unskilled workers' wages decreased slightly between 1973 and 1984. Table 4 shows that there was virtually no change in educational levels and an increase in the proportion of

migrants in the population. These findings, which are more or less consistent with those on malnutrition, do not explain the reduction in mortality.

Demographic factors

The mean number of people per household remained constant, suggesting that there were no major changes in parity, and maternal age showed little change. Consequently, it seems that these factors did not have an important influence on the fall in mortality.

Environmental factors

There was a large increase in the coverage of the public water supply system. According to our case-control study, among infants from houses without piped water the mortality associated with diarrhoea was four times greater than that among infants from houses where such a water supply existed. If this is correct, the increase in coverage corresponds to a 43% reduction in deaths associated with diarrhoea. This would explain about half the observed fall in such deaths and approximately 11% of the fall in overall infant mortality.

Breast-feeding

Breast-feeding also increased, possibly in response to a public health campaign. For children aged under a year, it was

Table 4. Prevalence of possible risk factors for infant and child mortality, São Paulo city, 1973-74 and 1984-85

Indicator	1973-74	1984-85
<i>Socioeconomic</i>		
Illiterate head of family	7.2%	9.8%
Illiterate mother	9.8%	10.1%
Mothers born outside the State	40.5%	51.0%
<i>Demographic</i>		
Mean number of persons per family	5.3	5.2
Maternal age*		
Under 20 years	9.2%	10.7%
35 years or over	11.7%	9.6%
Crude birth rate*	2.57%	2.55%
<i>Environmental</i>		
Piped water in the home or plot	68.4%	96.2%
Linked to sewerage system	52.7%	45.2%
Mean number of rooms	3.4	3.3
<i>Health care</i>		
One or more antenatal visits	87.4%	92.9%
Hospital deliveries	93.5%	99.7%
Caesarean deliveries	23.7%	47.3%
Immunizations		
DPT (3 doses or more)	74.6%	92.2%
Sabin oral polio (3 doses or more)	73.4%	92.8%
Measles (1 dose or more)	51.2%	88.7%
<i>Breast-feeding</i>		
Breast-fed at 3 months of age	35.7%	59.0%
Breast-fed at 6 months of age	21.5%	33.1%

*Data from State System for Statistical Data Analysis.

estimated that this factor might account for reductions of about 17% in diarrhoea-related deaths, 13% in deaths related to respiratory problems, 15% in deaths due to

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other infections, and 9% in overall infant mortality. On the other hand, little impact would be expected on children aged 1-4.9 years, as fewer than 10% of them were breast-fed.

Health care

Between the surveys there was an increase in the number of neighbourhood health centres from 173 to 314. The expanded services have reached many of the most deprived children, resulting in high coverage by programmes of immunization, growth monitoring and health education. Oral rehydration therapy was not widely available until 1985, but there were significant improvements in the hospital care of dehydrated children. Unfortunately, it was not possible to estimate directly the impact of these changes on infant and child mortality rates.

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Changes in socioeconomic variables and in the prevalence of malnutrition cannot explain the marked reductions in infant and child mortality that have occurred in São Paulo in recent years, whereas the

expansion of the water supply and the increase in breast-feeding possibly account for a reduction of some 20% in the infant mortality rate. It should be borne in mind, however, that these estimates are based on certain assumptions and are only rough indicators of the possible magnitude of the effects.

As infant mortality declined by about 50% and child mortality by about 70%, it seems reasonable to ascribe a substantial part of the reduction to improved coverage and quality of the health services, including their probable impact on the extent of breast-feeding.

The situation in São Paulo does not allow extrapolation to all urban areas in developing countries: the prevalence of moderate and severe malnutrition was already reasonably low in 1973-74; the average duration of breast-feeding was very short at that time, and even small increases could have reduced mortality; and the city had reached a level of economic development allowing large investments in health services and related sectors. However, in so far as other urban areas of Latin America, and possibly of Asia, have conditions similar to those in São Paulo, the city's experience could help to explain recent falls in mortality there also. □

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Children in urban slums

A hard look at urban slums and squatter settlements shows what the borderline living conditions mean in terms of the lives and deaths of millions of poor children. Over 1000 reports of research and field investigations have provided facts, figures, case reports and illustrative examples that document the realities of slum conditions, explain their direct impact on health, and point out lines of remedial action. Readers of this book are challenged to face both the magnitude of the problem and the inadequacy of conventional measures for dealing with it; they are presented with an outline of tasks facing governments and aid agencies and a reminder that the vast scale of ill health and premature death in urban centres demands urgent action.

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