

Infant deaths in a health unit area of Northern Sri Lanka

C. Sivagnanasundram, N. Sivarajah and A. Wijayaratham*

*Department of Community Medicine, Faculty of Medicine, University of Jaffna, Sri Lanka and *Health Unit, Kopay, Sri Lanka*

Summary

Ninety-seven infant deaths that occurred during 1 year were almost equally distributed in the neonatal and post-neonatal periods. The low infant mortality rate (IMR) reported for the area was found to be due to poor registration of deaths. The actual IMR is 35.4. Lower respiratory tract infections and gastroenteritis were the chief causes of death, with low birth weight contributing to it. Among these deaths, as a conservative estimate, 20 have been identified as preventable. Prevention of these deaths would reduce the IMR to 28.1. Practitioners of indigenous medicine need training on the management of dehydration in infants, and the mothers should be taught the proper use of oral rehydration solution. Families belonging to low 'social caste' were more at risk of infant deaths. This study shows the importance of small, community-based investigations in order to identify vulnerable small socio-cultural groups in developing countries.

Introduction

Demographic statistics published in Sri Lanka (Department of Census and Statistics, 1982) gives the island's IMR for 1979 as 38 per 1000 live births. It also shows regional differences in the rates ranging from 79 in the Nuwera Eliya District to 18 in the Jaffna District in the northern region. This regional variation has been the subject of discussion at seminars that attempted to postulate the possible reasons for it, such as medical care, socio-economic levels, nutrition, sanitation and housing.

Correspondence: Professor C. Sivagnanasundram.

We present a descriptive epidemiological study of infant deaths in one health unit in the district of Jaffna.

Materials and methods

AREA AND POPULATION

This study was performed in the area of Health Unit Kopay, in the district of Jaffna. It has a population of 111 649, and is divided into 20 Public Health Midwives (PHM) divisions. It consists of peri-urban and rural agricultural areas and adjoins the municipal town of Jaffna. There are two rural hospitals, four central dispensaries, one maternity home and 14 maternity and child welfare centres in the area. The Jaffna General Hospital is 5 miles away from the centre; 10 miles away from one border of the area is Base Hospital, Point Pedro. Communication by bus routes is good.

Ninety-seven infant deaths that took place during 1 year (1 June 1982-31 May 1983) are analysed.

SURVEY

The number of births in the area was reported by PHMs who collected this by field visits, from health volunteers and in child welfare clinics. The infant deaths were reported by PHMs, Public Health Inspectors and volunteers, and collected from hospital registers. Children in schools were also asked regarding infant deaths in their families and neighbourhood; this gave us deaths undetected by other methods.

Every infant death was investigated by one of us, by interviewing the mother in her home and consulting hospital records. An investi-

gation form was used to record the data pertaining to the birth and death of the infant, the socio-economic factors of the family and the use of the health services. Enquiry about most of the deaths was undertaken within 1 month of the event.

Causes of death were given by the attending physician. In the case of home deaths, the illness was identified from hospital records if treatment was obtained. Otherwise, the investigators arrived at a presumptive diagnosis from the history and signs described by the mother. A post mortem was performed in only one of these deaths.

Results

REGISTRATION OF DEATHS AND IMR

There were 2738 births and 97 infant deaths during the 1 year period, giving a birth rate (BR) of 24.5 per 1000 population and an IMR of 35.4 for the health unit area of Kopay. The reported BR and IMR for Jaffna district to which Kopay belongs, are 28.6 and 18, respectively (Department of Census and Statistics, 1982).

Only 35 (36%) of the 97 infant deaths were found to have been registered, and this figure would have given a rate of 12.8 in official documents, instead of the actual rate of 35.4. Twenty-five deaths took place in the homes

and none of these were registered; of the 62 deaths in the two large hospitals only 34 (55%) entered the registrar's records.

AGE AND CAUSES OF DEATH (Table 1)

Fifty-one infant deaths (52.6%) were in the neonatal period. Four-fifths of these were within 7 days. All except two were born in hospital. Of the 46 post-neonatal deaths, 21 were over 6 months, i.e. 21.6% of all deaths.

Lower respiratory tract infections (pneumonia and bronchiolitis) and gastroenteritis (47.4%), together with low birth weight were the diagnosed causes of 62.9% of the infant deaths. In the post-neonatal period 76.1% of the deaths were due to lower respiratory tract infections and gastroenteritis. The nine cases classified as 'others' were meningitis (2), encephalitis (2), convulsions (2) and one each of asphyxia, chicken pox and intussusception.

Lower respiratory tract infections (LRTI)

Deaths due to pneumonia and bronchiolitis (Table 1) are considered under LRTI.

Twenty-six deaths (26.8%) were due to LRTI, 10 of them in the neonatal period. Five of these 10 infants were born at home and three had no treatment. Of the 10 neonates six were of low birth weight, two of these were born before term. All gave a history of respiratory

Table 1. Causes of death in neonatal and post-neonatal periods

Causes	Neonatal		Post-neonatal	Infant	
	7 days and under	8-30 days		Number	Per cent
Pneumonia	6	2	14	22	22.7
Bronchiolitis	0	2	2	4	4.1
Gastro-enteritis	0	1	19	20	20.6
Low birth weight	12	3	0	15	15.5
Asphyxia in new born	6	0	0	6	6.2
Congenital abnormality	3	0	2	5	5.1
Birth trauma	2	1	0	3	3.1
Haemolytic disease of new born	2	1	0	3	3.1
Septicaemia	0	2	1	3	3.1
Other	2	1	6	9	9.3
Ill defined and unknown causes	2	3	2	7	7.2
	35	16	46	97	100.0
	(36.1%)	(16.5%)	(47.4%)	(100%)	

distress and fever, and died within 24 h of onset of symptoms. Of the 16 deaths in the post-neonatal period 10 occurred between 1-6 months and six after 6 months. Selected data concerning these 16 deaths is given below:

Number who had LRTI after measles	3 (18.8%);
Number with malnutrition (under weight for age; <80% standard weight)	4 (25.0%);
Number from a satisfactory house	8 (50.0%);
Number who had western treatment only (nine of them in hospital)	10 (62.9%);
Number who had indigenous treatment and were later hospitalized for western treatment	3 (18.8%);
Number of cases where treatment was delayed	5 (31.3%);
Duration of illness ranged from 2-14 days.	

Gastroenteritis

The deaths included in this category were those with suspected or proved intestinal infection. Only one was in the neonatal period. The 19 deaths in the post-neonatal period were spread evenly during the 11 months. Selected information related to these deaths is given in Table 2.

The duration of illness ranged from 1 to 40 days (median 6 days). Fifteen infants were hospitalized for a period, from 0.5 h to 40 days (median 3 days). Three were discharged as

being cured, but had a relapse and died at home within 2 days. In six cases the delay of 1-4 days in getting effective treatment for dehydration could be attributed to the child being given indigenous medicine (Siddha-Ayurvedic), before western treatment. In three cases the delay was due to neglect by the mother, two of whom were separated from their husbands and one a mentally ill patient. In another case, seeking occult help by tying a charmed thread was the cause of the delay. All of the 10 mothers to whom oral rehydration solution (ORS) was given for their children had little or no knowledge of the proper use of the solution, and had given insufficient amounts, some using medicinal-sized doses.

Low birth weight

Of the 51 deaths in the neonatal period 34 (66.6%) were known to be 2500 g or less at birth. Only one of them was born at home with a congenital defect and was admitted to hospital immediately. The cause of death of 15 of the 34 infants was given as 'low birth weight'. In 13 of them the following conditions were associated: pre-eclampsia (4), mitral stenosis in mother (2), placental necrosis (1), twins (6) which included both twins in two pairs. All mothers had received antenatal care in clinics, nine of them regularly. The deaths of the remaining 19 infants were attributed to other causes. This includes six of the 10 neonates dying of LRTI.

Among the post-neonatal deaths, four of the 16 deaths attributed to LRTI and four of the 19 deaths attributed to gastroenteritis occurred in low birth weight infants.

Table 2. Selected data of 19 post-neonatal deaths due to gastroenteritis

Information	Yes/present	No/absent	Not known
Dehydration	16	0	3
Malnutrition	7	10	2
ORS given	10	9	
Delay in treatment	10	9	
Western treatment only	10	—	
Indigenous and later western treatment	8	—	
Home remedy only	1	—	
Availability of latrine	9	10	

Table 3. Deaths by family income*

Rupees†	Neonatal		Post-neonatal		Infants	
	No.	%	No.	%	No.	%
450 and below	7	(13.7)	15	(33.3)	22	(22.9)
451-1000	38	(74.5)	29	(64.4)	67	(69.8)
Over 1000	6	(11.8)	1	(2.2)	7	(7.3)
Total	51	(100.0)	45	(99.0)	96	(100.0)

*Income of one family was not recorded.

†(£1 = Rs. 32).

SOCIO-ECONOMIC FACTORS

Occupation

Fifty-three fathers (54.6%) were labourers. The rest belonged to semi-skilled and clerical grade. Only 10 mothers were employed, nine as labourers and one as a pharmacist.

Income

Deaths of the infants by family income is shown in Table 3. Among the 22 deaths in the less than Rs.450 income group, seven (31.8%) were in the neonatal period, while in the over Rs.450 group 59.6% (44 out of 74) of the deaths occurred in the neonatal period, a difference that is significant ($\chi^2=5.9$, $df=1$, $P<0.02$).

Social handicap

Of the 97 deaths 49 (50.5%) were infants whose parents had a 'social handicap' as they belonged to the lowest ranks in the Hindu caste system. Of the 51 neonatal deaths, 25 were in this group. There was no statistical difference by caste between the deaths in the neonatal and post-neonatal periods ($\chi^2=0.11$, $df=1$, $P=NS$). Of the 22 families in the under Rs.450 income group 16 (72.7%) had social disability.

Education

Ten (10.3%) fathers and eight (8.2%) mothers had no education; all of these, except one father were in the low caste group. Thirty-one (32.0%) fathers and 28 (28.9%) mothers had education up to 5 years at school. Of these 59 parents, 44 belonged to the low caste.

Clinic visits

Antenatal visits of 71 (73.2%) mothers were

satisfactory. Among the 'low caste' group compared with the rest, the percentages of satisfactory visits were 63.3% and 83.3%, respectively, a difference that is significant ($\chi^2=4.7$, $df=1$, $P<0.05$).

Housing, water supply and latrines

Fifty-three (54.6%) families had unsatisfactory housing conditions; 61 (62.9%) had no well of their own; 45 (46.4%) had no latrines.

Further analysis showed that 45.1% (23) families of the neonatal deaths and 65.2% (30) of the post-neonatal deaths had unsatisfactory housing, and this difference is significant ($\chi^2=4.0$, $df=1$, $P<0.05$). The difference between families with neonatal and post-neonatal deaths as regards availability of latrines and wells is not significant.

Of 49 families that belong to the low caste 39 (79.6%) had an unsatisfactory house, 42 (82.7%) no latrine and 42 (82.7%) no well of their own. Thirty-four (69.4%) had all three of these disadvantages.

Discussion

Only 62% of the infant deaths were registered in the Kopy area. This was an incidental finding, and was unexpected, as the district of Jaffna has a high literacy rate of 85.5% (Central Bank of Ceylon, 1983), and 71% of the deaths took place in government hospitals. It is very likely that there is under-registration in the other seven health unit areas in this district, which accounts for the low IMR of 18 given in official statistics. The figure obtained

by us for Kopay is 35.4 and this is comparable with the figure of 38 reported for the whole island.

The percentage of deaths in the neonatal and post-neonatal periods is almost equal. In developing countries the post-neonatal component of infant deaths lies between 60 and 80% (Harfouche, 1979), and in developed countries it is around 32%. The mixed socio-economic features of Kopay—high rate of literacy, high use of clinical and hospital services (maternity and child care), but low income and poor environmental conditions—are reflected in the neonatal and post-neonatal distribution of infant deaths.

PREVENTABLE DEATHS

Data on the causes of deaths show that a reduction in the infant mortality is possible in the study area, and it is more easily achieved by reducing the 'preventable deaths' in the post-neonatal period. Neonatal causes of death appear less amenable to correction. Of the 51 infants who died in the neonatal period, all except two were born in a hospital, 37 of them in a major hospital. The care at delivery may be considered satisfactory. Further refinement in obstetric care would be beyond the means of this country for some time. Low birth weight has been the certified cause of 15 neonatal deaths and a contributory factor in another 19 deaths.

The neonatal mortality rate in this study is 18.6. Prevention of deaths from LRTI, especially in the late neonatal period (8–30 days) could cause a slight reduction in this rate. In the post-neonatal period LRTI and gastroenteritis caused 74 % of the deaths.

In our study malnutrition, measles and unsatisfactory housing conditions, were contributory factors to death from LRTI. Since many deaths have occurred even after inpatient treatment, hospital based studies of LRTI appear necessary in order to evaluate the efficacy of drugs, nursing care and other factors in hospital care. True pathology will still be in doubt unless post-mortem examinations are performed. Even under the prevailing circumstances we surmise that among the LRTIs, at least five deaths where treatment was delayed,

and one death following measles could have been prevented.

Analysis of the deaths due to gastroenteritis reveal that severe dehydration was the cause in the 10 cases where treatment (rehydration) was delayed. These were preventable deaths. Six of the infants had been taken to Siddha-Ayurvedic physicians, whose treatment did not correct dehydration. In four deaths, delay was due to neglect, ignorance and family disorganization. We have included four more deaths among the preventable deaths; three infants had been discharged from the hospital as fit to go home, but died within 2 days from relapse. Their mothers who were given ORS at the time of discharge did not know how to use it correctly. Another infant was given only home treatment. We stress the need for suitable training programmes on the management of dehydration to Siddha-Ayurvedic physicians. Effective education of the mothers on the use of ORS is essential in the treatment of diarrhoea in infants.

Thus, we have classified six LRTI deaths and 14 deaths due to gastroenteritis as preventable. Elimination of these deaths would have brought the post-neonatal mortality rate to 9.5 from the present 16.8; and there would have been a reduction in the IMR from 35.4 to 28.1—a figure that could be achieved under present Sri Lankan conditions. As in the case of LRTI, improvement in medical and nursing care of the cases of gastroenteritis may also reduce case fatality and therefore IMR.

INFLUENCE OF INCOME

Although the median monthly income of families in the study zone was Rupees 451 (Central Bank, 1983), the deaths in the families earning below Rs.450 were only 22.9% (Table 3), i.e. much less than the expected 50%, even if income is not an important factor in determining mortality. Among all neonatal deaths only 13.7% are in the under Rs.450 group, in which 73% have the social-caste disability. An explanation that could be given is that there may be a high rate of still births in this group and therefore deaths after birth, especially in the neonatal period are low. Only studies on pregnancy wastage could give a clearer picture.

SOCIAL HANDICAP

Half the infant deaths were in families of labourers, who predominantly belonged to the low social caste. Caste of the families appears to be a factor associated with the deaths, the 'low caste' group being more vulnerable. The social structure of the people of Jaffna is based on the caste system (Thambiah 1954). In this study we have grouped the Nalavars, the Pallas and Parayars who were earlier slaves of the high caste Hindus, as belonging to the 'socially handicapped' group which is comparable to the Indian 'scheduled castes'. Many of them still live in a state of abject poverty.

Population census by caste is not done in Sri Lanka, but the population in the low caste group in the study area, obtained from other sources is a figure between 30 and 35% of the whole population. The value of 50.5% for infant deaths in this group was therefore greater than had been expected.

The low caste group is handicapped in the important socio-economic parameters—environmental conditions, educational status and income. This study raises, perhaps for the first time in Sri Lanka, the association of caste and infant mortality. In developing countries similar cultural disparities may exist among various social groups and small scale com-

munity based studies help to expose the risk due to social disadvantages.

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