Epidemiological factors in acute infectious infantile diarrhoea in Cape Town

K. C. HOUSEHAM, M. D. BOWIE

Summary

The results of a year-long prospective study of the epidemiological factors associated with acute infectious infantile diarrhoea in Cape Town are reported. Many coloured infants had a low birth weight, which was a risk factor for subsequent malnutrition. The parents were young, often unmarried, had 1 - 3 children and below average living conditions. However, coloured parents were better educated and had smaller families than their black counterparts.

The incidence of breast-feeding was low, especially in the coloured population group. Black families originated from a largely migrant population and generally came from a squalid environment and had a higher incidence of sibling deaths. A hypothesis is advanced: coloured infants with infectious diarrhoea come from a deprived subgroup of their community while black patients come from a society that is generally disadvantaged and impoverished. In both groups financial pressures exacerbate the situation. Priorities are an improvement in living conditions — particularly for the black community — and the promotion of breast-feeding among coloured mothers. Oral rehydration programmes are advocated for both groups.

Acute infectious infantile diarrhoea remains a major health problem world-wide.\(^1\) The situation is most acute in the developing areas. Large numbers of coloured and black children with dehydrating diarrhoea are admitted annually to Red Cross War Memorial Children's Hospital in Cape Town. As part of a wider prospective study of 545 infants aged 6 weeks -1 year admitted with dehydrating diarrhoea, the associated epidemiological factors were determined. This study was carried out for a period of 1 year from 1 April 1981 to 31 March 1982.

Patients and methods

The infants studied were those aged 6 weeks - 1 year admitted to the rehydration ward with acute dehydrating diarrhoea on week-

Days. Not more than 15 patients were studied in any week. This study group was made up of a systematically selected non-random sample\(^2\) of 545 infants. These infants represented a 17,2% sample of the 3 163 infants aged 6 weeks - 1 year admitted during the year-long study.

Parents (usually the mother) or escorts were questioned regarding the current illness, past medical history, feeding practices and the family socio-economic status according to a standard questionnaire.

Data storage, counting and analysis were undertaken using a computer. Standard methods of statistical analysis\(^3\) were employed and the specific test is designated in the text.

Results

The study group consisted of 545 infants of which 316 (58%) were black and 229 coloured.

Birth details

The majority of infants (87%) were born either in hospital or a midwife obstetric unit (MOU). Most of the 71 infants born at home were black (77%). The place of birth is shown in Table I. The birth weight of 400 infants was recorded — 66 (16,5%) were < 2500 g and 334 (83,5%) ~ 2500 g. More coloured infants (24,6%) had a birth weight < 2500 g than blacks (9,9%). It was observed that those infants with a birth weight < 2500 g more often had a rehydrated weight of less than 80% expected weight for age (National Center for Health Statistics percentiles\(^5\)).

Infant feeding practices

Feeding practices were reliably ascertained in 539 subjects (Table II). A majority of those weaned before admission to hospital were over 6 months of age (65%) while 60% of those still receiving breast-milk were under the age of 6 months. Fig. 1 shows the differences in breast-feeding between the coloured and black infants.

Parental age

This was known in 526 mothers and 419 fathers. The fathers were on average older (mean age 30 years) than the mothers (mean age 25,5 years). Fewer coloured couples

Mothers' educational level (Table III)

About 75% of the mothers were functionally literate (i.e. had attended school for more than 3 years and were able to read simple instructions). Black mothers were more often illiterate while coloured mothers were more frequently educated to the primary or junior secondary level.

Marital status

Marital status was known in 535 instances. Overall, equal numbers were married and unmarried. Fewer coloured couples

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TABLE I. PLACE OF BIRTH

<table>
<thead>
<tr>
<th></th>
<th>Total (N = 535)</th>
<th>Black (N = 314)</th>
<th>Coloured (N = 221)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>327 (61%)</td>
<td>195 (62%)</td>
<td>132 (60%)</td>
</tr>
<tr>
<td>MOU/clinic</td>
<td>137 (26%)</td>
<td>64 (20%)</td>
<td>73 (33%)</td>
</tr>
<tr>
<td>Home</td>
<td>71 (13%)</td>
<td>55 (18%)</td>
<td>16 (7%)</td>
</tr>
</tbody>
</table>

MOU = midwife obstetric unit.

TABLE II. FEEDING PRACTICES (N = 539)

<table>
<thead>
<tr>
<th></th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never breast-fed</td>
<td>105</td>
<td>19.5</td>
</tr>
<tr>
<td>Fully weaned</td>
<td>269</td>
<td>49.9</td>
</tr>
<tr>
<td>Receiving breast-milk</td>
<td>163</td>
<td>30.2</td>
</tr>
<tr>
<td>Exclusively breast-fed*</td>
<td>2</td>
<td>0.4</td>
</tr>
</tbody>
</table>

*Both under 6 months of age.

TABLE III. MATERNAL EDUCATION (N = 514)

<table>
<thead>
<tr>
<th></th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate*</td>
<td>91</td>
<td>17.7</td>
</tr>
<tr>
<td>Semi-literate</td>
<td>43</td>
<td>8.4</td>
</tr>
<tr>
<td>Literate†</td>
<td>380</td>
<td>73.9</td>
</tr>
</tbody>
</table>

*No formal schooling.
†More than 3 years schooling.

(44%) were married than black parents (56%). Statistical analysis showed this difference to be significant (chi-square test; P < 0.01).

Employment (Table IV)

One or both parents were employed in 80.7% of the families. The father was most often the breadwinner (74%). Among coloured families 85% had 1 adult employed compared with 77.6% in the black group. Blacks were mostly unskilled or semi-skilled labourers while coloureds were more frequently in semi-skilled or, to a lesser extent, skilled employment.

Family income (Table V)

This information was in most cases obtained from the mothers and was uncorroborated data. Estimates of income were possible in 476 families (87%). The admitted level of income in the coloured group was higher than in the black group with more families earning over R200 per month and fewer families having a negligible income of below R30 per month.

Family size and sibling deaths

Most coloured families (82%) had 1 - 3 children but fewer black families (64%) fell into this category. There were significantly

<table>
<thead>
<tr>
<th></th>
<th>Total (N = 533)</th>
<th>Black (N = 313)</th>
<th>Coloured (N = 220)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both parents unemployed</td>
<td>103 (19.3%)</td>
<td>70 (22.4%)</td>
<td>33 (15%)</td>
</tr>
<tr>
<td>One parent employed</td>
<td>410 (76.9%)</td>
<td>238 (76%)</td>
<td>172 (78.2%)</td>
</tr>
<tr>
<td>Both parents employed</td>
<td>20 (3.8%)</td>
<td>5 (1.6%)</td>
<td>15 (6.8%)</td>
</tr>
</tbody>
</table>

TABLE V. FAMILY INCOME

<table>
<thead>
<tr>
<th>R/mo. (1981)</th>
<th>Total (N = 476)</th>
<th>Black (N = 270)</th>
<th>Coloured (N = 206)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30</td>
<td>97 (20.4%)</td>
<td>64 (23.6%)</td>
<td>33 (16%)</td>
</tr>
<tr>
<td>30 - 100</td>
<td>164 (34.4%)</td>
<td>109 (40.4%)</td>
<td>55 (26.7%)</td>
</tr>
<tr>
<td>100 - 200</td>
<td>167 (35.1%)</td>
<td>84 (32.1%)</td>
<td>83 (40.3%)</td>
</tr>
<tr>
<td>&gt; 200</td>
<td>48 (10.1%)</td>
<td>13 (4.8%)</td>
<td>35 (17%)</td>
</tr>
</tbody>
</table>
more sibling deaths among the black group (chi-square test; \( P < 0.001 \)). As family size increased so did the incidence of sibling deaths. Multiple sibling deaths occurred in 7.6% of families and most were black.

**Housing**

**Location.** Black infants came predominantly from the Crossroads (squatter) area (50%) and the Guguletu township (24.7%), whereas coloured families were more widely spread across the Cape Peninsula. A number of coloured infants (15%) were referred to Red Cross War Memorial Children's Hospital from areas in the western Cape outside the Cape Peninsula, reflecting the considerable coloured population in these areas.

Type of accommodation. Fig. 2 indicates the type of housing occupied. Blacks had poorer quality accommodation compared with the coloured group.

**Family origin**

The origin of the particular family was taken as the area or district in which they had spent the longest period of residence. This information was available for 535 families. Fig. 3 shows that most blacks originated from Transkei and Ciskei, while most coloured families were local. Many blacks were recent arrivals and in many instances illegal residents without the necessary documentation to remain in Cape Town.

**Discussion**

The focus of this study was infants suffering from acute infantile diarrhoea living in an urban or peri-urban environment. Despite the limitations of its hospital-based nature, this study provides useful information regarding the demographic, social, economic and, to a lesser extent, cultural variables in the population studied.

The black group was mainly of the Xhosa tribe having its origins in Transkei and to a lesser extent Ciskei. Owing to economic pressures there has been considerable migration to urban areas such as Cape Town. Many reside in urban or peri-urban squatter areas in poor socio-economic conditions.

The Cape Coloureds, consequent to statutory controls imposed since the mid-1950s (Group Areas Act No. 41 of 1950), reside in specific areas. Since the implementation of this Act, the coloured population has been regarded as a totally separate society although according to the Theron Commission Report (1976) they share the aspirations and norms of white South African society. Most (75%) are urbanised although some are farmworkers in the western Cape. While coloured housing in many instances is overcrowded and inadequate, it generally is permanent with a reticulated water supply, adequate sewage disposal and often is electrified. The coloureds have the right to permanent residence and, until recently, benefited from a preferential employment system in the western Cape. The coloured population was estimated to be 53% of the population of greater Cape Town during the 1980 census while in comparison the black population constituted only 12.6%. It is accepted that the black population may have been underestimated but the preponderance of black infants in the study may suggest a higher incidence of diarrhoeal disease among this infant population.

All infants studied had a common illness and in this sense formed a single unit. General points relating to the whole group which emerged from the study were the very low incidence of breast-feeding and the low levels of income. In the majority, family income was below the Household Subsistence Level for 1981 estimated by the Institute for Planning Research of the University of Port Elizabeth. Most mothers were at home and, surprisingly, the majority were literate. Both these facts are important in the planning of preventive programmes.

Housing generally was inadequate being either in itself substandard or extremely overcrowded. The shanty dwellings in most cases are shelters of a temporary nature constructed from wood, corrugated iron and even plastic sheeting. No plumbing, sewage disposal or electricity is provided. Water sources are communal taps at strategic points in the area. Hostel accommodation is designed to accommodate unmarried migrant labourers and is inadequately equipped for family dwellings. These findings are similar to those reported from developing areas elsewhere. \(^1,^9,^10\) Spencer and Coster\(^11\) in their study in Johannesburg among a mainly black population, found subtenancy a common occurrence. Although not permitted by the authorities, 30% of households consisted of 10-14 members. Subtenancy was particularly common among the coloured families in the current study.
Distinct differences were demonstrated between the two racial groups. Coloured parents were younger, less often married, and had smaller families. Although better educated, the coloured mothers less often breast-fed their infants. A feature of the coloured group was the high incidence of low birth weight babies. This finding has been reported previously from Cape Town. A comparison with other reports shows 24.6% to be one of the highest figures recorded. A study of malnourished children in Jordan showed that a low birth weight was significant in the occurrence of malnutrition. In the present study a birth weight of < 2500 g was associated significantly with a rehydrated weight less than 80% of that expected for age (chi-square test; \( P < 0.001 \)). It seems that these light-for-date coloured infants are at risk for later malnutrition and that this may be an important contributory factor leading to the development of diarrhoeal disease. The birth weights for black infants in the study correspond with figures quoted for American Negroes with 9.9% < 2500 g in Cape Town compared with 11.2 - 13.8% for the American Negro infants.

The level of maternal education was deemed relevant, since most infants were in full-time care of their mothers. The level of education or literacy may be a significant limiting factor in any health promotion scheme. Overall, black mothers were less educated although the numbers achieving the secondary level did not differ significantly from coloured mothers. Literacy rates were higher than average for both black and coloured mothers when compared with figures obtained from the 1980 census. In the 1980 census the average literacy rate in blacks was 51% and in the coloured population 69.7%. Wittman et al. in their study of coloured mothers in the Cape Peninsula (1964) found 6% to have received no effective education, while 24% had been educated to between Standards 1 and 3. These figures are similar to those in the current study.

A large number of the parents were unmarried (50.7%). This trend was more marked among the coloured mothers (56%) and fewer black parents were unmarried (44%), possibly reflecting persistence of traditional customs. The number of unmarried black mothers is high when compared with traditional black tribal communities where most mothers are married according to local custom. The large number of unmarried black parents in this study reflects the social disruption associated with migration to peri-urban slum areas.

Coloured infants came from more widely dispersed areas of the Cape Peninsula and western Cape than their black counterparts who generally came from two specific local areas of the Cape Peninsula - Crossroads squatter area and Guguletu. A consideration of the origins of the families shows a distinct division along ethnic lines. Firstly, the coloured group that is indigenous to the western Cape and who are mostly permanent residents of the Cape Peninsula; and secondly, the black predominantly migrant group who had arrived in Cape Town at intervals ranging from less than a week to over a year before admission of the infant to hospital. Only a minority of the blacks studied could be termed indigenous to the western Cape.

From the data presented it seems reasonable to conclude that the coloured cohort were a sample of a deprived subgroup dispersed widely among this population. This subgroup is from the lower socio-economic strata of the community and infants are placed at risk predominantly due to parental inadequacy. Other risk factors such as low birth-weight and the paucity of breast feeding also are operative. In comparison, the black group studied was probably more representative of a wider spectrum of their community in Cape Town, which as a whole is poorer and has a less than optimum environment. It is suggested that black infants may be inherently less at risk (i.e. more often breast-fed, higher birth weight and in a better mothering situation) but are overwhelmed by the massive load of pathogenic agents from the highly contaminated environment in which they live.

This difference between the two groups necessitates different strategies of intervention. Promotion of breast-feeding and identification of families and infants at risk is a priority in the coloured community. Improved living conditions are a priority, particularly for the black community. Oral rehydration programmes are necessary for both groups and for the black community concentrated in the Crossroads and Guguletu areas this would be a highly cost-effective project.

REFERENCES