

## ORIGINAL ARTICLES

# The Epidemiology of Diarrhoeal Disease in Children at Queen Elizabeth Central Hospital, Blantyre, Malawi, 1994–1997

NA Cunliffe,<sup>1,2,4</sup> JS Bresee<sup>3</sup>, J Gondwe<sup>2</sup> and CA Hart<sup>4</sup>

Malaria Project and Wellcome Trust Centre, Queen Elizabeth Central Hospital, Blantyre<sup>1</sup>; Department of Paediatrics, College of Medicine, Blantyre, Malawi<sup>2</sup>; Viral Gastroenteritis Section, Centers for Disease Control and Prevention, Atlanta, Georgia, USA<sup>3</sup>; Department of Medical Microbiology and Genito-Urinary Medicine, University of Liverpool, Liverpool, UK<sup>4</sup>

## Abstract

Diarrhoeal disease (DD) is a leading cause of childhood morbidity and mortality in developing countries throughout the world. To begin to understand the burden of DD at Queen Elizabeth Central Hospital (QECH), its seasonality and age distribution, we reviewed inpatient and outpatient records for cases of gastroenteritis between 1994 and 1997.

Annually, DD accounted for an average of 7,300 attendances to the Under 5's rehydration clinic, 1219 paediatric admissions (12% of all hospitalisations) and 183 deaths in hospitalised children (19% of total). A distinct seasonal pattern was identified with monthly peaks for DD occurring between October to January. Over 75% children (inpatients and outpatients) were below two years of age.

During the study period, an increase in the number of outpatient attendances for DD was observed. In contrast, the number of children with a more severe outcome, hospitalisation or death, declined during the study period. This is likely to be explicable by the increasing and appropriate use of oral rehydration therapy.

We conclude that DD is a substantial cause of morbidity and mortality in Malawian children. Further studies of the patterns of DD at QECH will be necessary to assess the impact of DD control programmes.

## Introduction

Diarrhoeal disease (DD) remains one of the leading causes of childhood morbidity and mortality worldwide. A recently published Global Burden of Disease Study estimated that, in 1990, DD was the fourth most common cause of death worldwide, accounting for 2.9 million of all deaths (largely affecting children), and the second leading cause (after lower respiratory infections) of premature mortality and disability (1, 2). The largest burden of disease is seen in developing countries, where it has been estimated that each child suffers an average 2.6 episodes of diarrhoea per year, and as many as 6-10 episodes/year in some African studies (3).

In Malawi, DD is recognised to be a major cause of childhood morbidity and mortality. A National Morbidity, Mortality and Treatment Survey undertaken in 1991 documented that children under five years suffer an average of six diarrhoeal episodes per year. With an estimated 1.8 million

children below age five in Malawi, more than 10 million episodes of diarrhoea occur annually in this age group. In addition, DD was responsible for approximately 10% of deaths in hospitalised children under age five (4). The National Control of Diarrhoeal Diseases Programme (NCDDP) introduced a Five Year implementation Plan (1995-1999) to combat the threat of DD to child health; the provision and correct use of Oral Rehydration Therapy (ORT) is central to this plan (5).

As preparation for a two-year study of the aetiology of diarrhoea in children in Blantyre, Malawi, we examined the epidemiology of DD in children receiving health care at the Queen Elizabeth Central Hospital (QECH), Blantyre, for the years 1994 to 1997. The questions we wished to address were: (i) what is the magnitude of DD morbidity and mortality in children attending, or admitted to, QECH? (ii) What is the age distribution of cases of DD? (iii) Is there a seasonal pattern to DD? (iv) Have there been any changes in these trends over time?

## Methods

This was a retrospective review of inpatient and outpatient log books, obtained from the medical records department of QECH. All available records for the three-year period April 1994 to March 1997 were reviewed. Individual case notes were not examined.

We reviewed all inpatient records for admission diagnoses (made by the admitting paediatrician) that identified gastroenteritis as the sole diagnosis, or that included gastroenteritis as a major differential diagnosis (e.g. gastroenteritis/malaria). The causes of death in children admitted to QECH were obtained from a further logbook. Finally, the outpatient records of children with DD attending the Under 5 rehydration clinic at QECH were examined. Children were grouped according to age (months) as follows: 0-5, 6-11, 12-23, 24-35, 36-47, 48-60 and > 60.

## Results

### *Morbidity and mortality estimates*

During the period of study, DD accounted for an average of 1219 admissions, 7,300 visits to the rehydration clinic and 183 deaths each year. This represented 12% of all paediatric admissions and 19% of all hospital deaths in this age group (data not shown).

### *Age distribution*

More than 75% of children were less than two years old, and over 40% were less than one year. Less than 15% were below 6 months. Two-thirds of children were aged 6-24 months. The age distribution did not differ for inpatients, outpatients, and children who died (Figure 1).

### Seasonal variation

The number and proportion of admissions with gastroenteritis showed a marked seasonal trend each year between 1994 and 1997 (Figure 2). Peak diarrhoea rates were identified from November to April. These months correspond with the warm, wet season in Malawi, whereas the lowest rates of diarrhoea occurred during the cooler, drier winter months of July to August (Figure 2). The peak diarrhoea rates preceded the peak for total admissions by approximately two months.

### Changing trends over time

During the period for which all data were available, the number of DD hospitalisations decreased from 1264 between April 1995 and March 1996 to 862 between April 1996 and March 1997 (a reduction of 33%). During the same period, the number of deaths attributed to DD fell from 226 to 140 (a reduction of 38%). In contrast, the number of outpatient visits rose from 4744 to 7302 (an increase of 54%) (Figure 3).

### Discussion

We have retrospectively reviewed morbidity and mortality data for cases of gastroenteritis seen at QECH between 1994 and 1997. The burden of DD was considerable, being responsible for 12% of all paediatric hospitalisations and 19% of deaths. Furthermore, an average 7,500 outpatient visits with gastroenteritis were made annually. It is evident that DD is a major contributor to morbidity and mortality in Malawian infants and young children.

The age distribution of children with DD (over 75% below two years) confirms that infants and young children are most at risk of dehydrating diarrhoea, emphasising the importance of targeting this age group in DD control programmes.

Peaks in hospitalisation for DD in young children have consistently been associated with rotavirus infection, which accounts for 30-60% of all severe gastroenteritis cases worldwide (6). In this study, we observed peak rates of DD in wet, warm months (November to April) while a review of African studies documented that rotavirus circulation was more common during dry months (Cunliffe et al, submitted). A two-year study of DD aetiology in Malawi (currently underway) will allow greater understanding of the role that different enteropathogens play in producing these distinct seasonal trends.

The decreasing number of DD hospitalisations and deaths over the period of study contrasts with the rising number of outpatient visits with DD, and it is likely that this observation reflects the success of ORT, and its skilled use, in the US oral rehydration unit at QECH. This clinic was opened in 1986 and trained clinic personnel have routinely given ORT to children with DD since 1992. A study at Kamuzu Central Hospital, Lilongwe in 1987 has previously demonstrated the value of oral rehydration units in Malawi, and the benefits of

ORT, by decreasing the number of paediatric hospitalisations and deaths from DD by 50% and 39% respectively, with concomitant increases in cost savings (7).

This retrospective review of DD at QECH has limitations since it relied on admission, rather than discharge, diagnoses and some of the recorded information was incomplete. Nevertheless, this review allows the identification of DD patterns from which conclusions can be drawn, using simple data that were easily obtained.

The NCDDP, through the Five Year Implementation Plan, aims by the year 1999 to reduce the mortality associated with acute DD in children under 5 in Malawi by 50%, and to reduce the number of cases admitted to hospital with severe dehydration by 70% (5). Further study of DD morbidity and mortality at QECH will allow analysis of changing patterns of disease, as well as assessment of the continuing impact of the DD control programme.

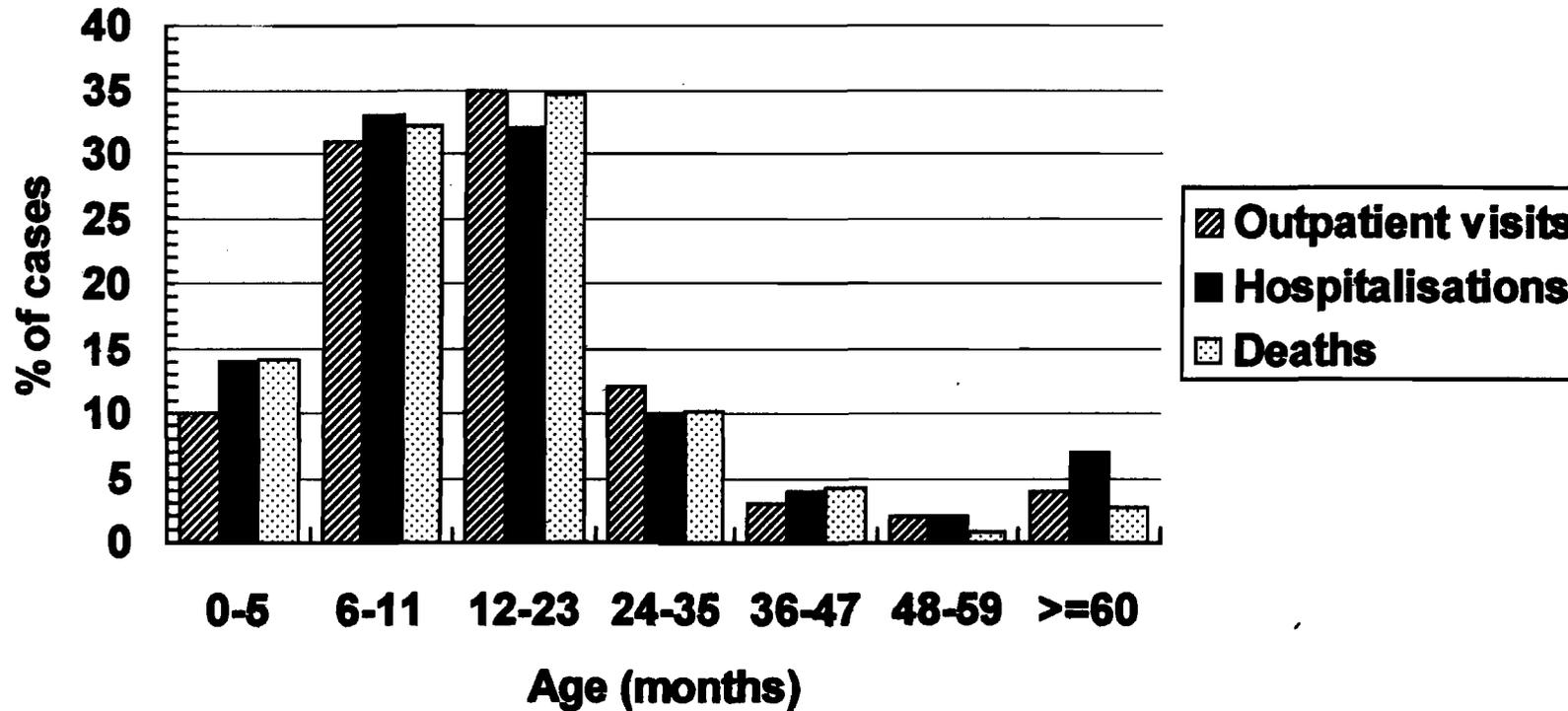
### Acknowledgements

The authors thank the Medical Records Department at QECH for their assistance with this work. Nigel Cunliffe is a Wellcome Research Training Fellow in Clinical Tropical Medicine (award number 049485/Z/97/Z).

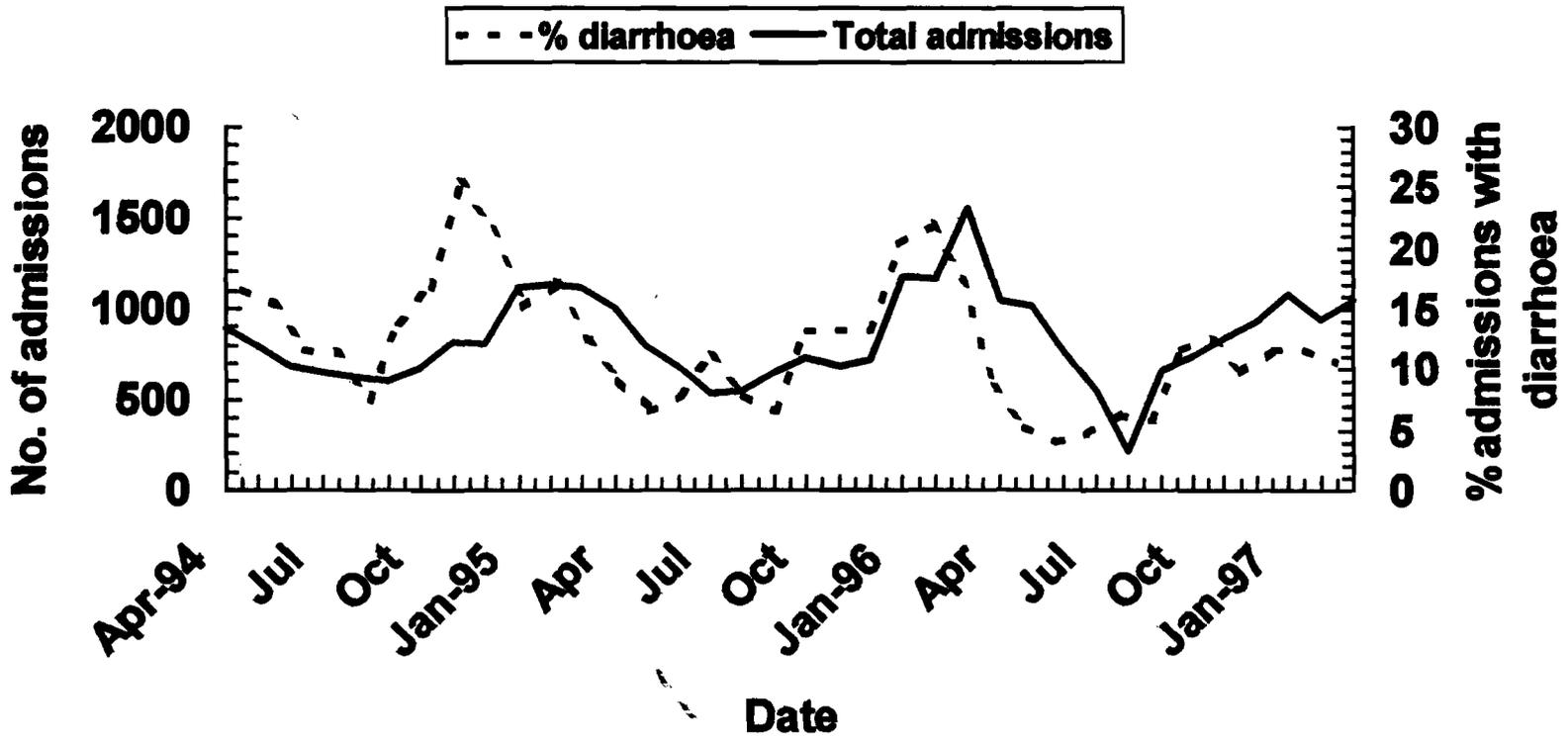
### References

1. Murray CJL and Lopez AD. Mortality by cause for eight regions of the world: Global Burden of Disease Study. *Lancet* 1997; 349: 1269-1276.
2. Murray CJL and Lopez AD. Global mortality, disability, and the contribution of risk factors: Global Burden of Disease Study. *Lancet* 1997; 349: 1436-1442.
3. Bem C, Martines J, de Zoysa I and Glass RI. The magnitude of the global problem of diarrhoeal disease: a ten-year update. *Bull VMO* 1992; 70:705-714.
4. DHSS Report, Malawi Government, Zomba, 1991.
5. Malawi. National Control of Diarrhoeal Diseases Programme. Five Year Implementation Plan 1995-1999. Improving National Preparedness and Response to Cholera and Dysentery Epidemics.
6. Kapikian AZ and Chanock RM. Rotaviruses. In Fields BN, Knipe DM, Howley PM et al, Eds. *Field's Virology*, 3rd edition. Philadelphia: Lippincott-Raven, 1996; 2:165 7-1708.
7. Heymann DL, Mbvundula M, Macheso A, McFarland DA, Hawkins RV. Oral rehydration therapy in Malawi: impact on the severity of disease and on hospital admissions, treatment practices, and recurrent costs. *Bull WHO* 1990; 68: 193-7.

# Figure 1: outpatient visits, hospitalisations, and deaths from diarrhoea by age group, QECH, April 1995-March 1997



**Figure 2: total admissions and admissions for diarrhoea to paediatric ward, QECH, April 1994-March 1997**



**Figure 3: outpatient visits, hospitalisations, and deaths from diarrhoea, QECH, April 1995-March 1997**

