



Trends in Diarrhoeal Disease in a Southern Nigerian Coastal City

Tendances dans les maladies diarrhéiques dans une ville côtière du sud du Nigeria

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ABSTRACT

BACKGROUND: Among the goals set at the 1990 World Summit was the reduction of diarrhoeal disease incidence by 50% and its mortality by 25% by 2000. However, despite all efforts, diarrhoeal disease remains a significant contributor to under-five morbidity and mortality in developing countries. **OBJECTIVE:** This study aimed at determining the role of diarrhoeal diseases in paediatric disease burden at a University Teaching Hospital.

METHODS: Data on children with diarrhoeal diseases admitted into the Children's Emergency Ward (CHEW) or were attended to at the Diarrhoeal Training Unit (DTU) between 1999 and 2005 were analysed retrospectively.

RESULTS: There were 9901 admissions of which 1080(10.91%) had diarrhoea. Diarrhoeal diseases accounted for 8.2%–15% of the total yearly admissions with a statistically significantly increased contribution between 2003 and 2005 ($\chi^2=33.58$, $df=6$, $p<0.001$). The children consisted of 628(58.1%) males and 452(41.9%) females; all aged 1–180 months; mean (21.3 ± 26.9 months). Of these 539(49.9%) were infants and 988(91.48%), under-fives. The degrees of dehydration were mild in 150(13.9%) children, moderate in 854(79.1%) and severe in 76(7%). During the period, 25 (2.5%) diarrhoea-related deaths occurred. In 2005, 745 children with diarrhoea received care in the DTU compared to 184 admitted for diarrhoea in CHEW.

CONCLUSION: Diarrhoea continues to contribute significantly to childhood morbidity. Well-known preventive strategies should be employed on a wide scale to reduce its current burden. *WAJM 2009; 28(4): 211–215.*

Keywords: Diarrhoeal diseases, paediatric admissions, Diarrhoea Training Unit.

RÉSUMÉ

CONTEXTE: Parmi les objectifs fixés lors du Sommet mondial de 1990 était la réduction de l'incidence des maladies diarrhéiques de 50% et son taux de mortalité de 25% en 2000. Cependant, malgré tous les efforts, les maladies diarrhéiques reste un contributeur important au moins de cinq ans la morbidité et la mortalité dans les pays en développement.

OBJECTIF: Cette étude visait à déterminer le rôle des maladies diarrhéiques dans la charge de morbidité pédiatrique à un centre hospitalier universitaire.

MÉTHODES: Les données sur les enfants atteints de maladies diarrhéiques admis dans Ward The Children's Emergency (mâcher) ou ont été soigné à l'unité de formation diarrhéiques (DTU) entre 1999 et 2005 ont été analysées rétrospectivement.

RÉSULTATS: Il ya eu 9901 entrées dont 1080 (10,91%) ont eu la diarrhée. Les maladies diarrhéiques représentent 8,2% -15% du total des admissions par an avec une contribution significativement augmenté entre 2003 et 2005 ($\chi^2 = 33,58$, $df = 6$, $p < 0,001$). Les enfants se composait de 628 (58,1%) hommes et 452 (41,9%) femmes, tous âgés 1-180 mois; moyenne ($21,3 \pm 26,9$ mois). Sur ces 539 (49,9%) étaient des bébés et 988 (91,48%), moins de cinq ans. Les degrés de déshydratation ont été légers dans 150 (13,9%) des enfants, modéré dans 854 (79,1%) et sévère dans 76 (7%). Au cours de la période, 25 (2,5%) décès liés à la diarrhée a eu lieu. En 2005, 745 enfants souffrant de diarrhée ont reçu des soins dans les DTU, comparativement à 184 admis pour la diarrhée chez les mâcher.

CONCLUSION: La diarrhée continue de contribuer de manière significative à la morbidité infantile. Bien connu des stratégies de prévention doivent être employés sur une large échelle afin de réduire sa charge actuelle. *WAJM 2009; 28(4): 211–215.*

Mots-clés: les maladies diarrhéiques, les admissions en pédiatrie, Diarrhée formation en unité.

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Abbreviations: CHEW, Children Emergency Ward; DTU, Diarrhoeal Training Unit; IMCI; Integrated Management of Children Illness; MDG4, Millennium Development Goal 4; ORS, Oral Rehydration Salt; UPTH, Port Harcourt Teaching Hospital; UNICEF, United Nation's Children Fund; WHO, World Health Organization.

INTRODUCTION

At the 1990 World Summit for Children, one of the goals set was to halve child deaths caused by diarrhoea and decreased its incidence by 25%.¹ By 2000, it was noted that although deaths due to diarrhoeal diseases had been reduced by 50% globally, diarrhoea still remained a major cause of deaths among children.¹⁻² A review of the causes of under-five deaths in developing countries in 2002 showed that although the under-five deaths had reduced to about 10.5 millions per annum, diarrhoea was still contributing to about 15% of these deaths.³⁻⁴ While, one of the Millennium Development Goals is the reduction of child mortality with specific targets being to reduce by two thirds, between 1990 and 2015 the under-five mortality,⁵ unless the major contributors such as diarrhoea are targeted for action and monitored, the attainment of this goal will remain illusive.

Diarrhoeal diseases have remained important contributors to under-five morbidity and mortality in many health facilities in Nigeria, including the University of Port Harcourt Teaching Hospital. A seven-year audit of diarrhoeal cases in the Diarrhoea Training Unit of the University of Port Harcourt Teaching Hospital showed that diarrhoea was still prevalent although, most of the children were mildly dehydrated and were managed as outpatients.⁶ In the 2003–2005 review of mortalities in the Department of Paediatrics in the same hospital, diarrhoea was found to contribute 8% of the deaths and most diarrhoea-related deaths occurred in infancy.⁷ This study therefore sought to determine the trends in diarrhoeal diseases in the department in the period 1999 to 2005 (a period of 7 years), to determine its current trend and the associated morbidity and mortality.

SUBJECTS, MATERIALS, AND METHODS

The University of Port Harcourt Teaching Hospital (UPTH) is a tertiary hospital accredited for medical training at the undergraduate and postgraduate levels. It has a Diarrhoea Training Unit (DTU) and the Children's Emergency Ward (CHEW) as the entry points for children with diarrhoeal diseases. With

the support of the United Nations Children's Fund (UNICEF), Oral Rehydration Salts sachets (ORS) are provided free to all children and adults with diarrhoeal diseases attended to at the hospital. All children that present with diarrhoeal diseases during official working hours are attended to at the DTU and those seen thereafter receive care at CHEW. All cases are treated as outpatients except the very ill ones who are admitted at CHEW. Registers of all clients are maintained at these units. Neonates with diarrhoeal diseases are treated at the Special Care Baby Unit and were therefore excluded from the study.

All diarrhoeal cases attended to in CHEW were assessed for dehydration and the presence of other illnesses and complications. Oral rehydration therapy (ORT), using the Guidelines for the management of Diarrhoeal diseases provided by the National Diarrhoeal Diseases Control Programme and the World Health Organisation (WHO), was used. Oral Rehydration Salt (ORS) solution was prescribed for all children except those in shock or who cannot take orally to whom Ringer's lactate (Hartman's solution) or normal saline is administered till ORT becomes feasible.

All records of children treated for diarrhoeal diseases at the CHEW and DTU were obtained and personal and clinical data extracted. Data extracted included the total admissions and admissions due to diarrhoea in CHEW and total diarrhoeal cases cared for at the DTU. For each case of diarrhoea, other details obtained included the month and year of presentation, the age, sex, hydration status, the duration of admission and its outcome. Data extraction covered the period January 1999 to December 2005. Data were entered into Microsoft Excel Spread Sheet and analysed with SPSS version 11. Chi square test was used to compare the categorical variables. Simple descriptive statistics and charts are used to present the results.

RESULTS

During the period, 9,901 children were admitted in CHEW of which 1,080(10.91%) had diarrhoea. They were aged 1–180 months with a mean age of

21.3±27.0 months. The median and modal ages were 12 months each. Five hundred and thirty (49.90%) children were infants and 988(91.48%), under-fives. Similarly, among the DTU cases, 377(50.6%) were infants and 651(87.38%), under-fives (Fig. 1).

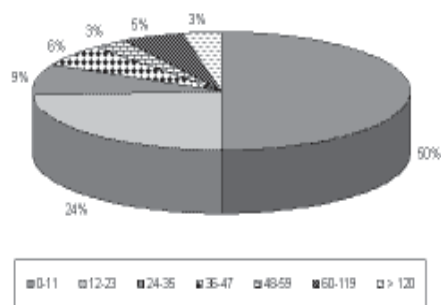


Fig. 1: Distribution of admissions by age, months. Fifty percent of the children were less than 12 months of age.

The 1,080 diarrhoeal cases comprised 628(58.1%) males and 452(41.90%) females. The mean ages for the males and females were (20.5±25.6) and (22.3±28.7) months respectively. There was no statistically significant difference in the ages of the males and females ($\chi^2=5.970$, $df=7$, $p=0.543$). Similarly among the DTU cases, there were 429(57.6%) males and 316(42.4%) females.

In 2005, there were 184 diarrhoeal admissions compared to a total of 745 cases seen at DTU. The annual number of diarrhoeal cases admitted during the period ranged from 84 to 192 with a mean yearly admission of 154.3. Although the total yearly admissions (Fig. 2) decreased from 161 in 1999 to 168 in 2005 with the lowest recorded admission of 561 in 2004, diarrhoeal-related admissions increased from 161(8.20%) in 1999 to 192(13.68%) in 2001 and 184(10.90%) in 2005 respectively with a peak proportional total diarrhoeal admission of 15% in 2004. This difference was statistically significant ($\chi^2=33.58$, $df=6$, $p<0.01$). The peak overall admission occurred in the months of May–October while that for diarrhoea was January–April (Fig. 3). Between May–October, 504(8.81%) diarrhoeal cases were admitted out of a total of 5721 admissions compared to 576 (13.78%) out

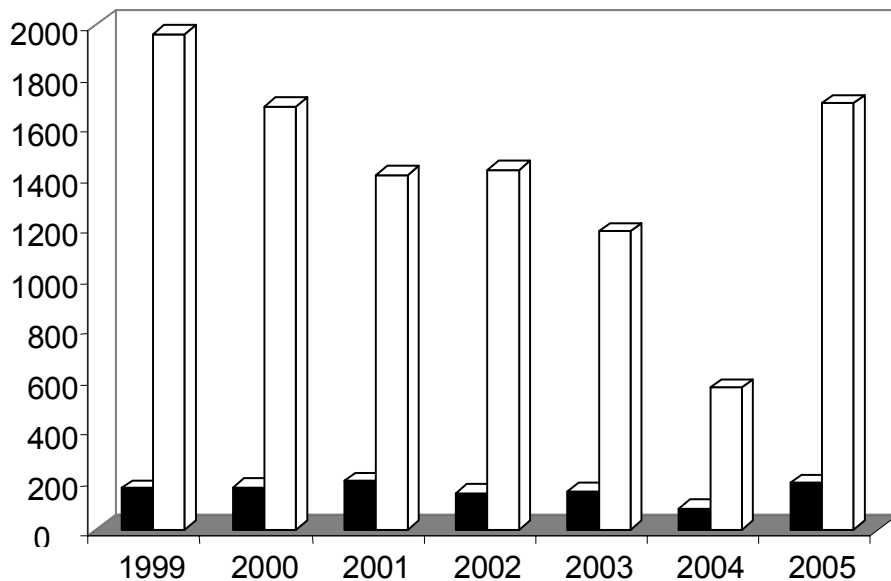


Fig. 2: Comparison of total (■) and Diarrhoea-related (□) Admission Trends over a Seven-year Period.

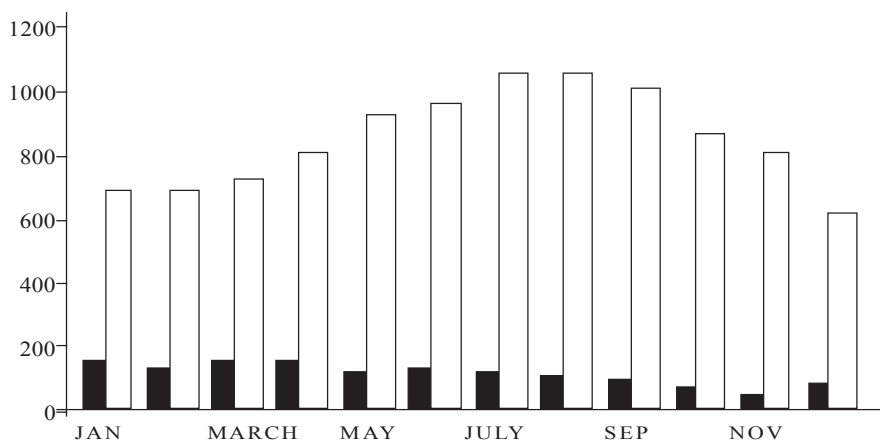


Fig. 3: Distribution of Total (■) and Diarrhoea-related (□) Admissions in Children Emergency by Month of the Year. Admissions tended to decrease in the dry season (October through March).

of 4180 admissions recorded from November to April. Thus, a statistically significant number of children with diarrhoeal diseases were admitted outside the peak period for admission into CHEW ($\chi^2=48.55$ with Yate's correction, $p=0.01$). Similarly, although a larger number of children were admitted in the second half of the year – 5248 compared to 4653, the total diarrhoeal admissions in the second half of the year was statistically significantly lower than that in the first half – (380 compared to 700) ($\chi^2=123.05$ with Yate's correction, $p=0.01$) (Fig. 3). The proportion of diarrhoeal cases admitted

increased from 5.39% in the last quarter of the year to 17.85% in the first quarter. This increase was statistically significant ($\chi^2=156.54$, $df=3$, $p=0.01$).

The degrees of dehydration among the CHEW cases were mild in 150(13.9%), moderate in 854(79.07%) and severe in 76(7.04%) children. Although 635(74.4%) children with moderate dehydration were aged 1–23 months, there was no statistically significant difference in the hydration status of children aged 1–23 months and others ($\chi^2=2.64$, $df=2$, $p=0.267$). Six hundred and twenty five children (57.87%) were admitted with

diarrhoeal diseases alone and others had additional diagnoses. The main additional diarrhoea-related reasons for admission were electrolyte imbalance and shock while the main non diarrhoea-related reasons were malaria, respiratory infections and sepsis (Table 1).

The duration of admission in the CHEW ranged from 1-8 days with a mean of 2.42+1.01 days, and mode and median of 2 days.

Seven hundred and sixty-six (70.90%) children were discharged, 269(24.9%) transferred to the Children's Wards, 13(1.2%) discharged against medical advice and five(0.5%) absconded while 27(2.5%) died. Twelve (92.3%) of the 13 children whose caregivers took the children away against medical advice had mild or moderate dehydration and all the absconded cases had moderate dehydration. Similarly, of the 27 diarrhoeal children who died, 7(25.9%) had severe, 16(59.3%) moderate and 4(14.8%), mild dehydration. However, of the 766 (70.9%) children who were discharged home, 123(16.1%) had no dehydration compared to 23(8.6%) transferred to the wards. Thus the hydration status of the children was a statistically significant determinant of the discharge or transfer of the child ($\chi^2=33.7$, $df=2$, $p<0.00$).

All the children discharged against medical advice and 4(80%) of those whose caregivers absconded were under-fives. Overall, 87 children died with 14(51.9%) being infants, 20 (23.0%) aged 1–23 months and 22(81.5%) 0–3 years. Twelve of the dead children had diarrhoea as the only diagnosis and nine had electrolyte derangement and four, shock as additional conditions. Thus 25(92.6%) of the diarrhoeal related deaths had diarrhoea with or without complications.

Six hundred and sixty-one (61.2%) children left CHEW by the end of the second day of admission, 410(38.0%) stayed for 3–5 days and nine (0.8%) for 6-8 days. In the first two days, 11(40.74%) children died while, 505(65.93%) of those who were discharged either died or were discharged. Between the 3rd–5th day, 16(59.3%) children died and 255(33.3%) were discharged. Thus, in the first five days of admission, the outcome was easily determined-death or discharge. The

Table 1: Other Reasons for Admission among Diarrhoeal Children

Reasons	Frequency	Percent
Electrolyte imbalance	90	8.33
Shock	23	2.13
Dysentery	21	1.94
Cholera	8	0.74
Persistent vomiting	6	0.56
Food poisoning	3	0.28
Malaria	327	30.28
Acute respiratory infections/		
Pneumonia	57	5.28
Sepsis	33	3.06
Anaemia	17	1.57
Measles	6	0.56
Pulmonary Tuberculosis	5	0.46
Malnutrition	3	0.28
Sickle cell disease	2	0.19

differences in the timing of discharge or death of the children were statistically significant ($\chi^2=7.9$ df=2, p=0.010).

DISCUSSION

The findings of this study agree with previous reports of diarrhoea being most common in under-fives, especially those aged less than two years and contributing significantly to their deaths. Although its total contribution to under-five deaths has decreased from 4.6 million in the 1980s to 1.6 million in the 2000s, its incidence has remained unacceptably high and its proportional contribution to under-five deaths reduced only from about 19% in the 1990s to 17% 2003.^{1,8} Some of the important contributors to this reduced mortality from diarrhoeal diseases include improved case management using Oral Rehydration Therapy (ORT), improved nutrition and increased breastfeeding, among others.⁹ The recent introduction of the low osmolar Oral Rehydration Salt (ORS) and zinc pro-mises to further reduce the morbidity and mortality from diarrhoeal diseases.¹⁰⁻¹⁵

While reduction in the mortality from diarrhoeal diseases remains commendable, it is worrisome that its incidence has remained high. Low cost and effective

measures which can further reduce this high incidence are already known but need to be applied on a wider scale especially in resource-limited settings where diarrhoeal diseases are more common and contribute to more deaths.¹⁰ The discovery that zinc supplementation for 10–14 days in children with diarrhoeal diseases will not only reduce the related morbidity and mortality in the current episode of illness,¹³⁻¹⁵ but also its incidence in the subsequent two-three months calls for immediate inclusion in the diarrhoea management guidelines in Nigeria. With the documented impact of zinc on other causes of childhood morbidities, its inclusion in diarrhoeal disease management protocol will contribute to a reduction in the morbidity and mortality from pneumonia and other childhood diseases.¹⁶

The continued significant role of a Diarrhoea Training Unit in reducing related admissions and improving the outcome of management has been further proven by this study. This therefore justifies its establishment at all levels of health care delivery especially in developing countries with the highest diarrhoeal disease burden. The closure of the DTU after official working hours may explain the high proportion of children with mild and moderate dehydration admitted into the CHEW. It is therefore important that the DTU operates on a 24-hour and seven-day-basis to ensure that children who present outside the normal work period are also appropriately managed to reduce the inpatient case load and diarrhoea related morbidity and mortality.

The multiplicity of presenting symptoms among under-fives which led to the adoption of an integrated management approach – the Integrated Management of Childhood Illness (IMCI) has been further supported by our findings.¹⁷ This highlights the need for the continued implementation of the Integrated Management of Childhood Illness (IMCI) as a key strategy for improved survival of under-fives and the attainment of the 4th MDG in resource-limited settings.¹⁸⁻²⁰ Additionally, other control measures such as improved hygiene, the provision of potable water and improved Infant and Young Child

Feeding practices should be widely applied to reduce the diarrhoeal disease incidence.

Conclusion

Diarrhoeal disease morbidity has remained high in our setting. Children under-fives, especially those in the first two years of life are most vulnerable. Widespread uses of ORT and a functional DTU have contributed to a significant reduction in diarrhoeal-related admissions, severity of dehydration in admitted cases and the related morbidity and mortality in our setting. There is, however, a need for immediate implementation of newer strategies such as the use of low osmolar ORS and zinc for diarrhoeal cases if further reductions in diarrhoeal disease burden will be obtained and MDG 4 attained.

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