

Childhood Mortality Among 22,255 Consecutive Admissions in the University College Hospital, Ibadan

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Summary

Adeyokunnu, A. A., Taiwo, O., and Antia A. U. (1980). *Nigerian Journal of Paediatrics* 7(1), 7. **Childhood Mortality Among 22,255 Consecutive Admissions in the University College Hospital, Ibadan.** A review of 22,255 consecutive admissions in the Department of Paediatrics, University College Hospital, Ibadan, during the five-year period (January 1969-December 1973) showed an overall mortality of 14 per cent. Fifty per cent of the deaths occurred in the first year of life, forty three per cent occurred in the next four years, and only seven per cent in children aged 6 to 14 years. Infections and malnutrition were the major causes of death in the first five years of life, but in the older age groups death was more frequently due to malignancies, anaemias and chronic renal disease. Deaths from malaria infections occurred mainly between the ages of 3 and 7 years. The study indicates that improvement in health care delivery, with particular attention to nutrition, health education, personal hygiene, and immunization against communicable diseases, will improve the survival rate of children in our environment.

As in most other developing parts of the world, health statistics in Nigeria are often rough estimates, and it is therefore impossible to give accurate or reliable figures of the incidence of most diseases and of birth and mortality rates. Most of the published health statistics are based on hospital records, and it is well recognised that these are inadequate as sources of information for the entire population. Patients attending teaching hospitals in particular are highly selected and therefore computation of disease patterns in such hospitals may not reflect the disease pattern in the community. In spite of

these limitations however, hospital records of morbidity and mortality rates serve as a pointer to what exists in the population at large, and may thus form a basis for planning of health care.

A previous analysis of the major causes of paediatric deaths in the University College Hospital (UCH), Ibadan, Nigeria, covered the period, 1964-1966 (Hendrickse, 1967). The present study was undertaken to evaluate the pattern of childhood mortality in the same hospital over the five-year period, January 1969 to December 1973.

Materials and Methods

A regular mortality review meeting was started in the department of Paediatrics, UCH, Ibadan, in 1965. At these meetings which are held once a week and attended by all the medical and senior nursing staff in the department, all the paediatric admissions and deaths during the previous week are reviewed. Each death is allotted a standard punched card on which are recorded the patient's age, dates of admission and of death, duration of hospitalization, presenting complaints, physical findings, results of relevant investigations, provisional diagnosis, management, and necropsy findings. The final diagnosis in each case was reached at the mortality review meeting after a thorough review of all the available data.

Results

During the five-year period under review, a total of 22,255 children were admitted into the department. These consisted of 12,978 males and 9,277 females, giving a M:F ratio of 1.4:1. There were 3,190 deaths, resulting in a mortality rate of 14 per cent. Of the 3,190 deaths, 98 were excluded from further analysis on the grounds of incomplete information with regard to age, sex and definite diagnosis, leaving 3,092 cases with acceptable data for the present study. In 312 cases, the ante-mortem diagnosis was supplemented with findings on necropsy (necropsy ratio 1:10).

The number of deaths in the different age groups is shown in Table I. One thousand, one hundred and sixteen (36 per cent) of the 3,092 deaths were in children below the age of six months, while 1,562 (50 per cent) of the deaths occurred in infants. Children in their second year of life accounted for 715 (23 per cent) deaths, but thereafter, there was a progressive decline in the number of deaths, such that only 202 (6.5 per cent) of the total deaths occurred in the age group, 6 to 14 years.

The 3,092 deaths consisted of 1,751 males and 1,341 females giving a male:female ratio of 1.3:1.

TABLE I

Age Distribution Among 3,092 Deaths in Children, aged, birth-14 years

Age	Sex		Total No of Deaths	Per cent of Total Deaths
	M	F		
Birth-1 month	418	307	725	23.5
2 Mons- 6 Mons	213	178	391	12.7
7 Mons-12 Mons	262	184	446	14.5
13 Mons-24 Mons	396	319	715	32.1
25 Mons-36 Mons	177	148	325	10.5
37 Mons-60 Mons	182	106	288	9.2
6 yrs. - 14 yrs	103	99	202	6.5
Total	1,751	1,341	3,092	100.0

A similar male to female ratio was evident among deaths in all age groups and this accords with the observations stated above, that male admissions in the department outnumber female admissions in the ratio of 1.4:1.

The disease entities identified in the 3,092 deaths are listed in order of prevalence in Table II. However, significant differences were evident in the principal causes of death in the different age groups as detailed below:

Neonatal Period

Among a total of 725 neonatal deaths, the three principal causes of death were low birthweight, tetanus neonatorum and hyperbilirubinaemia which accounted for 36.4 per cent, 16.8 per cent, and 14.9 per cent, of total deaths respectively (Fig. 1). Other important causes of death in this period were congenital abnormalities which were diagnosed in 10.1 per cent of the cases, and septicaemia which was diagnosed in 7.6 per cent of the cases. As many as 26.6 per cent of the neonatal deaths occurred in the first 24 hours after delivery, and more than 50 per cent occurred during the first 6 days of life.

TABLE II
Common Causes of Death in all Age Groups

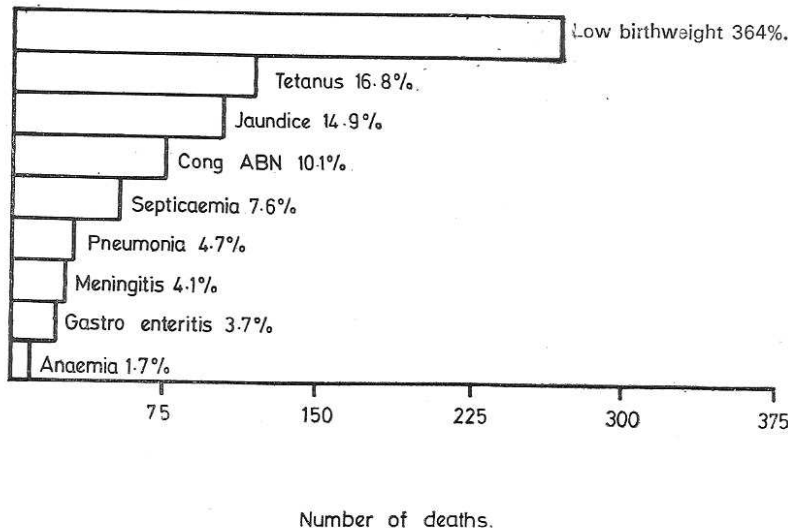
Diagnosis	No of Cases	Percentage of Total
Gastroenteritis	624	(16.3)
Pncumonia	551	(14.4)
Low Birthweight	518	(13.6)
Malnutrition	354	(9.3)
Tetanus	250	(6.5)
Jaundice	216	(5.6)
Meningitis	207	(5.4)
Congenital malformations	198	(5.2)
Anacmia	171	(4.6)
Convulsions	170	(4.5)
Septicaemia	143	(3.7)
Measles	137	(3.6)
Poisoning	77	(2.0)
Malignancy	64	(1.7)
Malaria	48	(1.3)
Typhoid	32	(0.8)
Nephrotic Syndrome	31	(0.8)
Tuberculosis	26	(0.7)
Total	3,817	(100.0)

Period of Infancy

Fig. 2 illustrates the diagnostic categories in 1,562 deaths which occurred between 1 month and 1 year of age. Bronchopneumonia and gastroenteritis were the two leading causes of death in this period, being responsible for 18.4 per cent and 17.7 per cent respectively of total deaths. Nutritional problem manifesting as marasmus was also of considerable importance in this age group and was responsible for 209 (13.4 per cent) of deaths.

Age Group, 1-3 Years

As detailed in Fig. 3, the leading cause of death in this period of life was gastroenteritis which was responsible for 259 (24.9 per cent) of the 1,040 deaths. Nutritional problems remained very important in this age group and was responsible for 20.4 per cent of the deaths, but unlike the situation in infancy, a majority of these were cases of kwashiorkor. Other significant causes of death in this age group were pneumonias, measles, and febrile convulsions, which were responsible for 17.9 per cent, 12.6 per cent, and 9.4 per cent of deaths respectively.



Con. ABN = Congenital Abnormalities
Fig. 1. Principal Causes of Death in 725 Neonates.

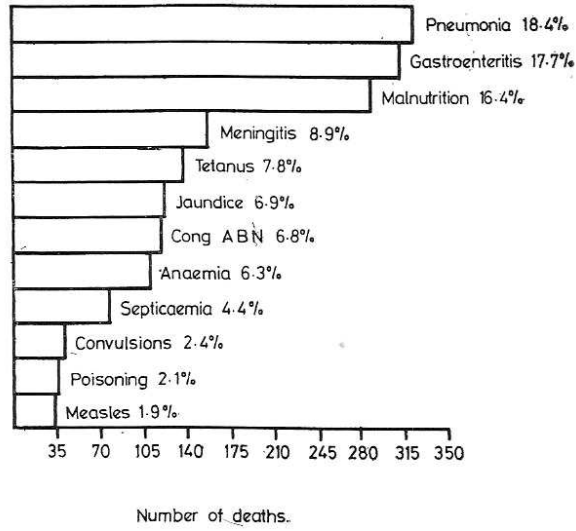


Fig. 2. Diagnosis in 1562 Deaths Occurring in Infancy

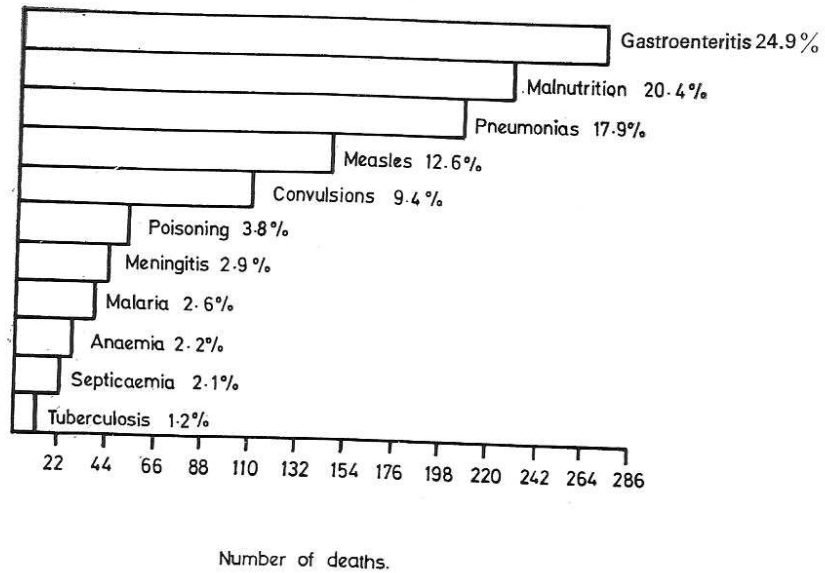


Fig. 3. Diagnosis in 1040 Deaths in Age Group, 1-3 Years

Age Group, 3-5 Years

The records in this age group (Fig. 4) showed that malnutrition, especially kwashiorkor was the leading cause of death, accounting for 20.9 per cent of the 288 deaths; this was followed by gastroenteritis (20.6 per cent), pneumonias (11.6 per cent), anaemias (6.9 per cent) and malaria (4.9 per cent). It is worthy of note that malignancies, tuberculosis and renal disorders which were uncommon in the earlier age period, became frequent causes of death in this pre-school age group.

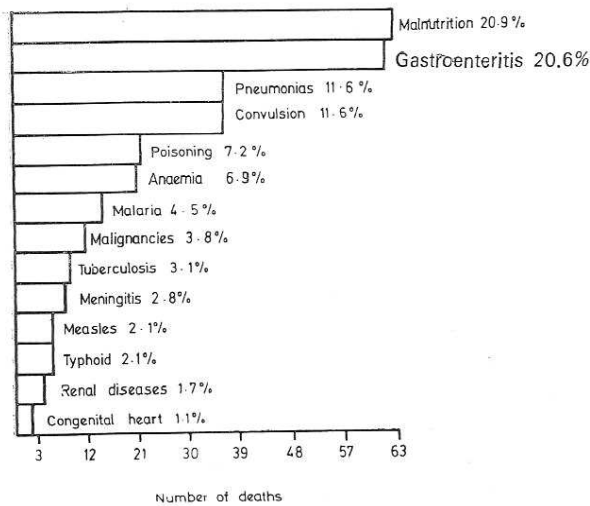


Fig. 4. Diagnosis in 288 Deaths in Age Group, 3-5 Years

The 202 deaths in this age group were due in order of frequency to malignancies which were predominantly Burkitt's lymphoma (23.8 per cent), anaemia resulting mainly from sickle cell haemoglobinopathy (16.8 per cent), and renal disorders manifesting mainly as nephrotic syndrome (13.4 per cent) (Fig. 5). Other notable causes of death in this age group were typhoid (12.9 per cent), meningitis (7.4 per cent), tuberculosis (6.0 per cent) and pneumonias (4.9 per cent).

Discussion

The need for reliable health statistics as an essential prelude to health planning in Nigeria and other African countries has been emphasised by several workers (Gans 1963; Morley 1973). Handicapped by mass illiteracy, lack of personnel, political instability and various other socio-economic problems, most African countries have not succeeded in establishing these essential base-line data. However, some efforts have been made within the past two decades to record the disease patterns in childhood in various large hospitals on the continent. Although the limitations inherent in such hospital-based data are well recognised, such records have been used with a measure of success in programming national health priorities in some developing countries. For example, the timing of routine immunization, the establishment of the "Under Five" clinics, and the emphasis on maternal and child health have derived their genesis from such hospital-based health data.

The likelihood of achieving reliable community-based health statistics in many of the developing countries of Africa remains remote, therefore hospital statistics are likely to retain their usefulness for the purpose of health planning for many years to come. Periodic reviews of the patterns of mortality and morbidity in our large hospitals are therefore necessary in order to evaluate the success or failures of existing policies, and to plan for the future.

The overall mortality rate of 14 per cent in the present study compares with that of 13 per cent observed in a similar study of paediatric deaths in the same hospital 10 years earlier (Hendrickse, 1967). Although additional revenue from petroleum products has greatly increased the national wealth during the intervening years, the associated massive migrations into urban centres have resulted in unprecedented overcrowding and deterioration of environmental sanitation. It has therefore not been easy to reduce the incidence of respiratory diseases such as pneumonia arising

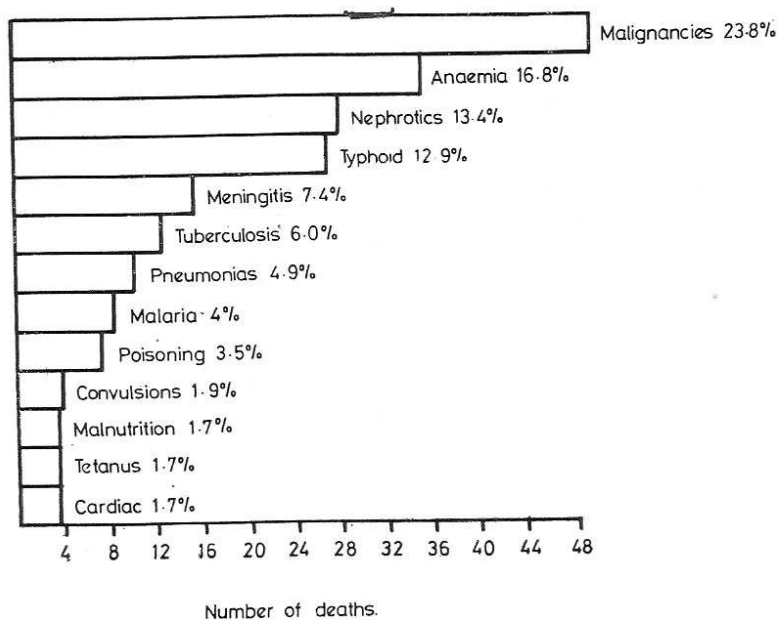


Fig. 5. Diagnosis in 202 Deaths in Age Group, 5-14 Years.

from overcrowding and gastroenteritis arising from inadequate sanitation and poor water supply. Thus, pneumonias and gastroenteritis caused 30.7 per cent of deaths in the present review compared with 17.3 per cent earlier reported by Hendrickse. Nevertheless, there has been a noticeable decline in the overall incidence of infections as causes of deaths in the environment. Thus while 70 per cent of deaths in the study by Hendrickse were due to infections, the proportion of deaths due to such causes dropped to 54 per cent in the present study. As in the earlier study, majority of deaths from infections occurred during the first 5 years of life, but the relative incidence of some specific infections notably, malaria, tetanus, measles and tuberculosis at various age groups has changed significantly.

In the review by Hendrickse (1967), malaria was responsible for 15 per cent, 20 per cent, and 14 per cent of deaths in the age groups, 0-1, 1-5, and 5-14 years, respectively. In contrast, there was no death primarily attributable to malaria in infancy in the present study, while in the age

groups, 1-5 and 5-14 years, malaria infection was incriminated in 3 per cent and 4 per cent of deaths, respectively. This significant drop in mortality from malaria infections in all age groups is probably due to free availability of antimalarial drugs for prophylaxis and therapy. It is to be noted however that contrary to expectation, malaria related deaths in the present review was higher in children aged, 5-14 years than in infants and pre-school children. A probable explanation for this phenomenon is that more and more children receive regular malaria chemoprophylaxis from infant welfare clinics during infancy and the toddler age period. They therefore fail to acquire natural immunity against malaria, and when regular attendance at the welfare clinics are discontinued in later childhood such children become liable to acute malaria infections which may be fatal. Until malaria eradication is achieved in the environment therefore, it seems desirable to continue all children on malaria chemoprophylaxis beyond infancy and the toddler age period.

The proportion of deaths due to tetanus has also declined from 8.8 per cent recorded in Hendrickse's review to 6.5 per cent in the present study. Much of the decline was from neonatal tetanus which accounted for 43 per cent of neonatal deaths in the study by Hendrickse, but was responsible for only 16.8 per cent of such deaths in the present review. Despite this encouraging trend, morbidity and mortality from neonatal tetanus remains unacceptably high and calls for greater preventive measures. The high prevalence of neonatal tetanus is largely due to unhygienic care of umbilical cord of newborn infants by traditional midwives and birth attendants. Since it seems unlikely that trained midwives and adequate maternity facilities will become available for all deliveries in the foreseeable future, serious consideration should be given to a programme of immunization of all females of child bearing age so as to ensure a high level of protective antibodies in all neonates (Schofield, Tucher and Westbrook, 1961; Newell *et al.*, 1966; Idoko, 1975).

In the study by Hendrickse (1967), measles and tuberculosis were responsible for 18 per cent and 3 per cent of deaths respectively whereas in the present review, they were responsible for 4 per cent and about 1 per cent of deaths respectively. As in all previous studies from West Africa (MacGregor, 1964; Morley, Martin, and Allen, 1966; Hendrickse, 1967) a majority of fatalities from measles occurred in infants and toddlers. Measles control or eradication is desirable, but the high cost of the currently available vaccines is beyond the financial resources of most developing countries. In contrast to measles, a majority of deaths from tuberculosis in the present review occurred in later childhood, especially after the age of 5 years. This suggests that many primary school children remain susceptible to the disease and should benefit from BCG inoculation. Routine BCG immunization on entering primary school is therefore desirable and should be incorporated into the school Health Services of the Universal

Primary Education programme currently being planned for Nigeria.

While deaths from most other infections have declined, the proportion of deaths from pyogenic meningitis increased from 3 per cent recorded by Hendrickse (1967) to 5.4 per cent in the present series. The clinical features presented by our cases were similar to those described in previous reports from Ibadan (Seriki, 1970; Barclays, 1971) and as in these other reports, a majority of our cases were neonates, infants and toddlers. *Haemophilus influenzae* and *Streptococcal pneumoniae* remain the dominant causative organisms, but in a high percentage of cases, the causative organism could not be isolated because of previous partial therapy with antibiotics bought from drug peddlers. A majority of cases come to hospital very late and this is probably the most important factor in the unfavourable prognosis recorded.

Next to infections, malnutrition was the other major cause of childhood mortality in the environment. A WHO survey of malnutrition in the third world (WHO Chronicle, 1974) puts the figure of those who suffer from moderate forms of protein-energy-malnutrition at between 4 and 40 per cent, and severe forms at between 0.5 and 5 per cent. It has been clearly shown that infections precipitate malnutrition while poorly-nourished individuals are also prone to infections (Smythe *et al.*, 1971; Chandra, 1974). The interaction is such that it is often difficult to separate cause from effect. As in other studies (Caddell and Goddard, 1967; Omololu, 1972), two patterns of malnutrition namely: marasmus and kwashiorkor, were discernable from the present study, with marasmus occurring mainly in infants while kwashiorkor predominated in the age, 1-5 years. Hendrickse's review 10 years earlier showed that 13 per cent of childhood deaths in our hospital was due to malnutrition, while in the present study, 9 per cent of deaths was due to malnutrition. It seems probable that this notable decline in the proportion of deaths attributable to

malnutrition was due partly to the reduction in incidence of infections noted above.

Apart from infections and nutritional disorders, the other major causes of deaths revealed by the present review were severe neonatal jaundice, anaemias, convulsive disorders, congenital malformations, and malignancies. Glucose-6 Phosphate Dehydrogenase (G.6.P.D.) deficiency and ABO blood incompatibility often in association with bacterial infections are the major causes of neonatal jaundice in Ibadan (Effiong and Laditan, 1976; Laditan, Effiong and Antia, 1975) while malaria infection and sickle cell haemoglobinopathy are the major causes of anaemia (Hendrickse and King, 1958; Seriki, 1974). It is worthy of note that a majority of deaths due to sickle cell haemoglobinopathy in the present study occurred in the age group, 5-14 years; it can be conjectured that sicklers in this age group are more likely to escape the vigilant surveillance of their parents and may therefore not receive regular prophylaxis and prompt therapy for malaria and other infections which can provoke sickle cell crises. It is therefore important to continue health education of parents and their affected children until these children are old and intelligent enough to look after themselves.

Convulsion was responsible for 4.5 per cent of deaths in the present series. A majority of these convulsions were caused by extra-encephalic febrile illnesses and were therefore instances of febrile convulsions. Febrile convulsions are responsible for about 15 per cent of paediatric emergencies in Ibadan and are associated with considerable morbidity and mortality (Famulusi and Sinnette, 1971). In Western Europe and North America, febrile convulsions are relatively benign, but in our social setting, the problem is often compounded by the previous administration of a traditional concoction, the principal ingredients of which are cow's urine, tobacco leaves, onion bulbs, and rock salts. Although the mixture may succeed in aborting some seizures, its other pharmacological effects such as hypoglycaemia and radiotoxicity (Oyebola and Elegbe, 1975) may

significantly increase the morbidity and mortality from febrile convulsions. Health education and provision of basic medical services within easy reach of everyone in the community should greatly reduce the incidence of deaths from this and other causes of childhood poisoning in the environment including overzealous helminthic purgation with obsolete oil of chinapodium and accidental ingestion of volatile hydrocarbons and caustic alkalis.

Congenital malformations and malignancies were responsible for 5.2 per cent and 1.7 per cent respectively, of deaths in the present study. These proportions represent slight increases compared with the findings of Hendrickse ten years earlier, and it may be inferred that with the control of communicable and nutritional diseases, the relative incidence of malignancies and congenital malformations in childhood mortality will increase significantly.

The present study has thus confirmed the findings of previous workers (Carter, 1961; Gans, 1963; Hendrickse, 1967) which incriminated infections and nutritional deficiencies as the principal causes of the unacceptably high morbidity and mortality in our environment. Greater preventive measures against these groups of disorders are therefore needed if we are to alter the gloomy picture in the near future. Such preventive measures should aim at improving the nutritional status of the general population through appropriate socio-economic measures, as well as ensure routine immunization against preventable infections, especially tetanus, measles, and tuberculosis. The importance of health education for the purpose of improving environmental sanitation and altering adverse child-rearing habits can also not be overemphasised. Health education should, in particular, encourage breast-feeding and discourage the growing popularity of bottle-feeding which is a major cause of the rising deaths from infantile gastroenteritis observed in the present study. The government on its part will need to establish more maternal and child health centres which should be within

easy reach of every family in the community. The proposed basic health service scheme of the Federal Republic of Nigeria, if properly executed, should in this regard, be a step in the right direction.

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