

## A Review of Bronchopneumonia in African Children

BY

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This study was undertaken because of the high mortality seen in children with bronchopneumonia in the paediatric wards of Mpilo hospital.

A review of all admissions of children under 16 presenting primarily with respiratory disease at Mpilo hospital in 1964 was as follows:

The largest group, which also has the highest mortality, is bronchopneumonia. Three hundred and fifty-two of the 397 children in this group were under the age of three. The under three group of children with bronchopneumonia form the subject of further study in this paper. There were 190 males and 162 females in the group. In further subdivisions of the paper the sex incidence was of no statistical significance.

One hundred and eighty-three, forming 52 per cent. of these 352 children, died; 94 children (51 per cent. of those who died) died within 24 hours of admission.

### PRESENTATION

The cases were selected from the hospital records which are classified according to the disease of primary significance.

The commonest presentation was cough (72 per cent.), fever (53 per cent.) and dyspnoea (30 per cent.). Seventy-eight per cent. had chest signs consistent with bronchopneumonia, and in the 22 per cent. without chest signs the diagnosis was confirmed by X-ray or at autopsy. Sixty-five per cent. of those with records of chest X-ray had positive findings. Autopsies were performed on all children who died.

One hundred and twenty-seven children had bronchopneumonia alone and 40 (31.5 per cent.) died. Although all patients presented initially with bronchopneumonia, the majority were found to have other diseases (Table II).

It is difficult in a retrospective study to separate the vomiting or diarrhoea which occasionally occurs as a result of bronchopneumonia from that due to primary infection of the bowel. All children with a record of diarrhoea and vomiting were labelled gastroenteritis. Whether or not signs referable to the gastrointestinal tract were attributable to genuine gastroenteritis, these complications carry a very poor prognosis. The total of children with bronchopneumonia and gastrointestinal complications (groups 1 to 4, Table II) was 156, of whom 101 (64.7 per cent.) died. This mortality is over twice as great as those with bronchopneumonia alone (31.5 per cent.). This

mortality rate and the large number of such patients make gastrointestinal disease the most important single factor contributing to the overall mortality.

The combination of malnutrition and bronchopneumonia, with or without gastrointestinal complications, was fatal in all but two cases, but the number of such cases is relatively small.

Measles and bronchopneumonia has a similar incidence to malnutrition and bronchopneumonia, but even with gastrointestinal complications the mortality is surprisingly low. The probable explanation of this is that most cases were transferred to the infectious diseases hospital.

The miscellaneous group is largely composed of premature infants and infants with congenital abnormalities.

Treatment fell into three main groups (Table III).

Table I  
INCIDENCE OF RESPIRATORY DISEASE IN CHILDREN

	Total	Died	Per cent. Mortality
Bronchopneumonia .....	397	188	47.4
Upper respiratory tract infections .....	194	5	2.6
Lobar pneumonia .....	134	12	9.0
Acute bronchitis, laryngotracheitis .....	111	0	0
Pulmonary tuberculosis .....	55	4	7.3
Bronchiectasis .....	33	3	9.1
Empyema, lung abscess .....	11	4	36.3

Table II  
INCIDENCE OF DISEASES ASSOCIATED WITH BRONCHOPNEUMONIA

	Total	Died	Per cent. Mortality
1. Gastroenteritis .....	111	74	66.7
2. Gastroenteritis + measles .....	19	4	21.5
3. Gastroenteritis + malnutrition .....	19	19	100.0
4. Gastroenteritis + measles + malnutrition .....	7	4	57.1
5. Measles .....	24	3	12.5
6. Malnutrition .....	17	15	88.2
7. Miscellaneous .....	28	24	85.5
Total with associated diseases .....	225	143	63.6

## DISCUSSION

Bronchopneumonia is often the terminal event of another disease, but where possible such cases were excluded. As the diagnosis was made *post-mortem* in a small number of cases and it is not always possible *post-mortem* to separate the primary from the secondary disease, inclusion of such cases will tend to load the mortality figures.

The high incidence of bronchopneumonia in the first three months of life is partly due to congenital and neonatal disorders. Parents are often ignorant of the age of their children and assume the nearest age landmark, e.g., one year, which may partly account for the peak incidence in the 10-12 month group (Fig. 1). Fig. 1b shows that, with the exception of the 0-3 month group, the pattern of gastrointestinal disease closely reflects the overall pattern of bronchopneumonia and that gastrointestinal complications contribute largely to the mortality of any one age group.

The disease is present throughout the year, with an increased incidence from July to November. One cannot relate the increased incidence in the later months to temperature which ranged from 67° max. 41° min. in July to 83° max. 60° min.

in November. The lowest incidence occurred with the hot weather in February and March, but it was just as hot in October and November when the incidence was highest. Nor can incidence be related to rainfall, which was non-existent from April to September and only 2.1 inches in November, reaching a maximum of 3 inches in January and February (Fig. 2). Pneumonia is universally regarded as a winter disease, but the early summer peak here contradicts this idea. The reason for this is to be found largely in the influence of gastrointestinal disorders (Fig. 2b). If cases with gastrointestinal complications are excluded, there is still a high incidence of bronchopneumonia in October and November, showing that gastrointestinal disorder is not the only factor involved. Measles and malnutrition occur randomly throughout the year and do not contribute significantly to the October-November incidence. The nature of the summer factor or factors is one of speculation rather than deduction from the information obtained here, but may lie in the aetiology of the disease.

There is a marked lack of aetiological investigations in the records, which is explained by the

Table III  
TREATMENT OF ALL CASES

	Total	Died	Per cent. Mortality
1. Penicillin alone .....	207	86	41.5
2. Multiple antibiotics without steroids—			
Tetracycline .....	15	13	86.6
Ledermycin .....	21	9	42.9
Chloramphenicol .....	4	2	50.0
Streptomycin .....	2	2	100.0
Combinations of the above .....	4	2	50.0
TOTAL .....	46	28	60.9
3. Antibiotics with steroids—			
Penicillin .....	44	27	61.6
Tetracycline .....	11	10	90.9
Ledermycin .....	20	10	50.0
Chloramphenicol .....	4	3	75.0
Streptomycin .....	3	3	100.0
Combinations of the above .....	6	6	100.0
TOTAL .....	88	59	67.0
4. No treatment .....	11	10	90.9
(All died before treatment was commenced, except one who was transferred.)			

large numbers involved, the already heavy demands on the laboratory and the difficulty of obtaining sputum specimens from young children. There is an urgent need for bacteriological and virus studies. Elderkin *et al.* (1965), while undertaking virological studies in children primarily with bronchiolitis, also showed that of 45 children with bronchopneumonia, 42 per cent. had evidence of viral infection. They also

pointed out the difficulty of proving that bacteria from cough swabs are pathogenic.

The importance of gastrointestinal complications in relation to the mortality of bronchopneumonia has been stressed. Gross malnutrition, which was almost invariably fatal, did not occur in large numbers, but more accurate criteria based on laboratory investigations might reveal lesser degrees of malnutrition which could contribute

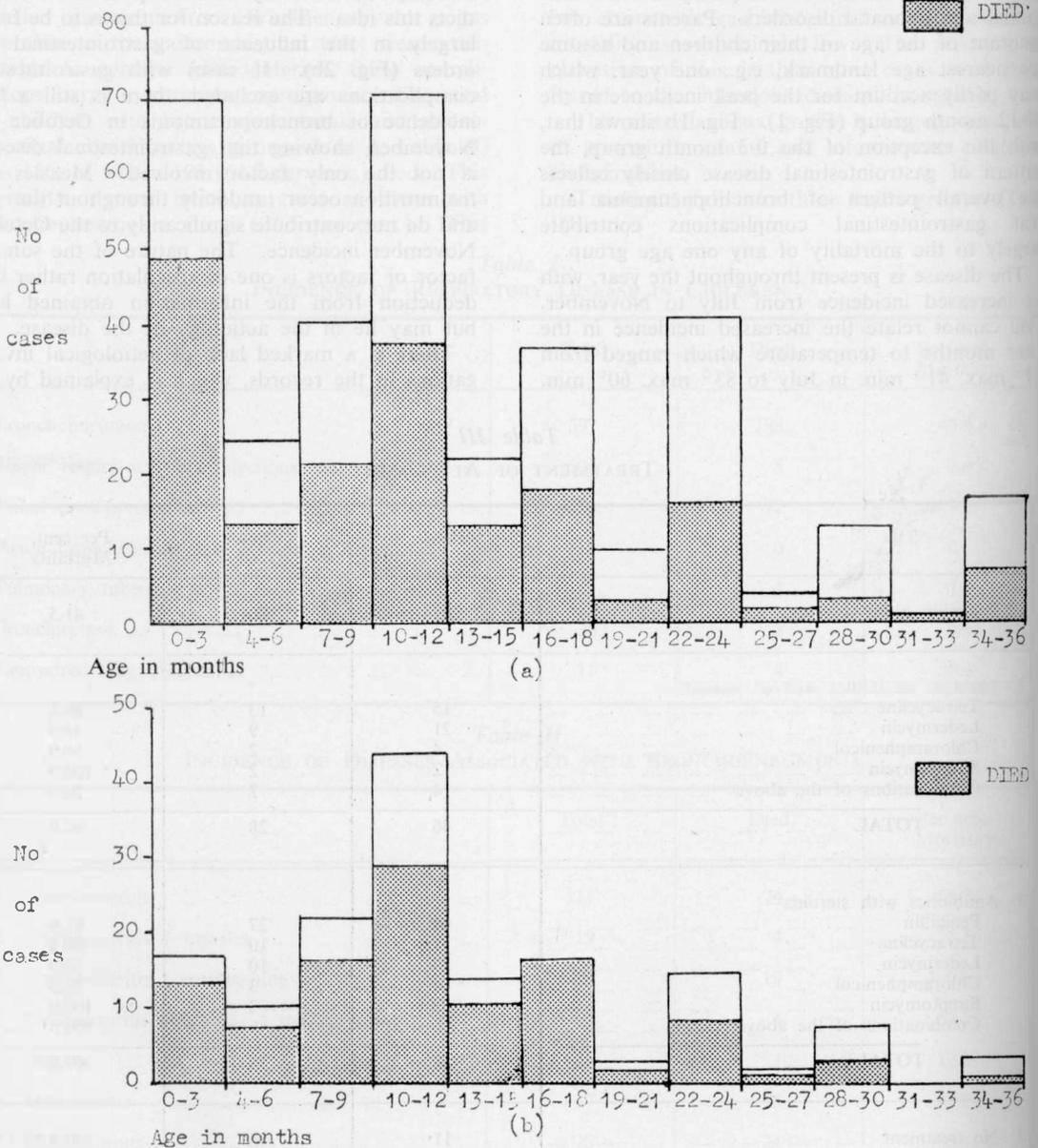


FIG. 1.  
BRONCHOPNEUMONIA, AGE INCIDENCE AND MORTALITY  
(a) All cases. (b) Cases with gastrointestinal complications.

significantly to the morbidity and mortality of bronchopneumonia. Thus Prinsloo and Pretorius (1966) found that 57 out of 82 African children with bronchopneumonia had hypoproteinaemia.

The criteria determining treatment are difficult to define in a retrospective study involving many doctors. It became apparent from our studies that penicillin alone (Group 1, Table 3) was used initially in most cases, that other antibiotics (Group 2) were used after failure of response to penicillin, and that steroids (Group 3) were used only in the very ill or unresponsive child. One would therefore expect the mortality to increase from Group 1 to Group 3 (Table III) as occurs, and little can be deduced about the relative merits

of any one form of treatment. Penicillin alone carries a mortality of 41.5 per cent. and we wonder to what extent mortality has decreased since the advent of antibiotics.

Davidson's (1966) review of paediatric problems in Zambia showed a mortality of 13 per cent. for bronchopneumonia in children aged 0-14 years or 14.1 per cent. for children 0-4 years. Our age group under study is 0-3 years with a mortality of 52 per cent. It is hard to account for the huge difference between these figures. The standard of nursing care at Mpilo hospital is as high as anywhere in Central Africa. Davidson points out that in many of his bronchopneumonia cases other diseases were present such as malnu-

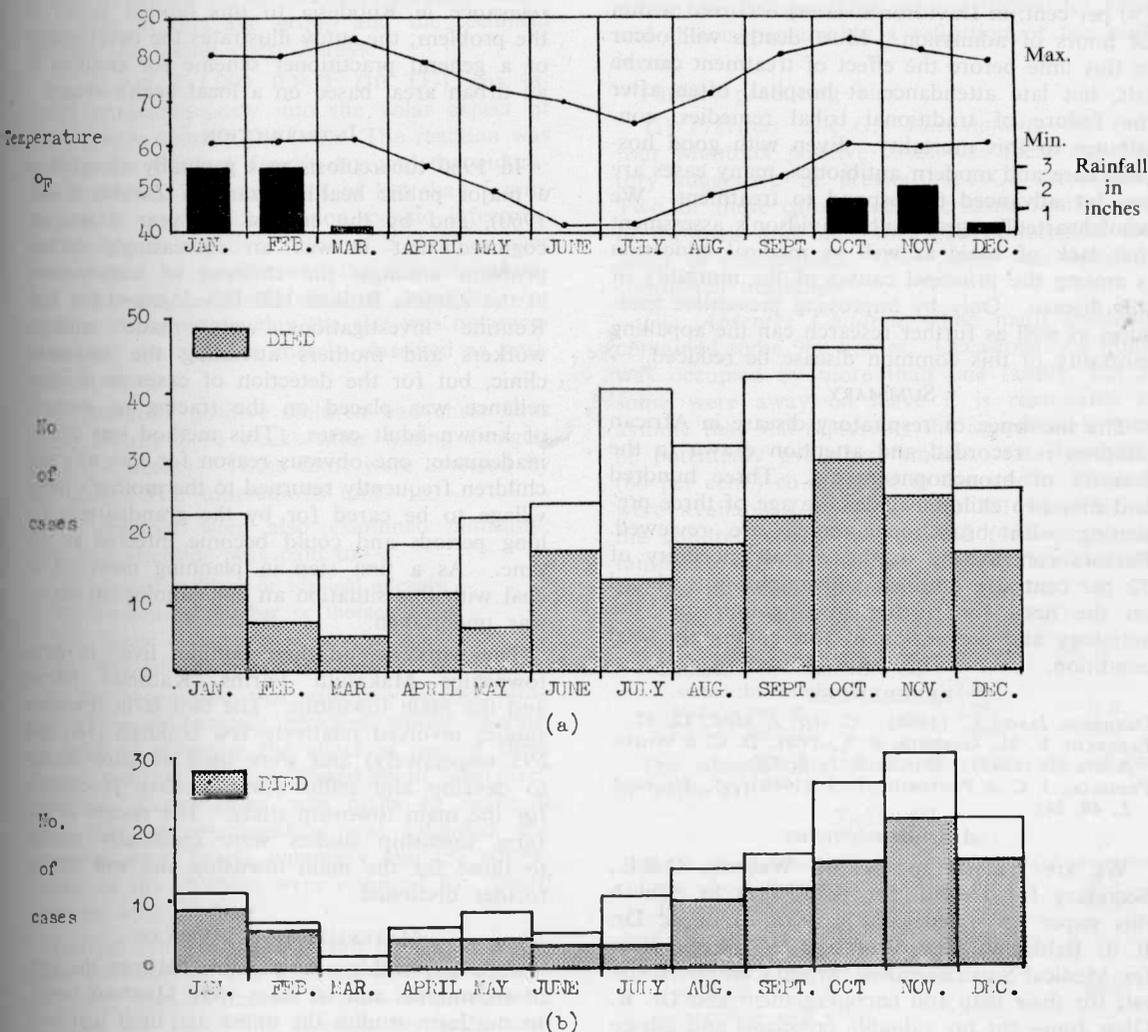


FIG. 2. SEASONAL INCIDENCE OF BRONCHOPNEUMONIA (a) All cases. (b) Cases with gastrointestinal complication.

trition, anaemia and gastroenteritis, and that a considerable number failed to respond to all antibiotics. Davidson's picture is very similar to the picture presented here, but he suggests that malnutrition is probably the biggest factor, whereas we suggest that gastrointestinal complications are of greater significance. Even if we assume that Davidson's classification of bronchopneumonia excluded all other diseases (which is unlikely in view of his remarks quoted above), the mortality of his series (14 per cent.) is still less than half the mortality of our cases of bronchopneumonia without gastrointestinal complications (31.5 per cent.).

Fifty-one per cent. of the deaths in our series (50 per cent. in Davidson's series) occurred within 24 hours of admission. Most deaths will occur in this time before the effect of treatment can be felt, but late attendance at hospital, often after the failure of traditional tribal remedies, contributes to this mortality. Even with good hospital care and modern antibiotics, many cases are too far advanced to respond to treatment. We wholeheartedly agree with Davidson's assessment that lack of basic as well as medical education is among the principal causes of the mortality of this disease. Only by improving preventive measures as well as further research can the appalling mortality of this common disease be reduced.

#### SUMMARY

The incidence of respiratory disease in African children is recorded and attention drawn to the severity of bronchopneumonia. Three hundred and fifty-two children under the age of three presenting with bronchopneumonia are reviewed. Factors contributing to the overall mortality of 52 per cent. are outlined and emphasis is placed on the need for further investigation into the aetiology and prevention of this commonly fatal condition.

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