

## Pattern and Outcome of Childhood Respiratory Diseases Admissions at a Specialist Hospital in Gusau, North-Western Nigeria: A Four Year Review

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### ABSTRACT

*Respiratory diseases are common causes of childhood morbidity and mortality as well as hospital admission globally with higher under five mortality especially in low income countries. Studies on specific childhood respiratory illnesses in different parts of the world have been reported but few reported on combined pattern and burden of the diseases. Indeed there are few published works in Nigeria and other developing countries. To determine the prevalence and pattern of childhood respiratory disease admissions, seasonal frequency and outcome. A retrospective observational study of respiratory disease admissions into the Emergency Paediatric Unit (EPU) over a 4 year period. Relevant information retrieved included month of presentation, age, gender, primary diagnosis and outcome. Results were analyzed accordingly with the level of significance set at  $p \leq 0.05$ . Five hundred and fifty-four of the 4315 children admitted during the study period had respiratory diseases, giving a prevalence of 12.8%. Males were 309(55.8%) with a M:F ratio of 1.3:1. Mean age ( $\pm$ SD) was 2.62  $\pm$  (2.50) years. Majority (81.9%) were Under-fives. Pneumonia constituted 315(56.9%), followed by pharyngotonsillitis 173(31.2%), and then pulmonary tuberculosis 19(3.4). Majority (91.7%) were discharged, while 37(6.7%) died, with more deaths seen in pneumonia; though asthma had the highest case fatality rate (18.2%). Prevalence and pattern of respiratory diseases remains high and show similarities in developing countries with under-fives being more vulnerable. Pneumonia, pharyngotonsillitis and pulmonary tuberculosis were the commonest causes of respiratory admission. Majority of the patients were discharged, with more deaths observed in children with pneumonia.*

**Keywords:** Diseases, Respiratory, Outcome

### INTRODUCTION

Respiratory diseases have been reported to be one of the common causes of childhood morbidity, mortality as well as hospital admission globally,<sup>1-6</sup> with higher prevalence of under five mortality especially in low income countries.<sup>3</sup> Studies on specific childhood respiratory illnesses in different parts of the world have been reported but there are few on the combined pattern and burden of the diseases.<sup>1,5-7</sup> Indeed there are few published works in Nigeria and other developing countries.<sup>8,9</sup>

Childhood respiratory diseases requiring hospitalization include pneumonia, bronchiolitis, pharyngotonsillitis, asthma, tuberculosis and foreign body aspiration amongst others.<sup>7</sup> Pneumonia have been shown to be the commonest respiratory disease in many studies.<sup>1,3,5,7,9</sup>

There is no available data from North Western Nigeria regarding the burden of childhood respiratory admissions. Information obtained from the study may be useful to ascertain their collective impact on the health systems for future intervention measures.<sup>1</sup>

**Objective:** To determine the prevalence and pattern of childhood respiratory disease admissions, seasonal frequency and outcome

### METHODOLOGY

A retrospective observational study of respiratory admissions into the Emergency Paediatric Unit of Ahmad Sani Yariman Bakura Specialist Hospital (ASYBSH), Gusau, Zamfara State; from May 2013 to April 2017 was conducted using the Unit's admission/discharge record book. All the admitted children aged 1 month to 13 years (upper age limit for admission in our institution's paediatric wards) were included.

Relevant information retrieved included month of presentation, age, gender, primary diagnosis and outcome. Results were analyzed using the Statistical Package for the Social Sciences 20 (Chicago Illinois, USA).

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Quantitative variables were presented as mean  $\pm$  standard deviation and presented as tables; while qualitative variables were analysed using Chi square and Fisher's exact test where applicable. The level of significance  $p$  was set at  $\leq 0.05$ .

### Ethical consideration

Approval for this study was obtained from the Ethics and Research committee of the ASYBSH, Gusau, Zamfara State.

### RESULTS

A total of 4315 children were admitted over the study period, of which 554 were due to respiratory illnesses giving a prevalence of 12.8%. There were 309(55.8%) males and 245(44.2%) females with a M:F ratio of 1.3:1. The mean age ( $\pm$  SD) was 2.62 ( $\pm$  2.50) years, with a range of 1 month to 13 years. Highest number of admissions including respiratory admissions occurred in 2016. The distribution of admissions according to year is shown in figure 1.

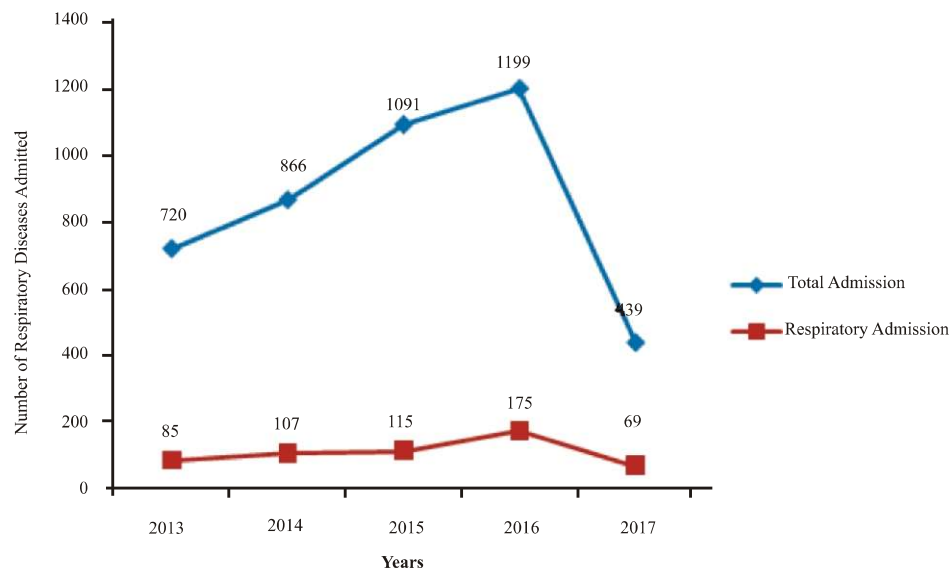


Figure 1: Distribution of total and respiratory admissions according to year

Table 1: Age distribution according to gender

Age range (years)	Males no (%)	Females no (%)	Total no (%)
<5	263(47.5)	191(34.5)	454(82.0)
5.0-9.9	37(6.7)	44(7.9)	81(14.6)
10.0-13.0	9(1.6)	10(1.8)	19(3.4)
Total	309(55.8)	245(44.2)	554(100.0)

Three hundred and fifteen (56.9%) were due to pneumonia, 173(31.2%) pharyngotonsillitis and 19(3.4%) pulmonary tuberculosis as shown in table 2.

Table 2: Pattern of respiratory diseases seen over the study period

Disease	Frequency	Percentage
Pneumonia	315	56.9
Pharyngotonsillitis	173	31.2
Pulmonary tuberculosis	19	3.4
Asthma	11	2.0
Aspiration pneumonitis	11	2.0
Otitis media	11	2.0
Bronchiolitis	6	1.1
Croup	5	0.9
Pertusis	3	0.5
Total	554	100.0

Aspiration pneumonitis cases were due to kerosene ingestion in 6(1.1%) children, near drowning in 3(0.5%) and soap inhalation in 2 (0.4%). There were 8 (1.4%) cases of acute otitis media and 3 (0.5%) chronic otitis media.

There was observed seasonal variation with more children admitted during the rainy season as shown in figure 2.

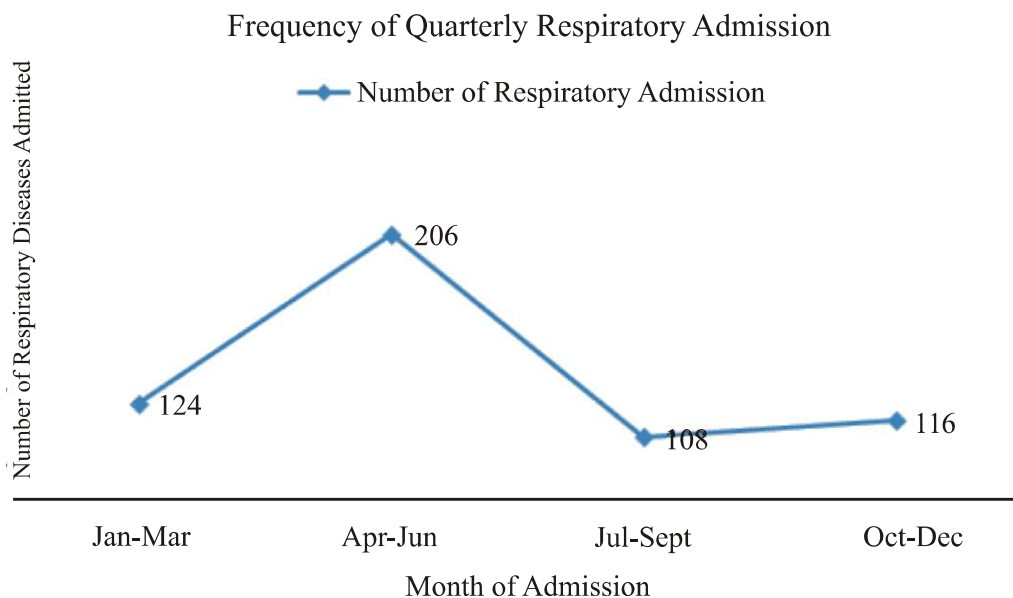


Figure 2: Frequency of quarterly respiratory admissions

The most frequent period of presentation was between April to June (37.2%), followed by January to February (22.4%).

Most of the cases of pneumonia appeared more in the months of April to June, with a peak in May and the least in January. Pharyngotonsillitis was seen more between February to May, with a peak in February. There was no observed seasonal variation with asthma presentation. Of the admitted children, 508(91.7%) were discharged, 37(6.7%) died, 5(0.9%) were referred, 3(0.5%)

signed against medical advice while 1(0.2%) absconded. Mortality was higher among the under-fives 31(83.8%), followed by 5-9.9 years age group 4(10.8%) and least in >10 years age group with 5.4%. There was no significant association between gender and outcome (Fisher's exact=0.07), 19 males died while 18 females died.

Thirty-two (86.5%) of the mortalities had pneumonia; while case fatality rate was 18.2% for asthma and 10.2% for pneumonia as shown in table 3.

Table 3: Case fatality rate according to diseases

Disease	Number of admissions	Number of deaths	Case fatality rate (%)
Pneumonia	315	32	10.2
Pharyngotonsillitis	173	1	0.6
Asthma	11	2	18.2
Aspiration pneumonitis	11	1	9.1
Otitis media	11	1	9.1

## DISCUSSION

Our study demonstrated that respiratory admissions are common causes of morbidity in children in Gusau, our prevalence was lower than 24.7% reported from Enugu,<sup>1</sup> 21.9% from Jos<sup>3</sup> and 28.0% from Nepal.<sup>10</sup> Reason for the variations from other studies could be attributable to sample size, study period and climatic variations.

Over the study period, the yearly prevalence of respiratory diseases has been consistently high with no particular pattern over the years but was low in 2017. Reason for this is because the hospital commenced clinical activities in March 2013 and steadily patient turnover increased. Secondly, the relatively low prevalence in 2017 could be attributable to the fact that only 5 months from that year were studied since the study period was between May and April.

There were more males than females, which is similar to what was reported by Oguonu *et al.*<sup>1</sup> in Enugu, Ezenonu *et al.*<sup>7</sup> in Ebonyi and Uijen *et al.*<sup>5</sup> in The Netherlands. Reason for the male preponderance could be due to the fact that by culture, males are also more exposed to outdoor interactions with the community, thus more prone to acquiring transmissible respiratory infections.

Majority of the children were Under-fives, which is similar to findings by Oguonu *et al.*,<sup>1</sup> Yiltok *et al.*<sup>3</sup> and Uijen *et al.*<sup>5</sup> Such age group have reduced immunity especially in those less than one year due to decline of maternal antibodies and their immune system is not yet developed.

Pneumonia, pharyngotonsillitis and tuberculosis were the predominant respiratory diseases in descending order, requiring hospitalisation in our centre. Other diseases observed included bronchiolitis, aspiration pneumonitis, otitis media etc. This finding is also

similar to the findings reported by Yiltok *et al.*<sup>3</sup> in Jos and other earlier reports.<sup>1,5,7,9,11</sup>

Pneumonia was the commonest cause of hospitalisation similar to findings in Enugu,<sup>1</sup> Jos,<sup>3</sup> The Netherlands,<sup>5</sup> Ebonyi,<sup>7</sup> Malawi,<sup>9</sup> Nepal<sup>10</sup> and Ilorin.<sup>11</sup> Pneumonia has been identified as the leading cause of morbidity and mortality in children aged below 5 years<sup>8,13</sup> which is similar to our findings. Pharyngotonsillitis was the second most common disease, a similar finding in Jos.<sup>3</sup> This was not reported in other studies.<sup>1,5,7</sup>

The admission rate of tuberculosis in this study was low, which was lower than 6.8%, 10.9% and 6.0% reported from Jos,<sup>3</sup> Ebonyi,<sup>7</sup> and Nepal<sup>10</sup> respectively. This may perhaps indicate that tuberculosis is still under diagnosed and under treated despite improvement in diagnostic facilities especially with the introduction of GeneXpert.

The prevalence of 2.0% for asthma in our study was low, which is comparable to 2.0% reported by Yiltok *et al.*<sup>3</sup> in Jos, 2.3% by Uijen *et al.*<sup>5</sup> in The Netherlands and 2.7% Adhikari *et al.*<sup>10</sup> in Western Nepal. However, it was lower than 27.7% reported by Oguonu *et al.*<sup>1</sup> in Enugu and higher than 0.8% reported by Ezenonu *et al.*<sup>7</sup> in Ebonyi. The reason for the variations may be based on the severity of the asthma exacerbation as not all cases of asthma exacerbation require hospitalization.

Otitis media is not a common disease requiring hospitalization unless complicated. The prevalence of 2.0% was similar to 2.2% reported by Yiltok *et al.*<sup>3</sup> in Jos, but lower than 12.2% reported by Dowell *et al.*<sup>6</sup> in New Zealand.

The prevalence of aspiration pneumonitis observed in this study was low, (2.0%) comparable to 2.1% obtained in Ebonyi.<sup>7</sup> Aspiration following Kerosene ingestion observed in our study was similar to that reported



in the Ebonyi study;<sup>7</sup> however none of the studies reported on aspiration of soap (during bath) or near drowning (falling into well or gutter). Kerosene is commonly used for cooking but storage problems make it available to children leading to poisoning. Even though the cases of aspiration due to kerosene poisoning were few, health education on domestic accident prevention is still needed to prevent such occurrences.

Bronchiolitis was not a common cause of admission in this study; it can be mis diagnosed in favour of pneumonia. Similarly it was uncommon in Jos,<sup>3</sup> Ebonyi<sup>7</sup> and Western Nepal reports, nonetheless, it is a common cause of acute lower respiratory infection (ALRI) which was reported by Johnson *et al.*<sup>13</sup> in Ibadan to constitute 28.4% of admissions of children with ALRI.

The peak period of respiratory admissions was found to be between April and June, followed by the period between January and March. The months of April to June correspond to the period of the rainy season in Gusau which peaks in June, hence the weather is cold. While January to March corresponds to the dry season in Gusau with the weather being hot and dry. Our peak months are similar to the finding in Nairobi,<sup>14</sup> which corresponds to the rainy season in Nairobi. Report from Enugu showed no seasonality as the cases were almost equal in number.<sup>1</sup> Studies from other parts of the country recorded peak period between July and November,<sup>7,11,12</sup> which can be attributed to the variation in these seasons between the different parts of the country. It has been postulated that rainfall and humidity are possible risk factors for development of pneumonia in children.<sup>7</sup> Acute respiratory tract infections increase during this season, with improperly managed upper respiratory tract infections progressing to lower respiratory tract infections that may require hospitalization.<sup>7</sup> Seasonality of respiratory diseases in this study shows that pneumonia was most common in the months of April, May and June; while pharyngotonsillitis was commoner in the months of February to May, which is not similar to the findings in Jos.<sup>3</sup> We did not observe any seasonality with asthma admissions unlike report from Jos.<sup>3</sup>

Our discharge rate was high, similar to 91.9% obtained in Enugu<sup>1</sup>, but higher than 85.0%

obtained in Ebonyi.<sup>7</sup> The mortality of 6.7% was lower than 7.5% obtained at Ebonyi,<sup>7</sup> but higher than 0.5% from Enugu.<sup>1</sup> Most of the death occurred from pneumonia similar to findings from Enugu,<sup>1</sup> Ebonyi<sup>7</sup> and review by Akanbi *et al.*<sup>8</sup>

Even though death from asthma is rare and more so in the hospital setting, our study showed asthma had the highest case fatality rate most probably due to acute severe asthma that was life threatening with late presentation. The Enugu study had a low asthma case fatality rate of 0.2%.<sup>1</sup>

## CONCLUSION AND RECOMMENDATIONS

The prevalence and pattern of respiratory diseases remains high and show similarities in different parts of the world, with under-fives being more vulnerable. Pneumonia, pharyngotonsillitis and pulmonary tuberculosis were the commonest causes of admission. Majority of the patients were discharged, while pneumonia accounted for most of the recorded deaths.

In order to reduce the impact of respiratory diseases, more efforts are required in strengthening immunisation which would protect against vaccine preventable diseases. Promoting exclusive breast feeding and general health promotion would go a long way in reducing the burden of infectious diseases particularly in under- fives.

## Limitation

The study being retrospective was limited by lack of information on co-morbidities or complications that may affect the assessment of the outcome of the various diseases.

## CONFLICT OF INTEREST-None

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