

### **A pilot study of nasopharyngeal carriage of *Streptococcus pneumoniae* in a Nigerian community.**

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#### Research team

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### **Background**

Pneumonia is a leading cause of mortality in children aged less than 5 years. It causes about 2 million (19%) of the 10.6 million deaths that occur annually in the under five year-age group, majority of which occur in sub-Saharan Africa.<sup>1</sup> *Streptococcus pneumoniae*, also known as pneumococcus, accounts for 30-50% of these pneumonia-related deaths.<sup>2-4</sup>

Nigeria is one of the 10 countries where two-thirds of all deaths due to pneumonia in children aged less than 5 years are concentrated.<sup>5</sup> With a predicted annual total of approximately 6 million new cases, Nigeria is also one of the 15 countries with the highest estimated number of new cases of clinical pneumonia.<sup>2</sup> Despite these data, there is surprisingly very limited information about nasopharyngeal (NP) carriage, invasive disease (IPD), and antimicrobial resistance patterns for pneumococcus in Nigeria.

Although harmless and asymptomatic by itself, NP carriage is a precondition for invasive and non-invasive pneumococcal disease including bacteraemia and pneumonia.<sup>6-7</sup> Pneumococcal carriage is highly prevalent in developing countries at all ages but particularly among children aged <5 years and is closely related to the burden of pneumococcal disease.<sup>8-11</sup>

The study was carried out to describe the prevalence, risk factors for and antimicrobial resistance patterns of pneumococcus carried in the nasopharynx of healthy Nigerian children and adults.

### **Materials and methods**

We conducted a cross sectional survey in 14 peri-urban Nigerian communities. Demographic, personal, clinical information and data on general and age-specific risk factors for NP carriage were obtained from study participants following consent. NP swabs were obtained from each subject and processed using standard methodology for culture and isolation of pneumococcus.<sup>12-13</sup> E-test was used to determine antimicrobial susceptibility. Univariate and multivariable logistic regression models were used to assess risk factors for carriage. Risk factors were examined in final random effects logistic regression model to account for clustering of carriage by location.

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### Small Grant Report of Ifedayo Adetifa

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nasopharyngeal carriage  
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## Results

We recruited 1023 subjects, from whom 1005 NP swabs were obtained. The overall prevalence of NP carriage was 52.5%. It was higher in children (67.4%) compared to adults (26%) and highest in young infants aged <9 months (~90%). NP carriage reduced significantly with increasing age ( $P < 0.001$ ). Young age was the only risk factor significantly associated with NP carriage. The odds of NP carriage in children under age 5 years were more than 7 times that of adults  $\geq 40$  years. Resistance to cotrimoxazole and tetracycline was high (93% and 84%). About a third had intermediate resistance to penicillin while all were susceptible to erythromycin.

## Conclusions

NP carriage of pneumococcus is highly prevalent as in other developing countries especially in young infants. Since pneumococcal NP carriage correlates with the burden of invasive disease, it is reasonable to expect a significant burden of invasive disease especially in children. Additional research is required to assess the burden of invasive pneumococcal disease and outcomes especially in Nigerian children. The antibiotic policy needs a review considering the level of resistance to first-line antibiotics seen in this study. Additional work is also required to characterize the prevalent serotypes of pneumococcus in Nigeria.

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