**Title:** ***Estimates of the potential public health impact and cost-effectiveness of adopting pneumococcal vaccination in the routine immunization programme in African GAVI countries: a modelling study***

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**Background**

Diseases caused by *Streptococcus* *pneumoniae (Sp)* *,* including pneumonia, meningitis and sepsis, are the leading cause of vaccine-preventable mortality in children under 5 years of age in Africa. GAVI provides funding to support introduction of pneumococcal conjugate vaccines (PCVs) in eligible developing countries. Information on the potential public health impact and cost-effectiveness can support decision-making process for the adoption of PCVs. We estimated the potential public health impact and cost-effectiveness of introducing pneumococcal non-typeable *Haemophilus* *influenzae* protein D conjugate vaccine (PHiD-CV) versus no vaccination in 36 African GAVI countries.

**Methods**

A decision-tree model is designed to include for each country the number of episodes and deaths related to pneumonia, meningitis caused by *Sp* and non-pneumonia non-meningitis (NPNM) grouping invasive diseases (such as bacteraemia or osteomyelitis) caused by *Sp* in children under 5 years of age. Estimates of disease incidences and mortality in children for years 2010/2011 and costs of care for year 2005 are taken from published studies specific to African countries. PHiD-CV vaccine efficacy is based on the COMPAS phase III trial. Access to outpatient care for pneumonia is based on monitoring data and hospitalization is assumed for severe episodes of pneumonia. All meningitis episodes and severe NPNM episodes are assumed to lead to hospitalization. Same coverage as that for Diphtheria-Tetanus-Pertussis dose 3 vaccine is assumed. Costs and DALYs are discounted at a rate of 3%.

**Results**

Compared with no vaccination, the introduction of PHiD-CV in each of these countries would potentially have a substantial impact. Considering the cumulative impact over 36 African countries, PHiD-CV is estimated to avert annually 2.1 million and 66.7 thousands pneumonia episodes and deaths, 24.9 and 18.2 thousands meningitis episodes and deaths and 125.6 and 5.7 thousands NPNM episodes and deaths. Overall, 976 thousands outpatient visits and 808 thousands hospitalization could potentially be averted saving more than $39 million. The cost-effectiveness ratio estimate for the introduction of PHiD-CV is $98 per disability-adjusted life-year across the 36 countries.

**Limitations**

This study is based on a static model and does not account for the dynamic transmission mechanisms or circulation of pathogens. Vaccine efficacy is transposed to different settings from where the study was originally conducted with a different schedule. Limitations from the data sources used would also apply to these estimates.

**Conclusion**

Compared with the hypothetical scenario without vaccination, the introduction of PHiD-CV would potentially result in substantial public health benefits and is likely to be highly cost-effective based on WHO threshold.