

# SERO-REPLACEMENT WITH NON-VACCINE SEROTYPES POST INTRODUCTION OF PCV10 IN NASOPHARYNX OF CHILDREN IN A RURAL COMMUNITY IN PAKISTAN

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## Background

- Owing to an unusually high burden of invasive pneumococcal disease, Pakistan was one of the first south Asian countries to introduce the ten-valent pneumococcal conjugate vaccine (PCV10) at national level in a 3+0 schedule without catchup immunization in 2013.<sup>1</sup>
- Out of the 95 known serotypes of *Streptococcus pneumoniae*, few serotypes are attributable to cause majority of the disease. PCV10 effectively targets these serotypes to reduce the disease manifestation in both vaccinated and unvaccinated children. However, these effects are being undermined by the emergence of non-Vaccine Type serotypes replacing Vaccine type ones in both carriage and disease. Here we describe the pneumococcal carriage in children under two years of age over a period of four years post introduction of PCV10 vaccine in a rural community in Pakistan.

## Findings

- Of the 3140 children enrolled, pneumococcal isolates were detected in 2370 (75%). VT carriage decreased from 16.1% to 9.6% (p-value < 0.001) over 4 years.
- There was a significant decline in VT serotypes 6B, 9V/9A and 19F only.
- The carriage of serotype 19A significantly increased from 4.0% to 6.8% (p-value < 0.001).
- This increase was more pronounced in vaccinated group.
- There was no significant change in the ten most common NVT serotypes except for 10A, which increased over time.
- There was no decline noted in carriage rate for serotype 6A.

## References

1. Wahl B, O'Brien KL, Greenbaum A, Majumder A, Liu L, Chu Y, Lukšić I, Nair H, McAllister DA, Campbell H, Rudan I. Burden of *Streptococcus pneumoniae* and *Haemophilus influenzae* type b disease in children in the era of conjugate vaccines: global, regional, and national estimates for 2000–15. *The Lancet Global Health*. 2018 Jul 1;6(7):e744–57.

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## Methodology

- From 2014 to 2018, children under the age of 2 years were randomly selected from a continually updated line listing of all children in two rural union councils of Matiari, Sindh in Pakistan.
- Nasopharyngeal swabs were collected using standard WHO guidelines by trained staff and were processed at Infectious Disease Research Laboratory at The Aga Khan University campus in Karachi using culture on sheep blood agar and Multiplex PCR methods described by CDC, USA.
- The serotypes were then classified as either vaccine type (VT) and non-vaccine type (NVT). We collected detailed information on sociodemographic, clinical history and vaccination status. We looked at carriage rates of VT and NVT serotypes over time in the vaccination and unvaccinated children..

## Conclusion

We observed an ongoing shift in the pneumococcal carriage of serotypes in children in the rural community. Since the pneumococcal serotypes associated with carriage and Invasive disease are constantly changing, monitoring is necessary to assess the impact of the vaccine and to develop better vaccination strategies.

