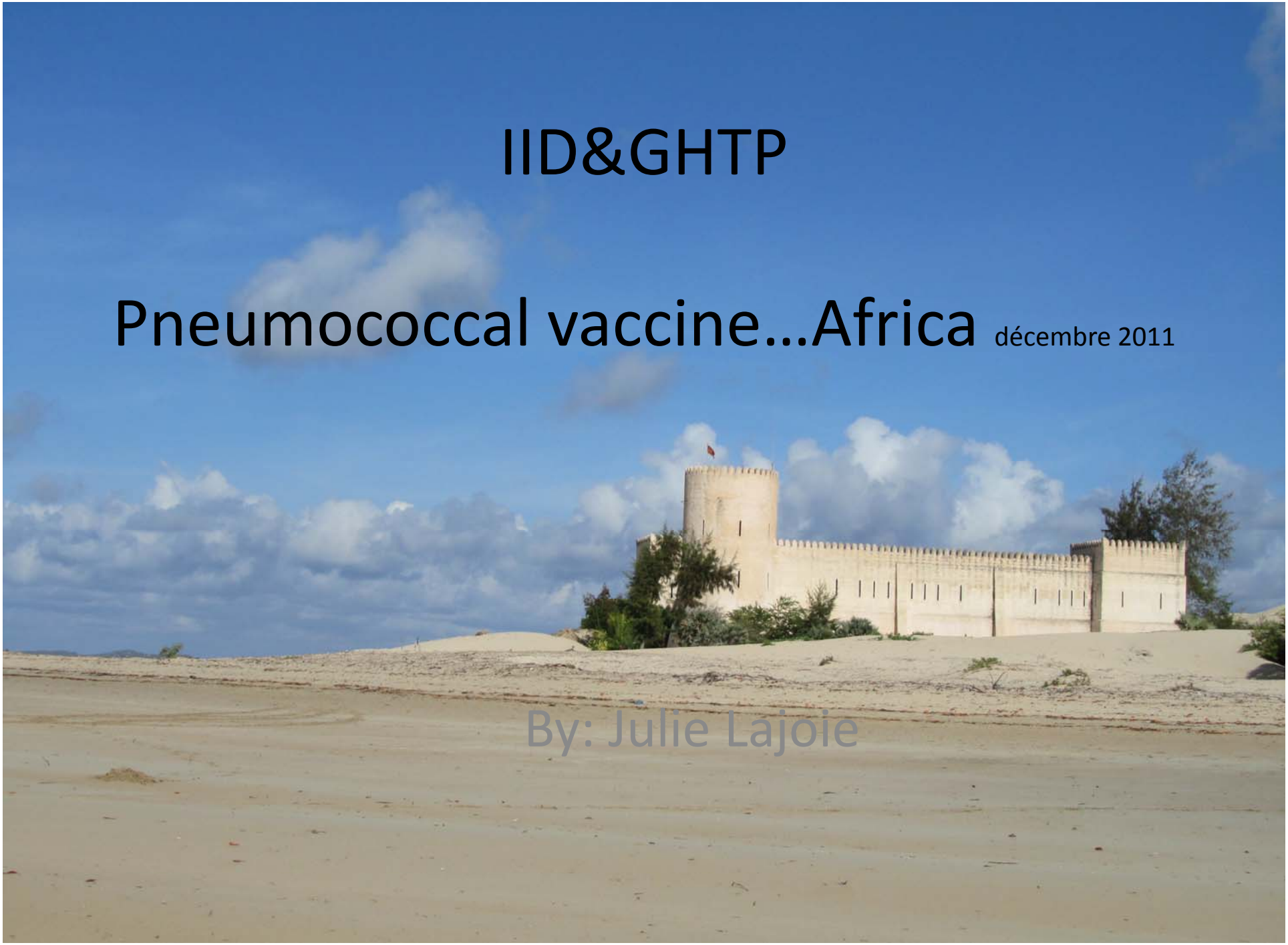


# IID&GHTP

# Pneumococcal vaccine…Africa décembre 2011

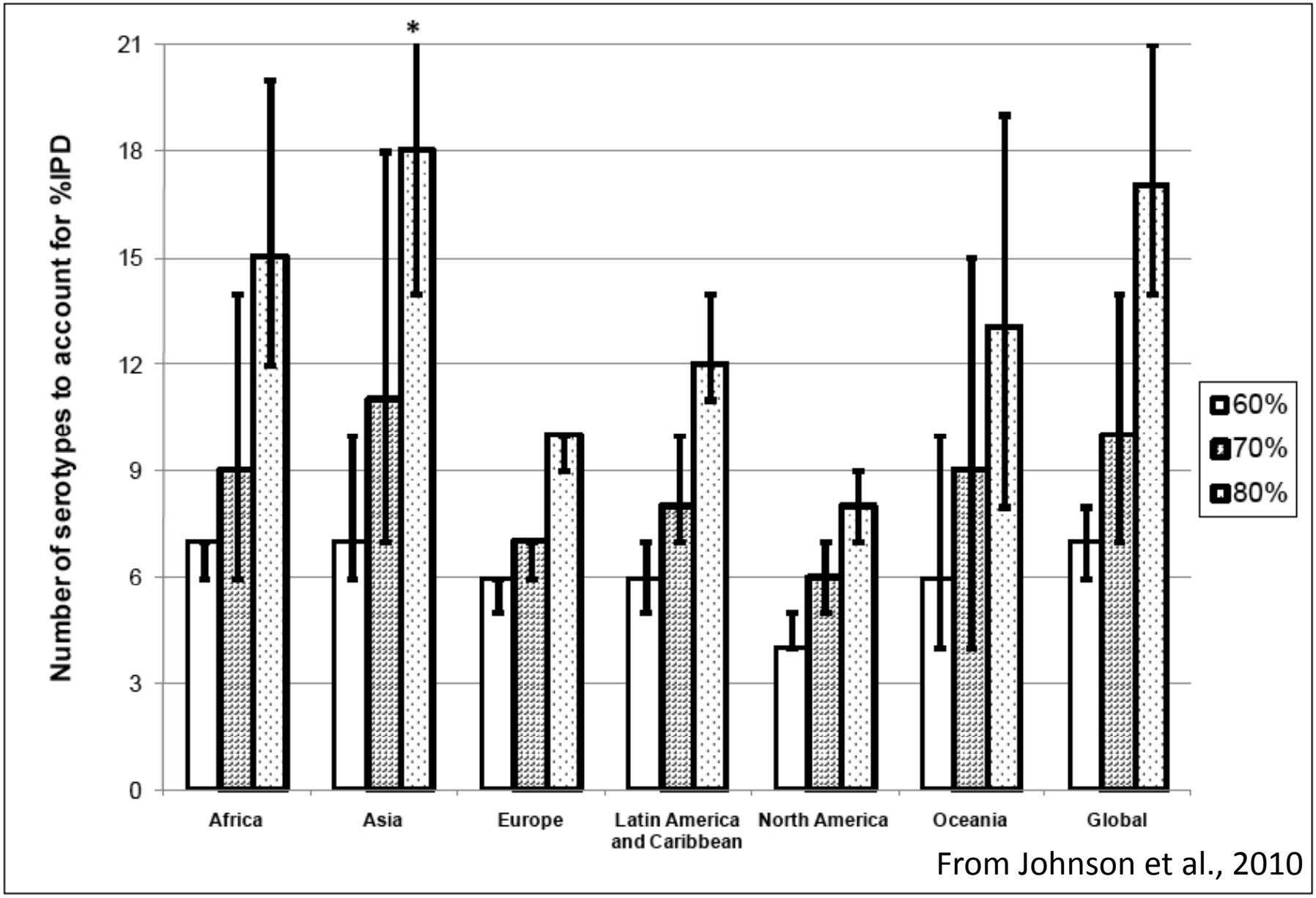
By: Julie Lajoie

# General information

- Ecology and Epidemiology of invasive pneumococcal disease (IPD) in sub-Saharan Africa is different from that seen in USA or Europe
- Sub-Saharan Africa have among the highest rate of transmission
- Wide variety of serotypes associated with both carriage and invasive disease
- Prevalence of individuals serotypes differs form those seen in developed countries

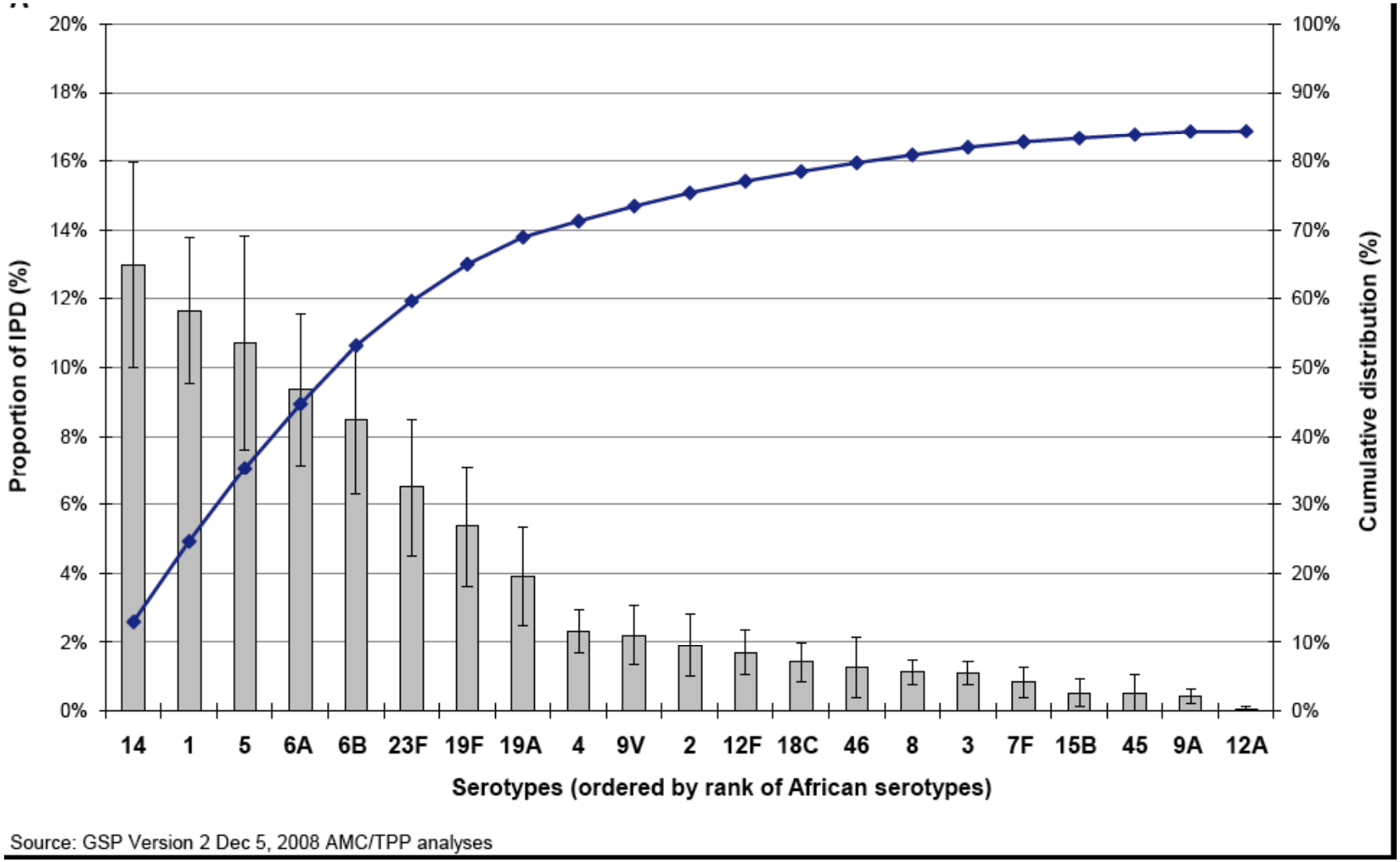
# Importance of vaccine in Africa

- 70% to 80% of severe pneumonias in Africa are caused by the pneumococcus
- During the “90” increase from 28 to 45% of penicillin resistant pneumococci causing systemic infection in South Africa
- 90% of the pneumococcal disease associated with HIV is in Africa
- Pneumonia remain one of the leading causes of child deaths in Africa, accounting for over one-third of all paediatric deaths du to infectious diseases.
- Pneumococcal pneumonia in children is an important cause of hospitalization for those with underlying tuberculosis




From Johnson et al., 2010

6 serotypes caused >70% in north america vs 9 in Africa




African serotype: 14>1>5>6A>6B>23F>19F>19A

# Some facts….

- WHO indicated in 2000 that incidence and mortality estimates that serotype (1,5,6A,6B, 14, 19F and 23F) account for approximately 9 million cases and 500 000 deaths in children <5 years of age
- Africa is the only region where 6A doesn't represent the second serotype
- PCV7 Account for only approximately 39% of the invasive disease-causing serotypes in Africa
- In April 2009, Rwanda was the first GAVI country to introduce PCV-7 in his routine childhood immunization
- New 10 and 13 valent vaccine are covering at least the three-quarters of circulating serotypes
- Kenya first country to introduce PCV including 1,5 and 14 serotype

# Gambia PCV-7 Roca et al.2011

- A cluster randomized (by village) trial of the impact of PCV-7 was conducted in 21 villages (2003-2008)

- PVC-7 was given to all children under 30 months

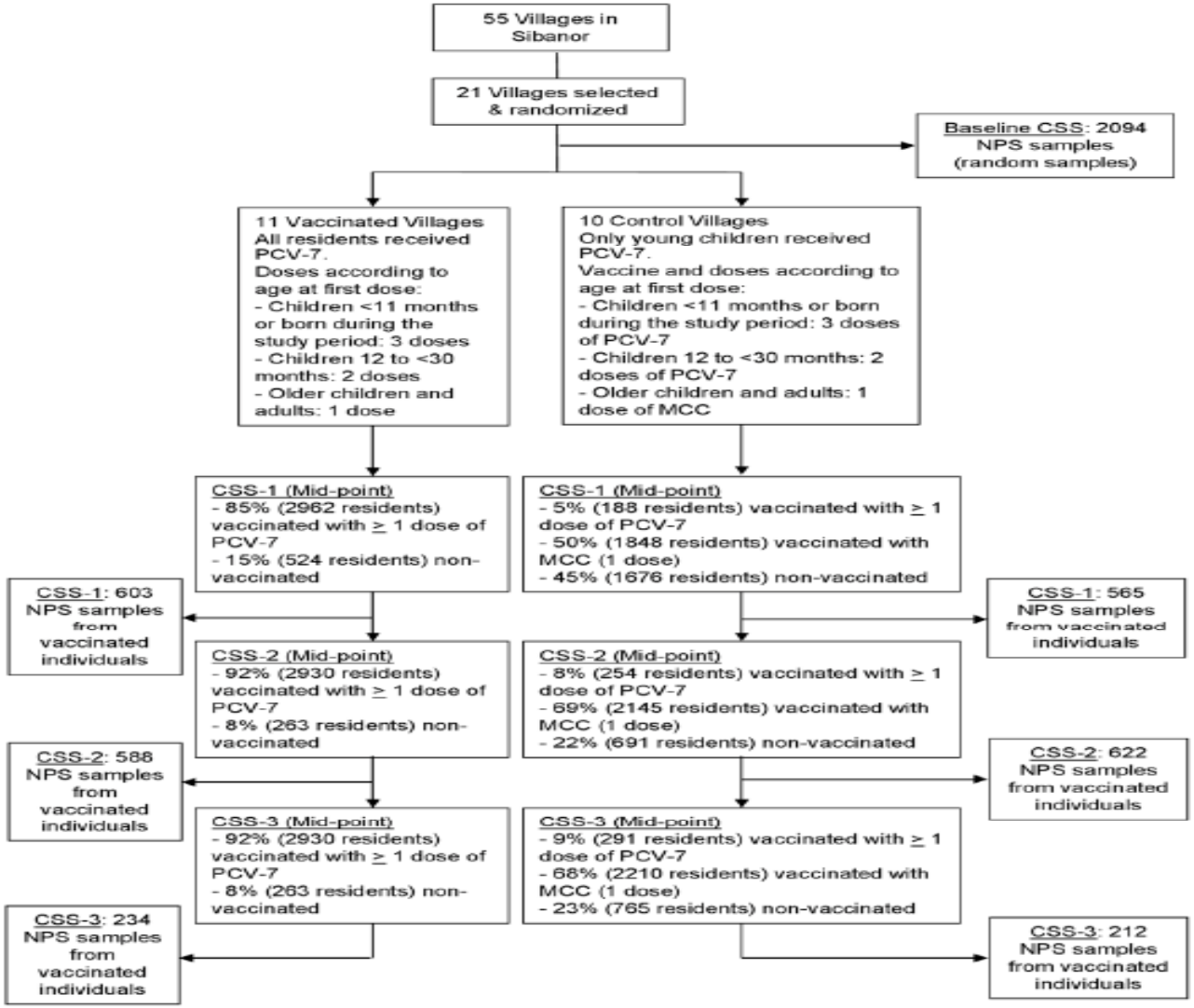



**Figure 1. Trial profile.** MCC, meningococcal polysaccharide C conjugate vaccine.
doi:10.1371/journal.pmed.1001107.g001

# Gambia PCV-7 Roca et al.2011

- Decline of prevalence of vaccine tyoe in older children and adults in control village
  - Suggests a herd effect resulting from vaccination of infants
  - This effect appears 6 months post vaccination
- Slightly but significant reduction of vaccine type prevalence in vaccinated individuals
- The prevalence of carriage of non vaccine type among adults was lower in the post vaccination surveys (not observed in other age group in either vaccinated or control villages)
- Decrease of the overall pneumococcal carriage in the post vaccination
- No add selection pressure towards an overall increase in carriage of non vaccine type

# Study in Soweto, South Africa

Mbelle et al., 1999

- Impact of the vaccine (9 valent) at age 6, 10 and 14 weeks (500 infants: 250 controls; 250 vaccines)
- Vaccine included serotype 1, 4, 5, 9V, 14, 18C, 19F and 23F
- **Significant** antibody responses to **all vaccine type** (VT) present 4 weeks after the third dose.
- **Little impact** of the vaccine on the **overall** nasopharygeal carriage
- **Reduction** in the carriage of **vaccine type** at age 9 months (18% vs 36%)
- Almost **complete replacement** of vaccine type by non vaccine type (36% vs 25%)
- 9 months post vaccination: **Reduction** of carriage of penicillin-resistant pneumococci (21% vs 41%) and cotrimoxazole resistant (23% vs 35%)

# Soweto South Africa: Huebner et al. 2002

- Immunogenicity of the 9valents after each doses in 500 infants (same design than previous study)
- Before the first dose at 6 weeks: >80% of infected had antibody to six of the nine (>0.15µg/ml) antigens (70% to serotypes 18C and 23F; 50% to serotype 4)
- After 1st dose: geometric mean concentration (GMC) ranged from 0.27µg/ml for serotype 23F to 2.98µg/ml for serotype 1; 90% of infant had serotype specific antibody
- After 2nd dose: GMC ranged from 1.14µg/ml to 5.68µg/ml; 95% of infant had serotype specific antibody
- After 3rd dose: GMC 2.73 µg/ml to 6.18 µg/ml; 98% of infants had serotype specific antibody

- Author suggest that a single dose could be sufficient

# Soweto South Africa: Klugman et al., 2003

- Impact of the 9 valent vaccine in children with and those without HIV infection
- In HIV- children:
  - Reduction of the incidence of a first episode of invasive pneucoccal disease due to a vaccine type by 83%
- In HIV+ children:
  - 65% of reduction

# Gambian trial Curtis et al 2005

- Conducted between 2000 and 2004 (529 children with vaccine; 568 placebo)
- Efficacy of 77% against invasive pneumococcal disease caused by vaccine type
- Efficacy of 37% against the first episode of radiologically confirmed pneumonia
- Efficacy of 50% against disease caused by all serotypes
- Efficacy of 16% against mortality

- Despite South Africa and Gambian trial; 9 valent vaccine was not commercialized in order to focus efforts on the 13 valent

# Conclusion

- Despite some studies showing increase prevalence of non vaccine type after vaccination, majority of studies concluded to the importance of include PVC in vaccination routine in Africa