

The landscape of infectious disease exposure over the past two decades in the Kenyan coast.

Kuria, Timothy Chege

GVIRF: Incheon, South Korea.

30th March 2023



Introduction

Kemri-Wellcome Trust/Mwanajuma Ngama

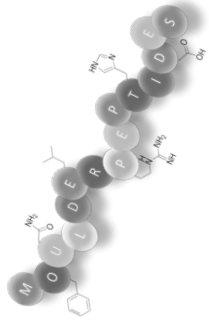


An infant with severe RSV-related pneumonia undergoing oxygen therapy in Kenya

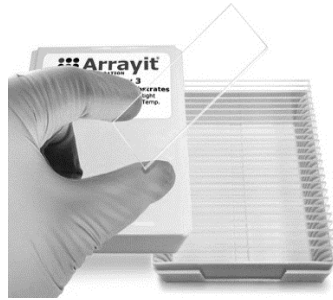
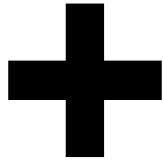
Objectives

- General objective
 - To evaluate the infectious disease burden in early life in a cohort of infants living in the Kenyan coast using a high-throughput seroepidemiological approach.
- Specific objectives
 - To elucidate the seroepidemiology of infectious diseases in coastal Kenya.
 - To correlate vaccination record data with serological data.

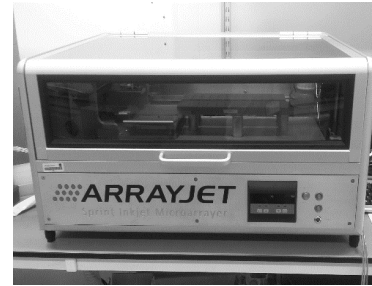
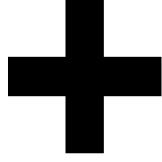
Microarray: 42 infectious diseases targets.



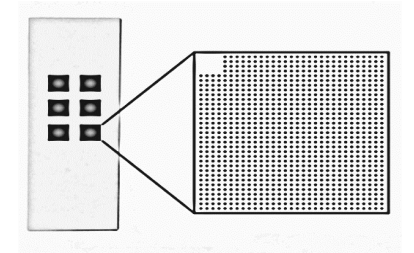
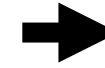
Protein/Antigens



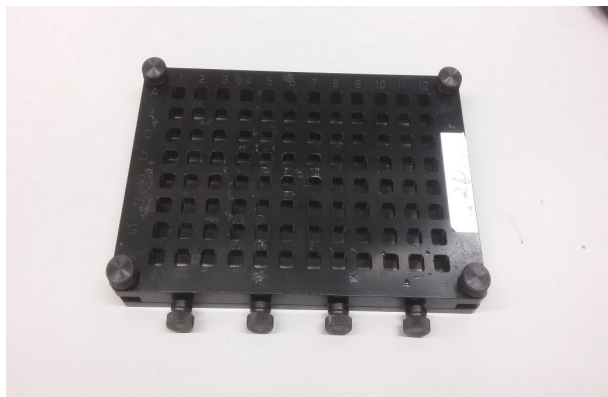
Microarray
slides



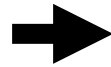
Microarray
printer; Spotting



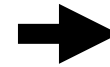
Antigens
spotted slide



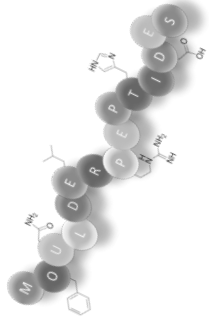
Cassette; Slide processing



Scanner; Data extraction



Data analysis



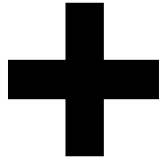
Protein/Antigens



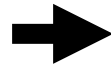
Casse

Mi

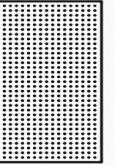
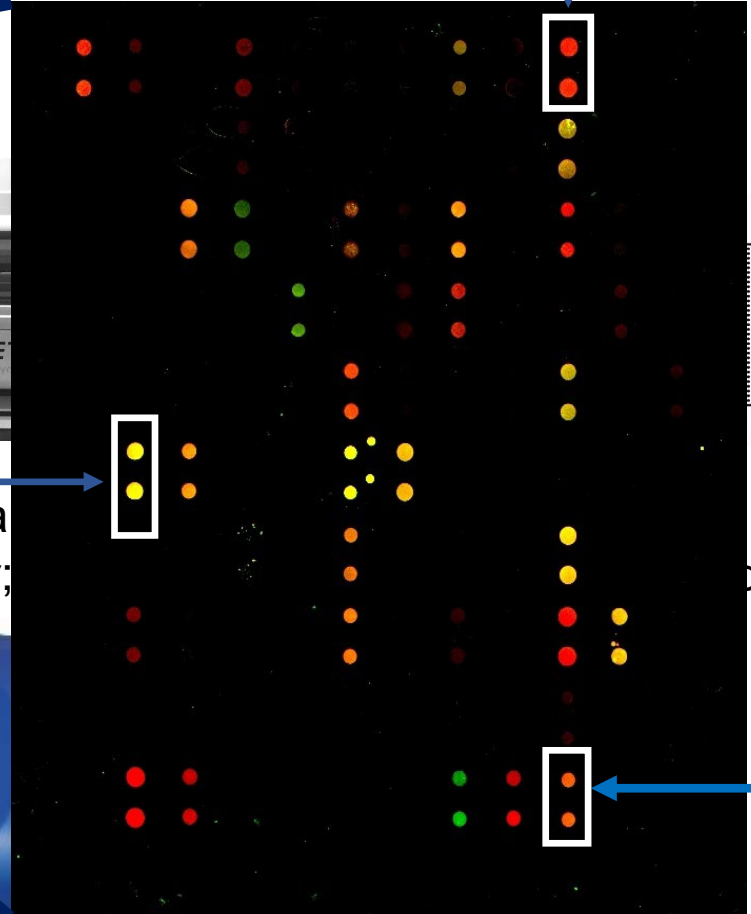
12 infectious diseases targets.



Microa
printer;

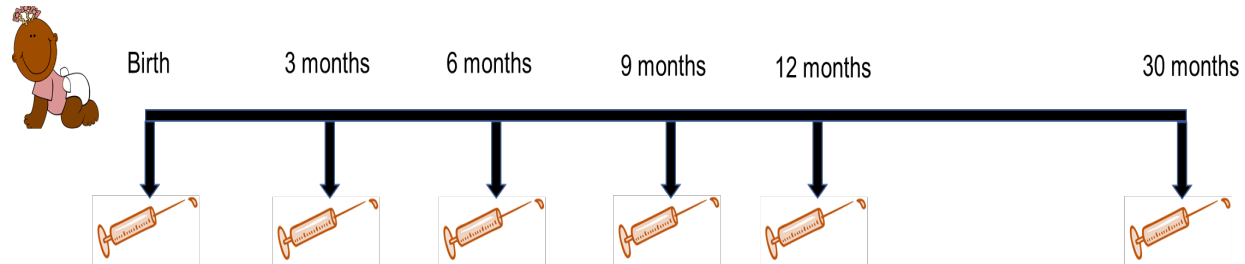


Scanner; Data extraction



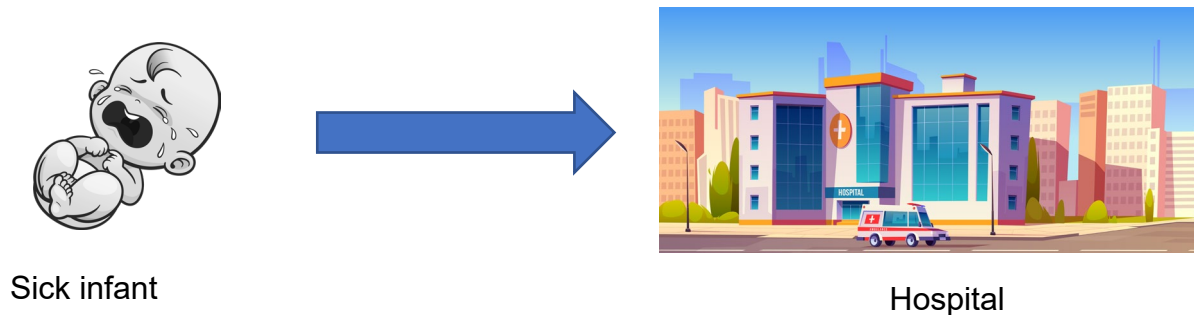
Experimental design

First decade (2002-2005)



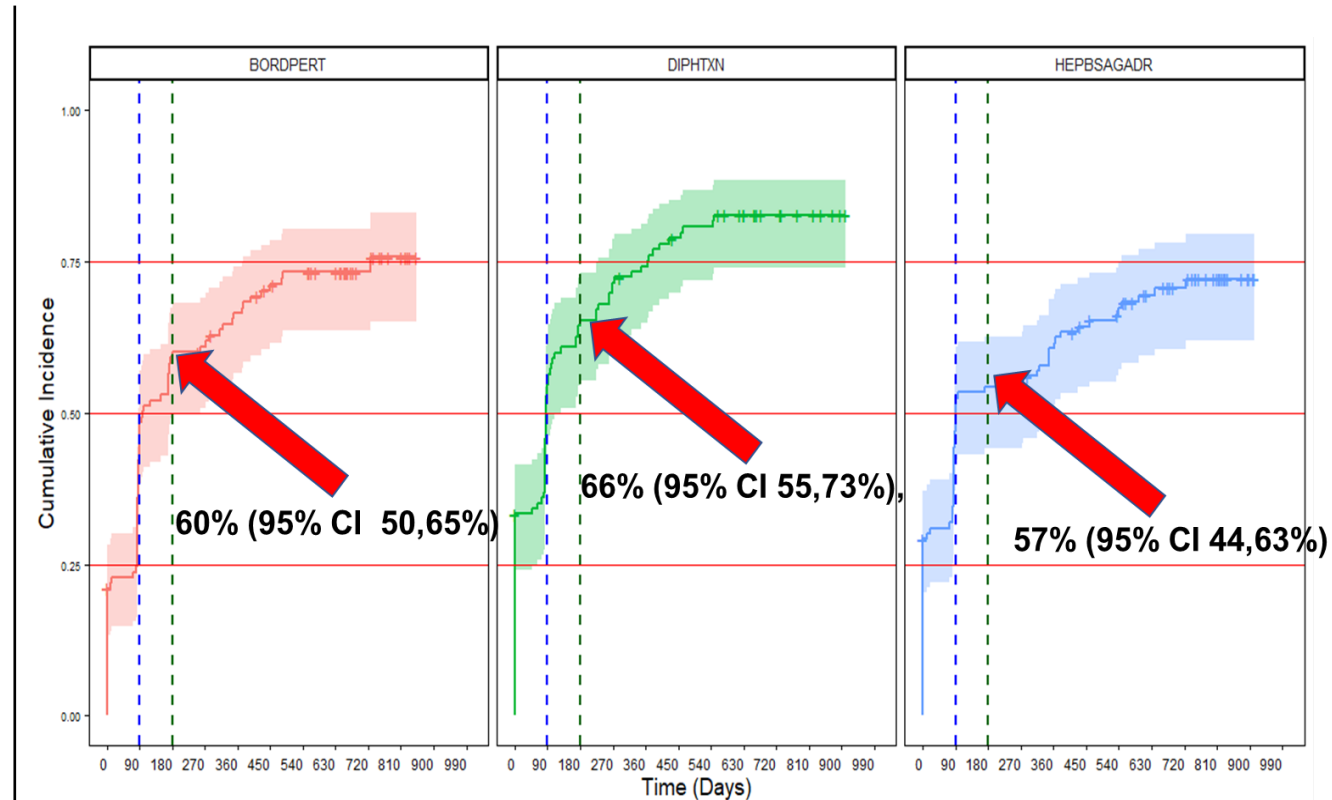
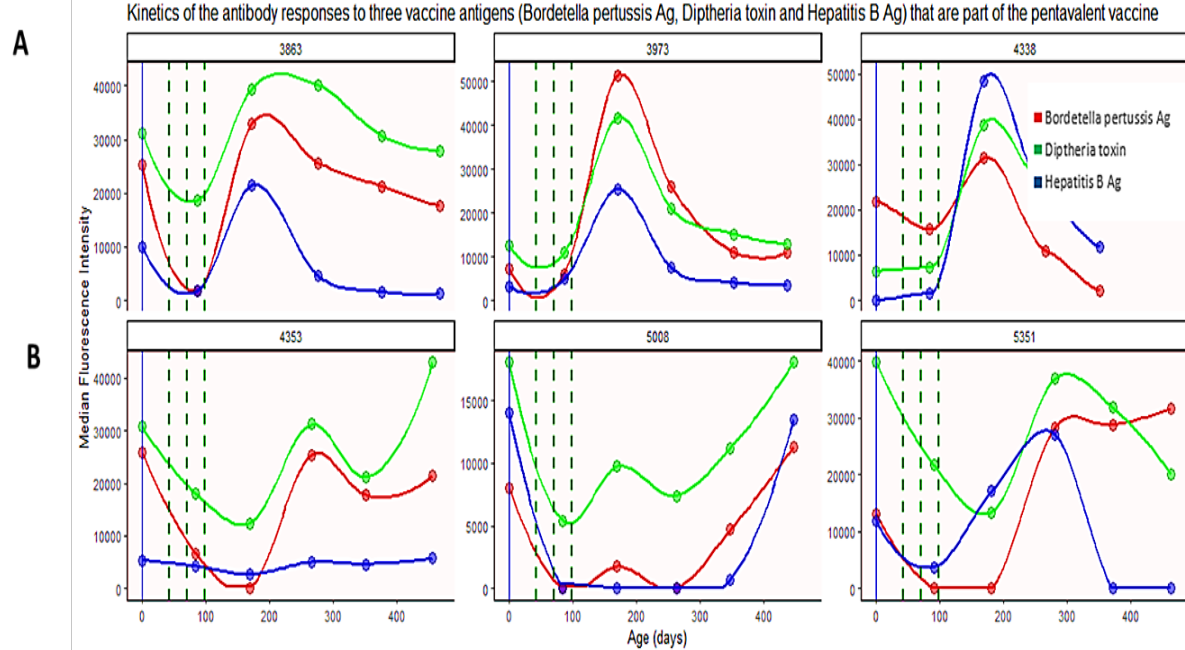
- Kilifi Birth Cohort; 2002 to 2005
- 124 infants
- Cord and serum samples
- 956 samples assayed against **42 pathogens.**

Second decade (2006-2017)



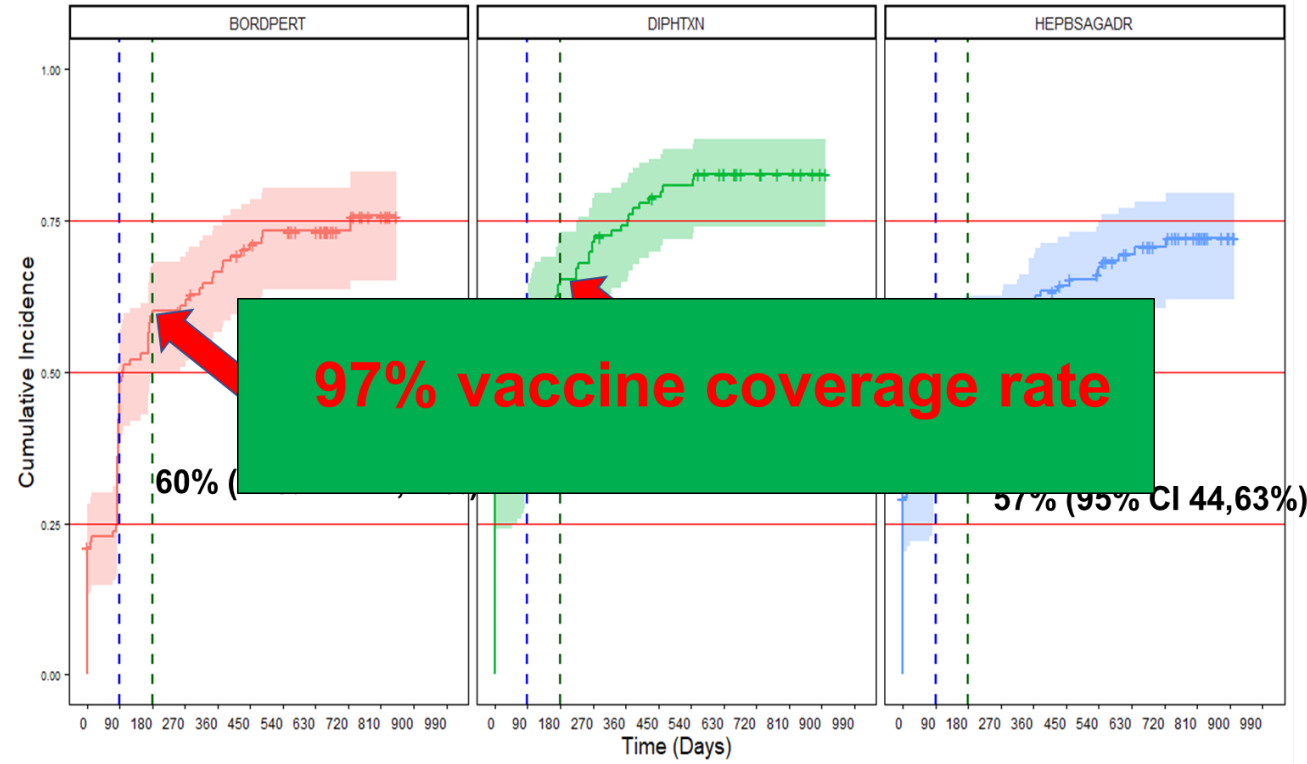
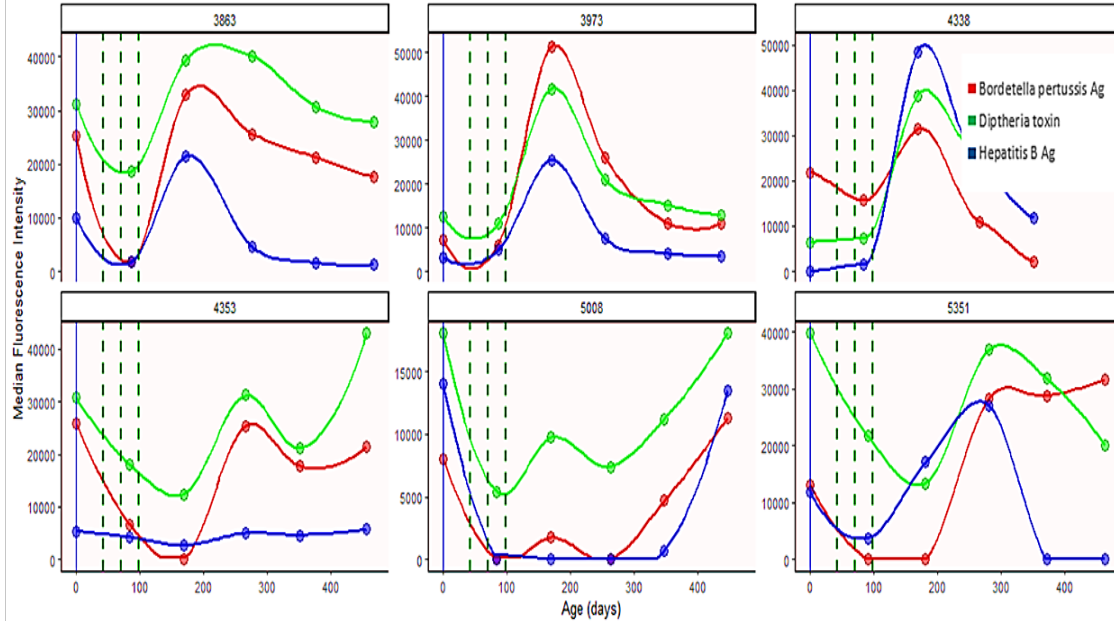
- Paediatric inpatient samples; 2006 to 2017. Kilifi County Hospital.
- 176 serum samples assayed against **42 pathogens.**
- Clinical data available.

Results: Correlation of vaccination record data and serological data; pentavalent vaccine

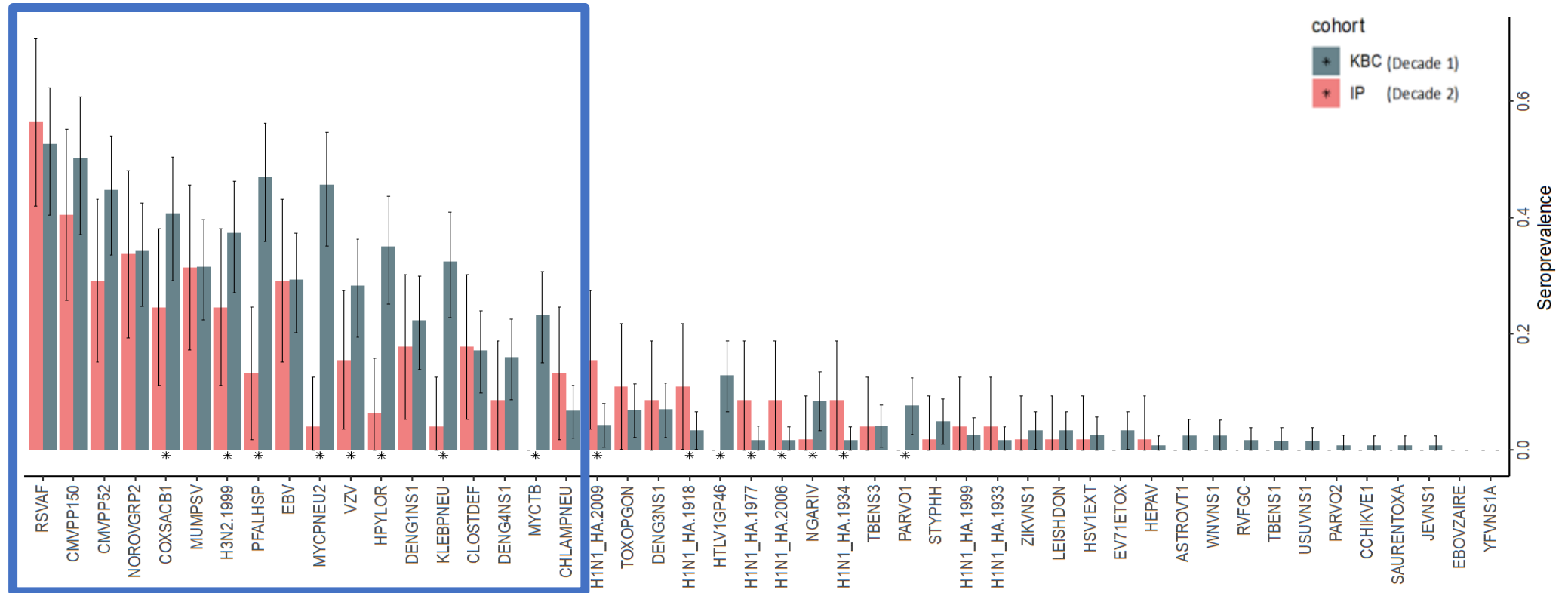


Results: Correlation of vaccination record data and serological data; pentavalent vaccine

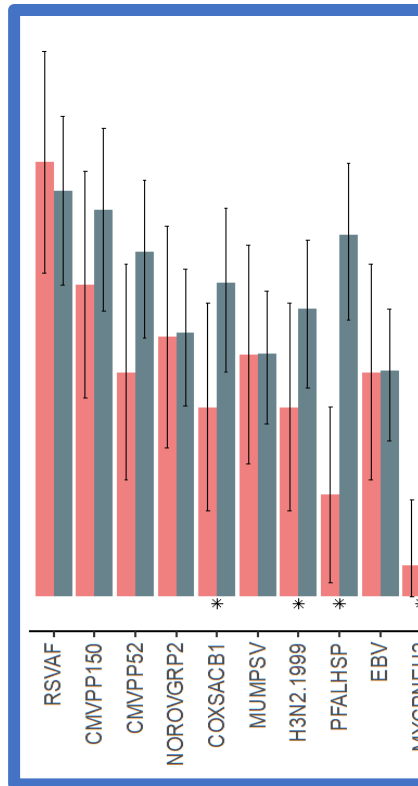
Kinetics of the antibody responses to three vaccine antigens (Bordetella pertussis Ag, Diphtheria toxin and Hepatitis B Ag) that are part of the pentavalent vaccine



Results: seroprevalence of infections that should be prioritized for vaccine development.



Results: seroprevalence of infections that should be prioritized for vaccine development.



1. RSV-A
2. Cytomegalovirus (CMV)
3. Norovirus
4. Coxsackie virus
5. Mumps virus
6. Influenza H3N2
7. *Plasmodium falciparum*(Malaria)
8. Epstein-Barr Virus (EBV)
9. *Mycoplasma pneumoniae*
10. Varicella Zoster virus (VZV)
11. *Helicobacter pylori*
12. Dengue virus
13. *Klebsiela pneumoniae*
14. *Clostridium difficile*
15. *Chlamydia pneumoniae*

Vaccine in development
No Vaccine available
Vaccine available



Conclusion

- This study highlighted significant proportions of infants who had no detectable amounts of antibodies to diphtheria, pertussis, and hepatitis B vaccine antigens despite being vaccinated.
- There is evidence of localized transmission of infectious diseases whose epidemiology is unknown.
- Need to have more infectious disease targets included in routine vaccination programs ie Mumps, influenza, and VZV, and Dengue.
- There is a need to have a priority list of pathogens that should be targeted for vaccine development; supported by epidemiological data.

Acknowledgement

KEMRI | Wellcome Trust



UNIVERSITÀ DI SIENA 1240



International
Vaccine
Institute

Dr. Charles Sande

Elijah Gicheru
Joy Kabagenyi
Deirdre Foley
Pamela Miano

Prof. Sue-Ann Clemens

Dr. Isabela Gonzalez
Daniele Sereni
Prof. Emanuele Montomoli
Prof. Claudia Trombetta

Prof. Ralf Clemens



Extra slide

| Vaccine | Description | Schedule | Year Introduced |
|---------------------|--|-----------------------|--|
| BCG | Bacillus Calmette–Guérin vaccine | At birth | 1980 |
| OPV | Oral Polio Vaccine | Birth, 6,10, 14 weeks | 1980 |
| DTwPHibHepB (Penta) | Diphtheria, Pertussis, Tetanus, Hepatitis B and Haemophilus influenzae type b) vaccine | 6,10, 14 weeks | DTwP (1980) Hib & HepB (2001) |
| IPV | Inactivated Polio Virus vaccine | 14 weeks | 2016 |
| MR | Measles/Rubella vaccine | 9, 18 months | Measles (1980) Measles 2 nd dose (2013) Rubella (2017) |
| Pneumococcal | Pneumococcal conjugate (PCV-10) vaccine | 6,10, 14 weeks | 2011 |
| Rotavirus | Rotavirus vaccine | 6,10 weeks | 2014 |
| HPV | Human Papilloma vaccine | 10 years+ 6 months | 2019 |