



23^e Rencontres du GEIG
Retours d'expériences sur la pandémie H1N1
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Estimating attack rates with sero-epidemiological surveys

Détermination des taux d'attaque à l'aide
d'enquêtes séro-épidémiologiques

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**The example of the 2009
A/H1N1 pandemic in
England**

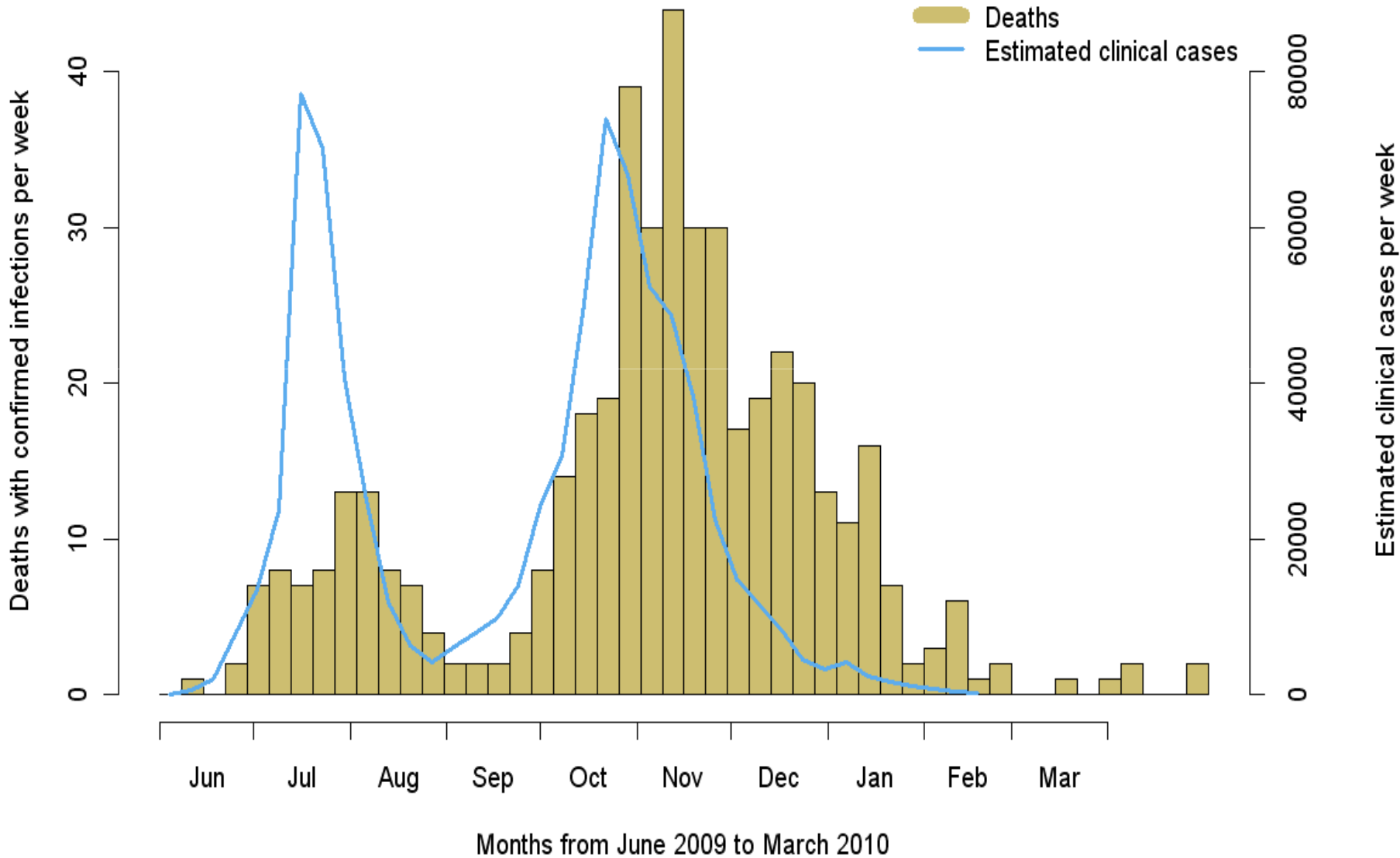
Role of seroepidemiology



- 1. Determining pre-pandemic baseline H1N1 prevalence**
- 2. Estimating attack rates**



H1N1 pandemic in England



Role of seroepidemiology



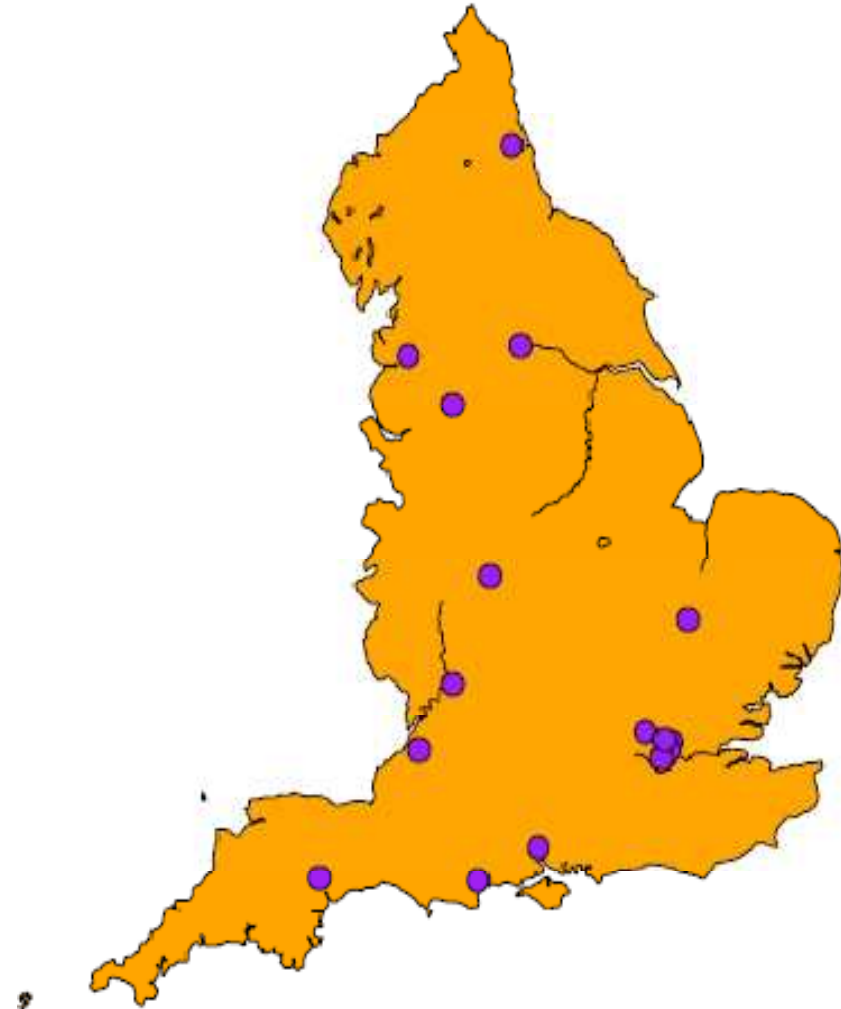
- 1. Determining pre-pandemic baseline H1N1 prevalence**
- 2. Estimating attack rates**
 - in population/ households/schools/
closed settings**
- 3. Estimating proportion symptomatic**
 - Case severity estimates**
- 4. Aid real-time modelling of epidemic**



Serological surveillance in England



- **First PHLS (now HPA) serosurvey of MMR in 1986**
- **Network of 16 microbiology laboratories throughout England contribute samples**
- **More than 150 000 sera stored**
- **Samples stored at Seroepidemiology Unit, Manchester**



England-wide H1N1 serosurveys



Baseline seroprevalence:

Specimens for study in England taken from HPA Manchester serum collection

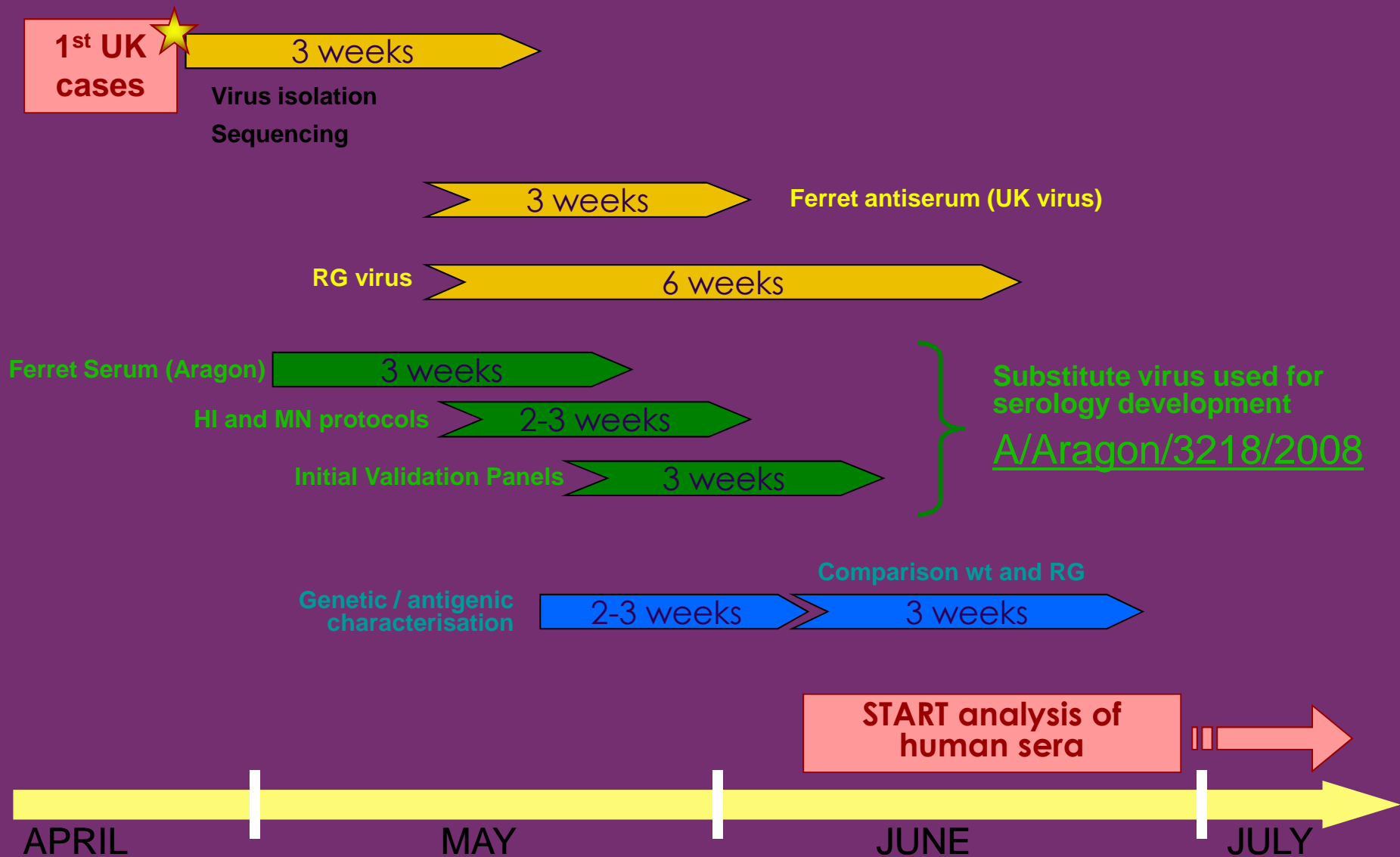
Residual sera from diagnostic microbiology testing in eight regions from 2008/early 2009

Seroincidence study:

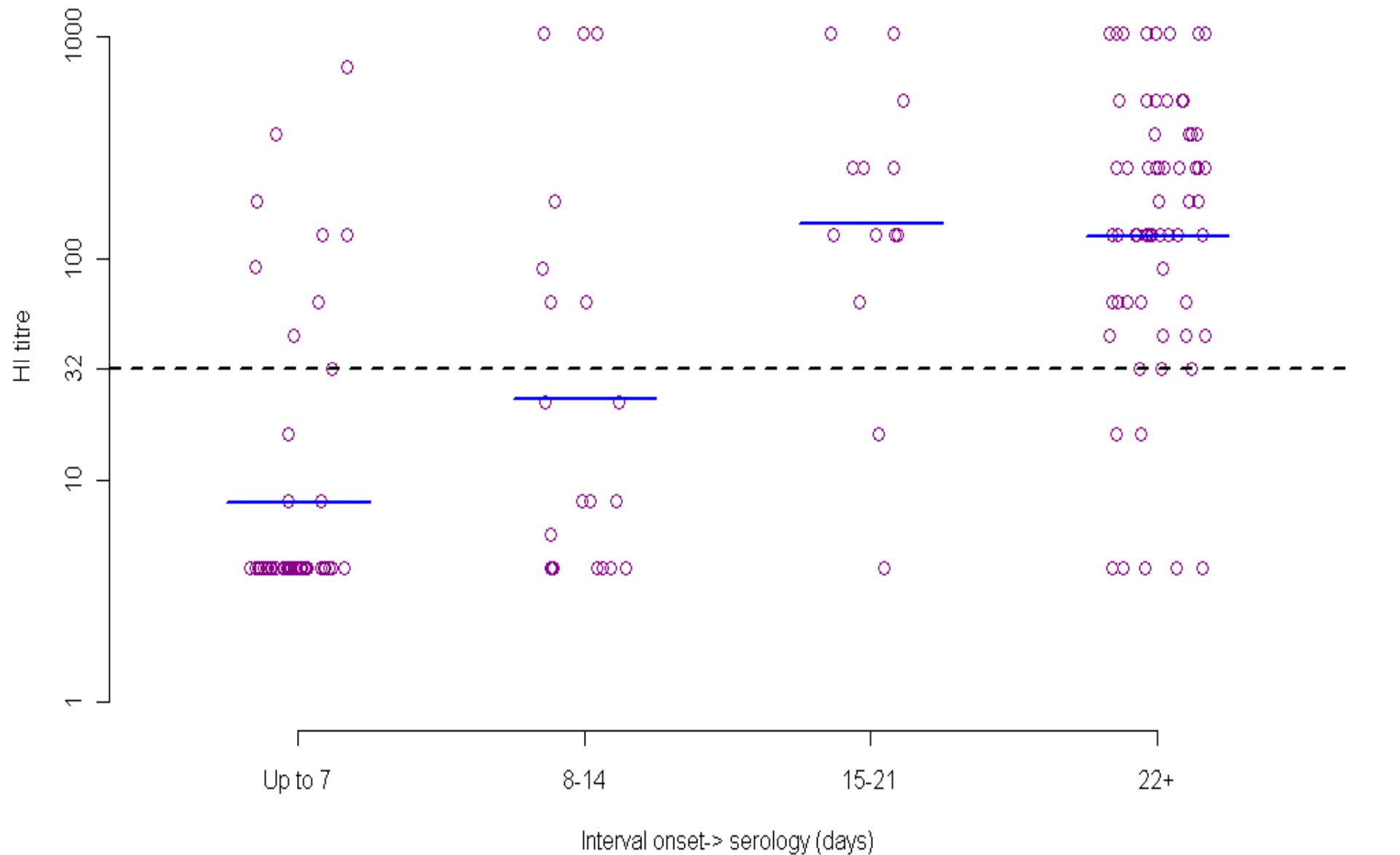
Residual samples from microbiology/chemical pathology testing
July 2009 – March 2010

Only data on age, sex, date of sample and collecting laboratory
(proxy for geographical region)

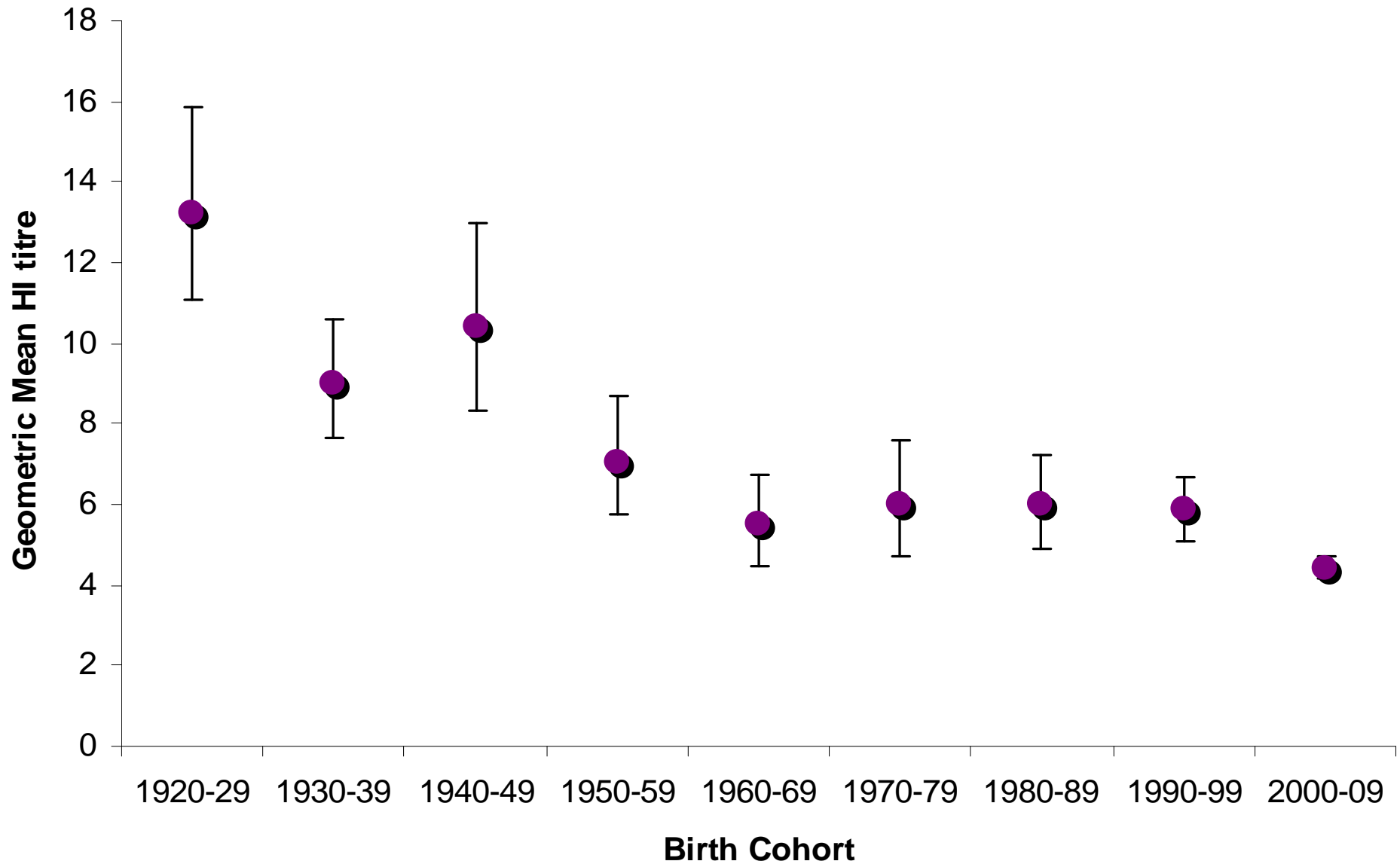
H1N1 serology development strategy



HI titres by time from onset to serology test in PCR confirmed cases



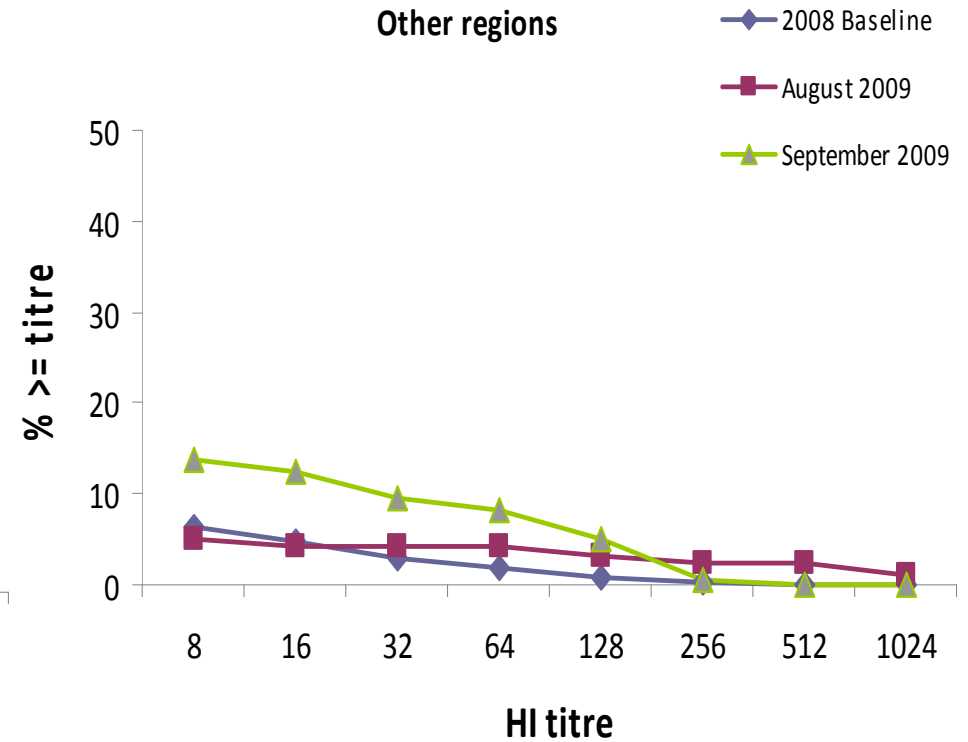
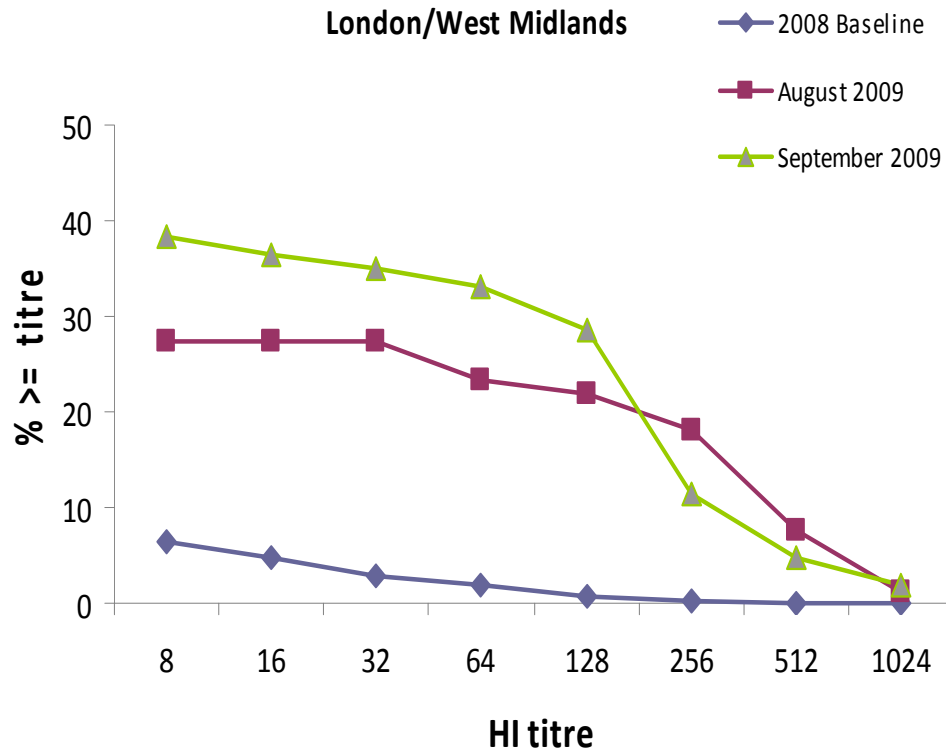
H1N1 titres by birth cohort, England 2008



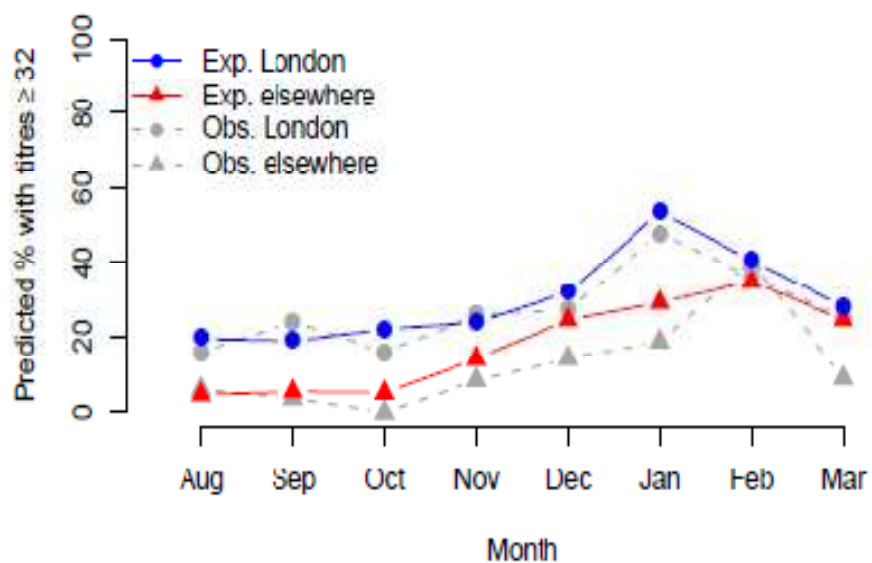
Results post first wave (end of September 2009)



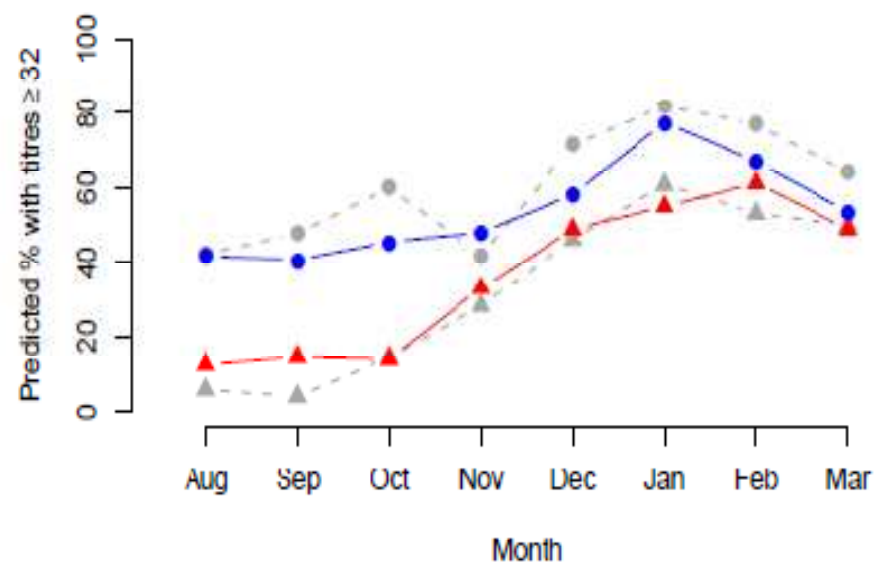
RCD curves 5-14 year olds



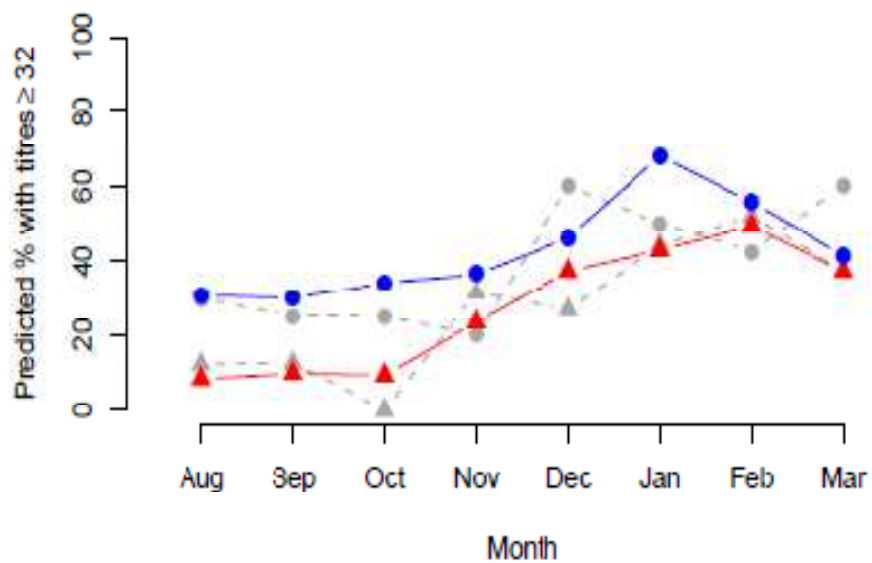
<5 years



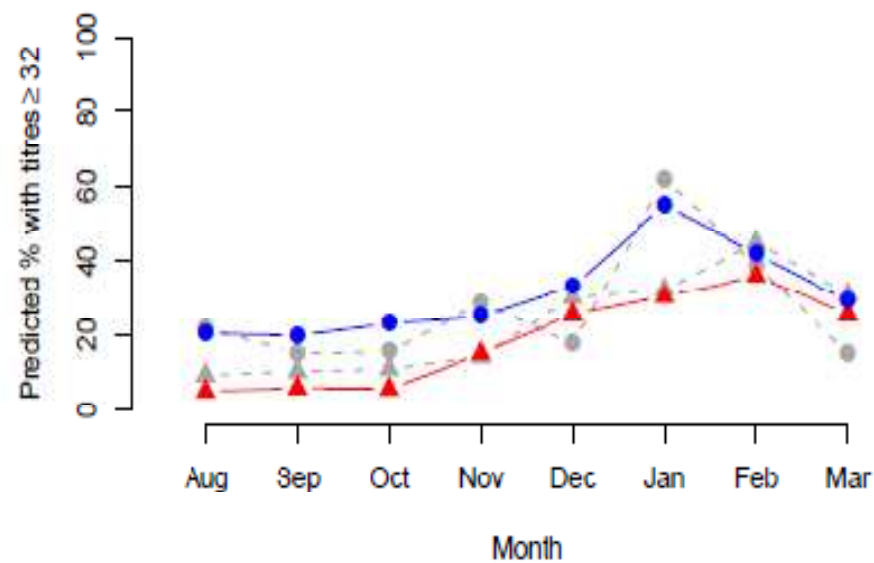
5-14 years



15-24 years



25-44 years





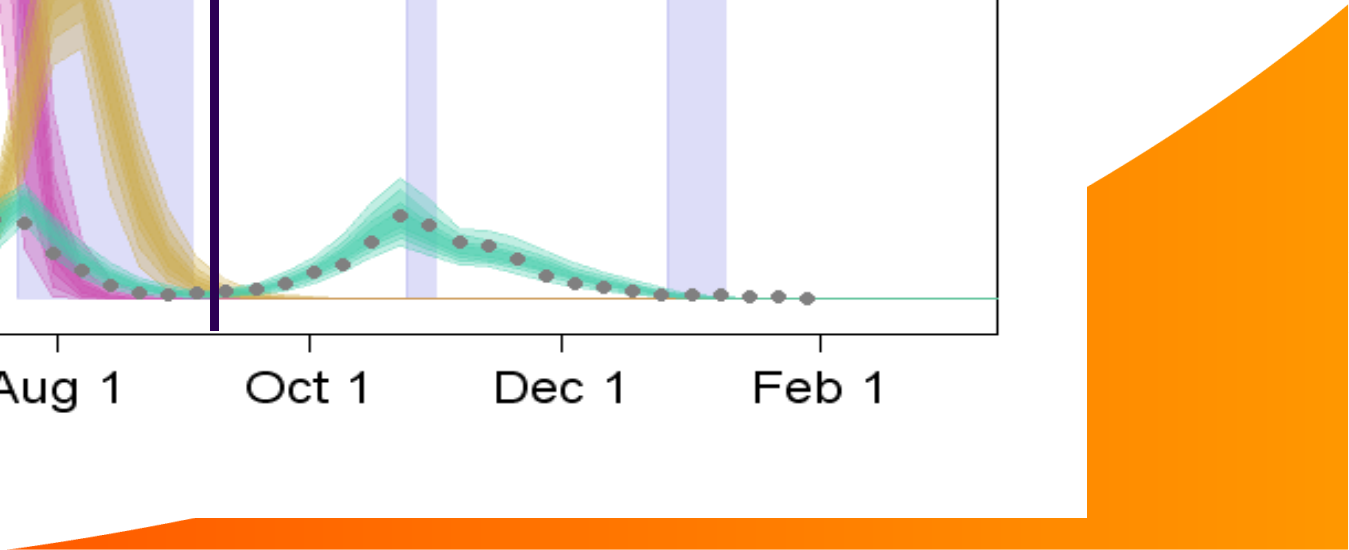
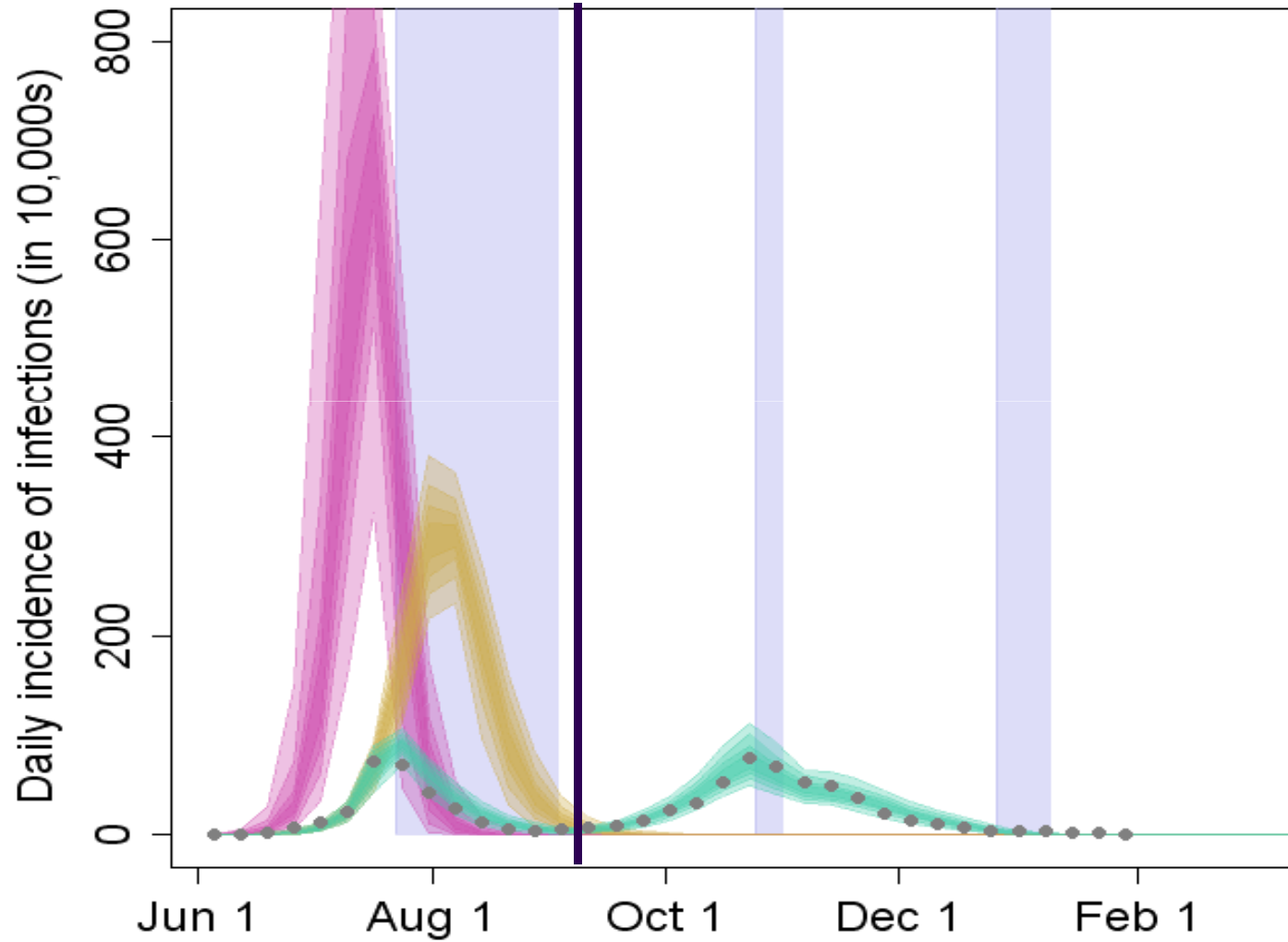
Key aim of seroepidemiology was to inform real-time models...



Impact of serology



Impact of school and background immunity



Serology results not timely enough...

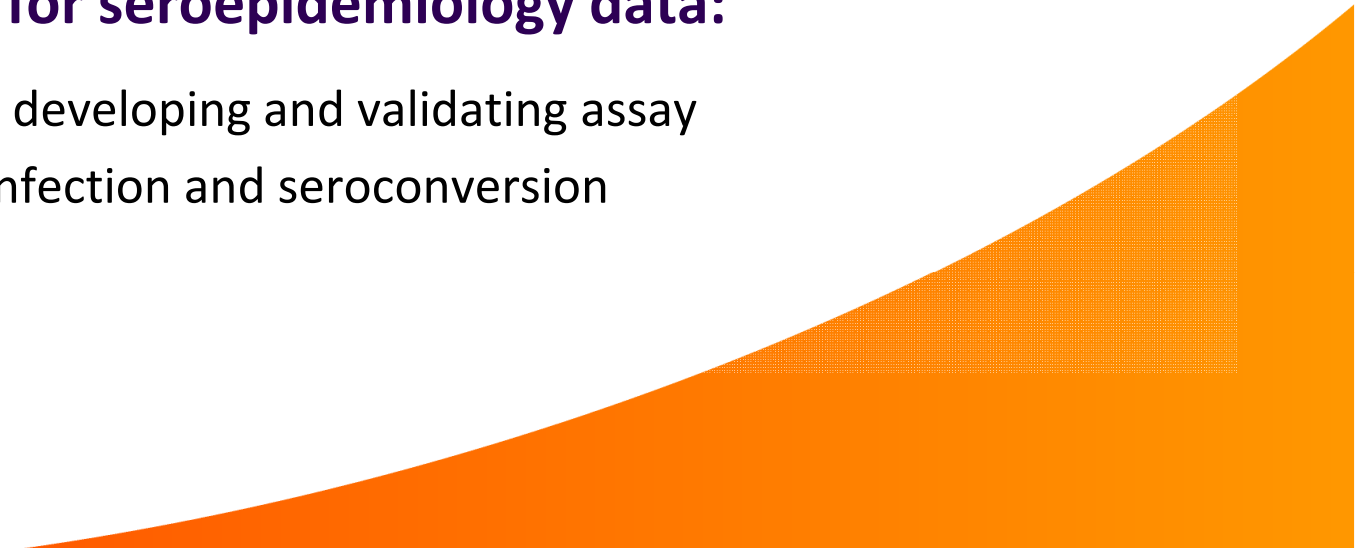


Seroincidence study did not provide timely enough estimates to be used for real-time modelling

- **baseline seroincidence was helpful**
- **helped confirm results (first wave)**

Inevitable delays for seroepidemiology data:

- Delays relating to developing and validating assay
- Delays between infection and seroconversion



Feedback to policy makers



- **Three reports to Scientific Advisory Group for Emergencies (SAGE)**

- **August 2010: Baseline seroprevalence, seroconversion in confirmed cases, preliminary results from school outbreak**
- **September 2010: Early seroincidence data**
- **October 2010: Update on seroincidence**



Benefits & drawbacks of HPA population-wide serology study



+	-
<ul style="list-style-type: none">• Relatively timely (particularly baseline and 1st wave results)• Key variables (region+age) available• Children represented	<ul style="list-style-type: none">• Not timely enough...• No population sampling• Representativeness?• Limited data available (risk factors? vaccination status?)• Small sample sizes in some subgroups• England only

Seroepidemiology legacy from H1N1



- **Ready-prepared protocols for how to generate seroepidemiology data rapidly**
- **Development of more rapid serological assays which measure recent infections in single sample (no need for convalescent sera)**
- **Oral fluid assays allow population-based sampling**
- **Development of models for continuous monitoring of seroincidence (currently under way) by coupling serology with other source of data from surveillance (GP consultation, uptake of vaccine, immunogenicity trials, etc) for Real time modelling and decision making using e.g. bayesian approaches**

Acknowledgements:



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Thank you!



Selected references



Miller E, Hoschler K, Hardelid P, Stanford E, Andrews N, Zambon M (2010). Incidence of 2009 pandemic influenza A H1N1 infection in England: a cross-sectional serological study. *Lancet*. Mar 27; 375(9720):1100-8.

Stephenson I, Heath A, Major D, Newman RW, Hoschler K, Junzi W, Katz JM, Weir JP, Zambon. MC, Wood JM (2009). Reproducibility of serologic assays for influenza virus A (H5N1). *Emerg Infect Dis*. 15 (8): 1250-1259

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