

Mumps seroprevalence in Belgium, 2013-2014

Preliminary results

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Seminar Diagnosis and surveillance of infectious diseases
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Background

Mumps

- Paramyxovirus
- Generally mild disease:
 - fever, swelling of salivary gland(s)
- Complications
 - orchitis, meningitis, pancreatitis, deafness
 - increase with age
- Herd immunity threshold 75-86%



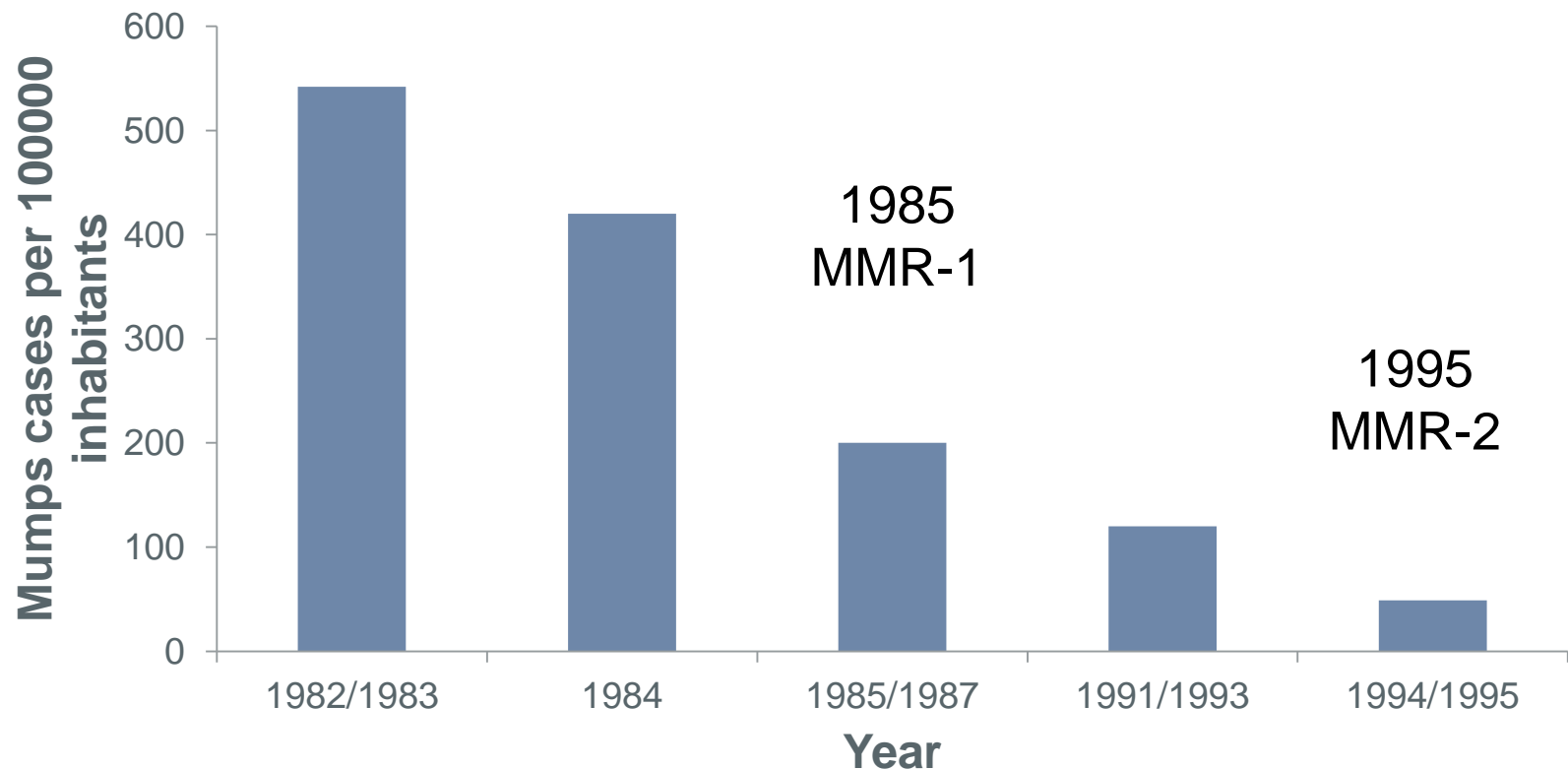
Mumps vaccination in Belgium

- Schedule:
 - 1981: partially reimbursed boys
 - 1985: routine vaccination (<2y)
 - 1995: two doses (10-12y)

measles-mumps-rubella=MMR

- Coverage 2012
 - MMR-1: 96%
 - MMR-2: 93% (Flanders)

Yearly mumps incidence per 100.000 in Belgium, 1982-1995



Adapted from Van Casteren, Archives of Public Health 1997

Mumps epidemiology in Belgium

- Since 2011: outbreaks
 - Young adults
 - MMR-1 & MMR-2
 - Close social contacts (student population)

Bof-uitbraak in Gent besmet al 150 studenten

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GERELATEERD NIEUWS



Bewerkt door: [Toon Mast](#)

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Une épidémie d'oreillons se propage entre universités

Jehan Goffin (st.)

Mis en ligne jeudi 18 avril 2013, 20h00

Après l'ULg et l'ULB, c'est au tour de l'UCL de faire face à une épidémie d'oreillons et de tirer la sonnette d'alarme. 15 cas de la maladie ont déjà été détectés.



Aim of the mumps seroprevalence study

Identify

- susceptible age cohorts
- risk factors for seronegativity

In order to

- provide additional information to adjust and guide preventive policies

Methods

Sample collection

- Voluntarily participating sentinel laboratories
- Residual samples
- Exclusion criteria
 - Avoid overrepresentation immunosuppressed
- Data on postal code, age, gender, ward of collection

Laboratory testing

- Procedures of National Reference Center
- Anti-parotitisvirus IgG Enzygnost® (Siemens)
- Seronegative-equivocal-seropositive

Data analysis

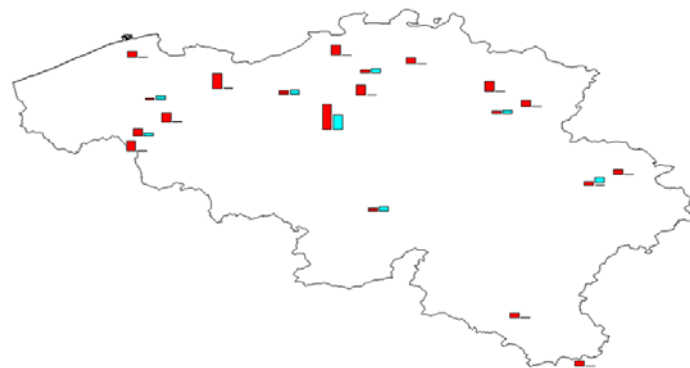
- Adjusted* prevalence in Belgium of seronegative/equivocal/seropositive for mumps IgG
- Trends of prevalence of seronegativity over age
- Comparison of prevalence of seronegativity between:
 - MMR-targeted: 2-28 years
 - Not MMR-targeted: > 28 years
- Risk factors for seronegativity
 - Log binomial regression by MMR target group

*Clustered sampling and standardization for age, gender and population per province

Preliminary results

Samples collected

27 participating laboratories

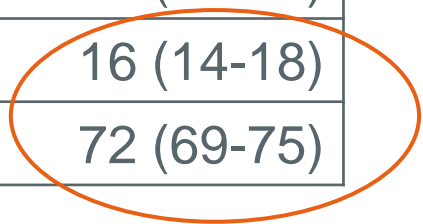


July 2013-June 2014

- 2732 samples collected (aim = 3600)
- 1/1 male/female

Adjusted prevalence of mumps IgG seronegative, equivocal and seropositive results, 2013-2014, Belgium.

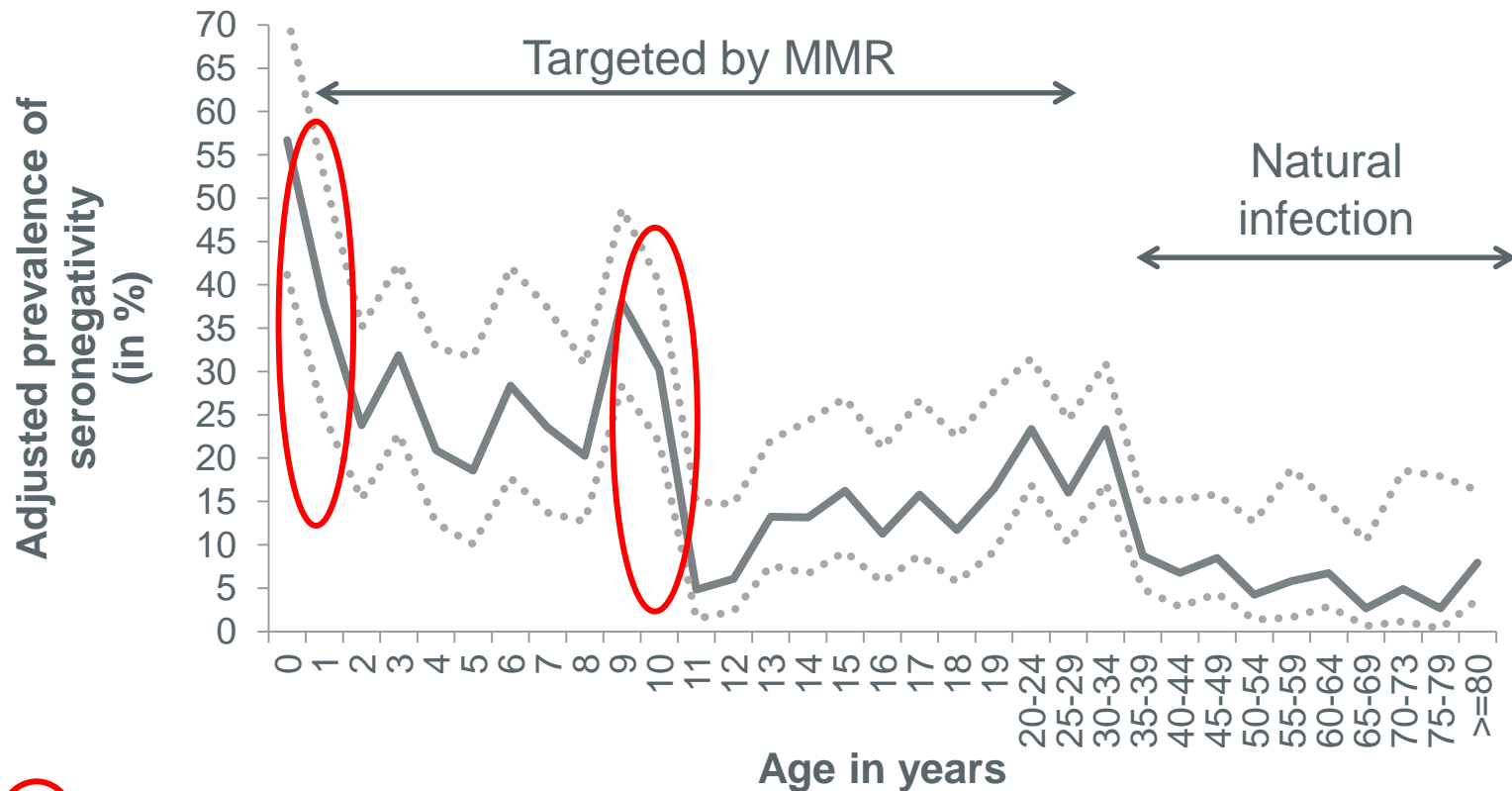
Belgium	Adjusted* prevalence
	% (95% CI)
Seronegative	12 (10-15)
Equivocal	16 (14-18)
Seropositive	72 (69-75)



“Not seronegative”

*adjusted for clustered sampling and weighted for gender, age and population per province

Adjusted prevalence of seronegativity against mumps per age group, Belgium, 2013-2014.



○ = MMR timing

Comparison of prevalence of mumps IgG seronegativity between MMR target groups, 2013-2014, Belgium.

	MMR targeted (2-28 years)	Not MMR targeted (>28 years)	p-value
Adjusted* prevalence of seronegativity (in %)	21	8	<0.001

*adjusted for clustered sampling and weighted for gender, age and population per province

Risk factors for mumps IgG seronegativity in those targeted by MMR vaccination, 2013-2014, Belgium.

Risk factors in 2-28 year olds		Adjusted prevalence ratio of seronegativity	95% CI	p-value
Region	Brussels	ref	ref	ref
	Flanders	1.41	1.02-1.96	0.04
	Wallonia	1.58	1.1-2.3	0.017
Number of MMR doses	1 (2-11 year)	ref	ref	ref
	2 (12-28 year)	0.32	0.16-0.62	0.002
Age in those received <u>2 MMR doses</u> (per year increase)		1.03	1-1.07	0.043

No impact of age in those who received 1 MMR dose and no impact of gender on prevalence of seronegativity

Risk factors for mumps IgG seronegativity in those not targeted by MMR vaccination, 2013-2014, Belgium.

Risk factors in >28 years	Adjusted prevalence ratio of seronegativity	95% CI	p-value
Age (per year increase)	0.97	0.94-0.99	0.006

No impact of gender or region on prevalence of seronegativity

Discussion
Conclusion
Recommendations

Discussion (I)

- Clear impact of MMR vaccination moments on prevalence of mumps IgG seronegativity
- More seronegativity in those targeted by MMR
 - Seroconversion higher after natural infection
 - Natural boosting

Discussion (II)

- Seronegativity increases with age after MMR-2
 - Waning immunity?
 - Historically lower vaccination coverage?
 - Combination?

Limitations

- Preliminary analysis
- No data on vaccination/disease history
- High proportion of equivocal results
 - Treated as not seronegative
 - Further investigation with seroneutralisation
- Presence of IgG as a proxy for protection
 - Role of cellular immunity not taken into account.

Conclusions and recommendations

- In general the Belgian population is sufficiently protected against mumps.
- Vulnerable age groups
 - 1-9 year olds
 - MMR-2 more than 10 years ago
- Effect of possible waning immunity may increase over time
 - Monitor (disease, coverage, seroprevalence)
 - Adjust schedule if needed

Acknowledgements



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Toon Braeye

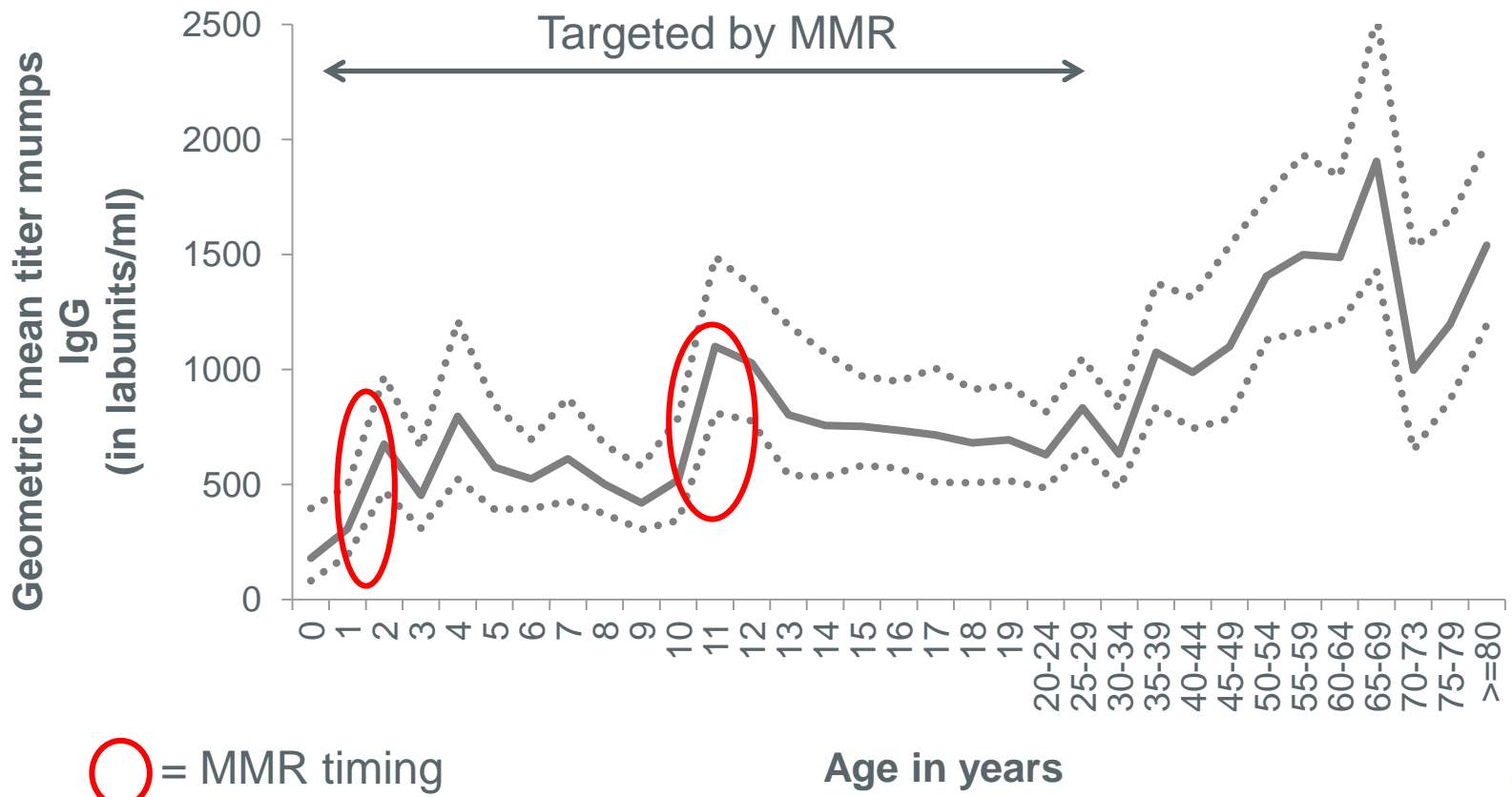
Sophie Quoilin

Martine Sabbe

Participating sentinel laboratories

Backup slides

Adjusted geometric mean IgG titer against mumps per age group, Belgium, 2013-2014.



- High prevalence of seronegativity in 1-9 year olds and 20-30 year olds

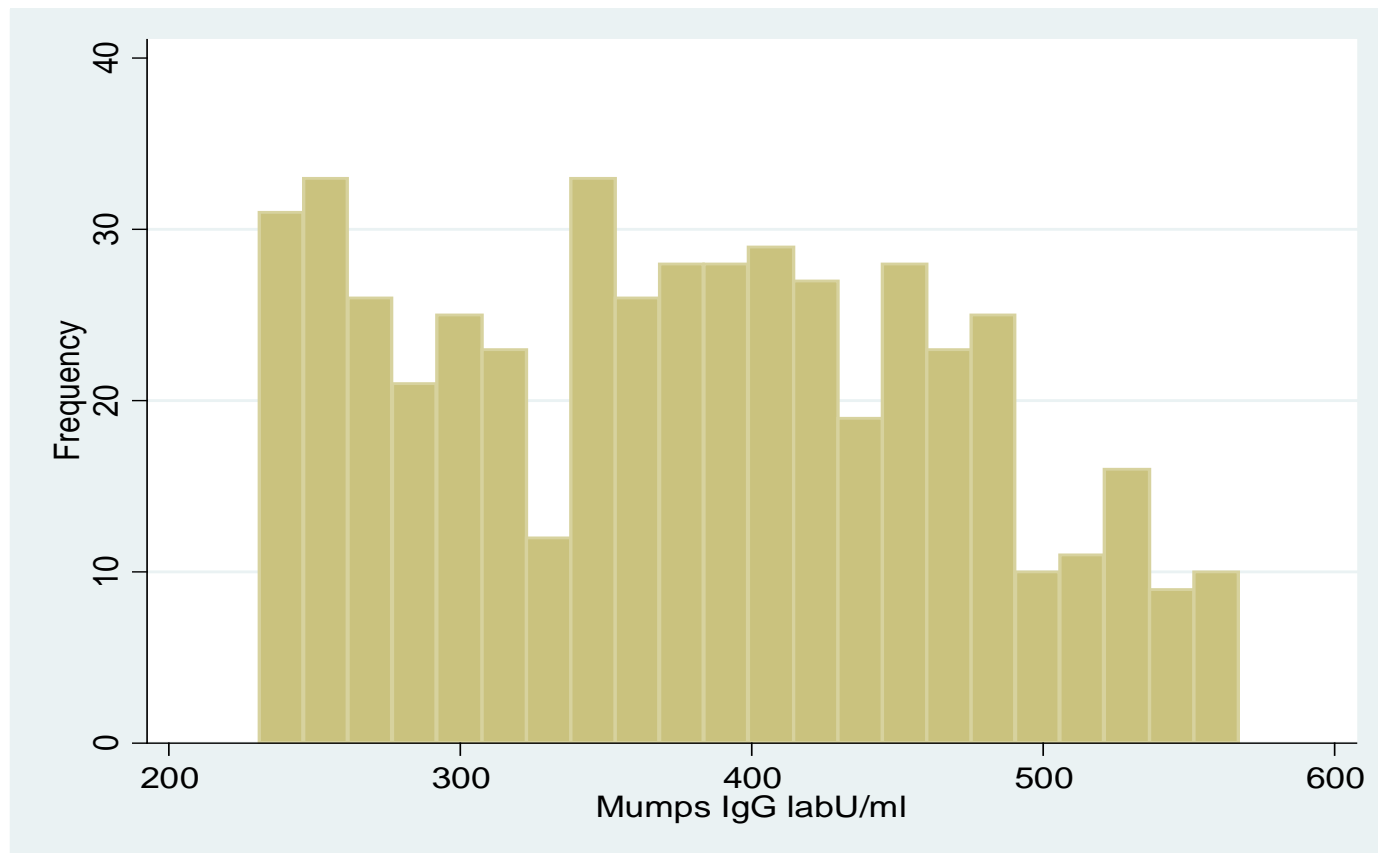
however outbreaks mainly among young adults

- More asymptomatic in younger?
- More heterogeneous social contacts in younger?
- Differences in cellular immunity?

Equivocal results

- 18% samples → 16% population
- Not associated with
 - Age, lab technician, laboratory or regions
- Treated as “not seronegative”

Titer of equivocal results



Comparison with Theeten et al, 2006

Belgium	Adjusted prevalence	
	2013-2014	2006
Seronegative	12	8.0
Equivocal	16	4.4
Seropositive	72	87.6

What happened?

- Test characteristics?
- Bigger group received vaccination smaller group has natural immunity?
- Results of waning?
- Combination?

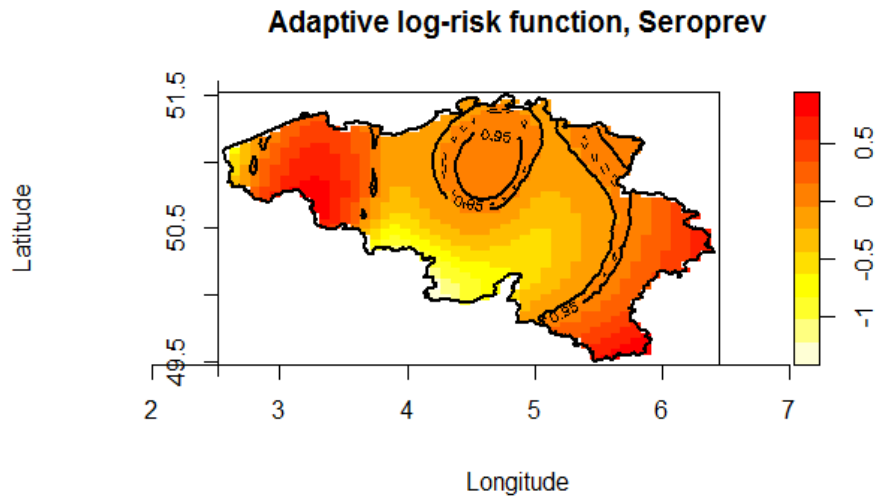
Sample collection: Aim

- May 2013-April 2014
- 4000 samples (400 back up)

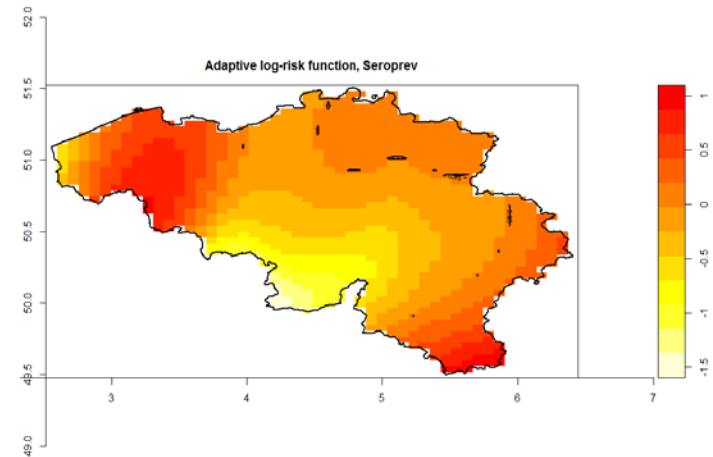
Age group	Relative number	Total number
0-19	100 +20 per year	2400
20-39	200 per 5 years	800
40-69	200 per 10 years	600
70+	200	200

Geographical representativity

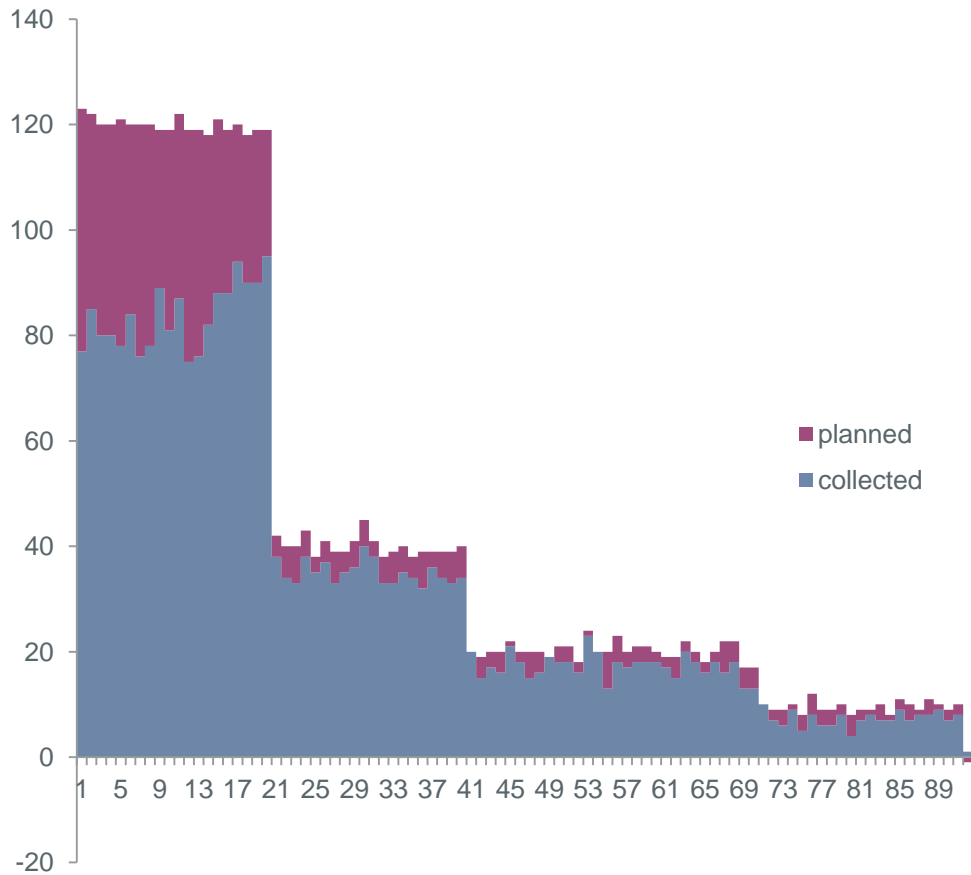
Planned situation



Current situation



Goals by age and gender



50% male
50% female