



**EPIDEMIOLOGIC SURVEILLANCE TO INFORM AND
ASSESS BELGIUM'S VACCINE POLICIES:
*STRENGTHS AND CHALLENGES***

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6 Décembre 2019

Symposium AFMPS sur les Vaccins

OUTLINE

- **Introduction: Surveillance & Vaccine Policy**
- **Epidemiologic surveillance: general principles**
- **Surveillance of Vaccine Preventable Diseases (VPD) in Belgium**
 - Data sources
 - Linking data
 - Strengths and weaknesses

Surveillance and vaccine policy

Implementation of a (new) vaccine:

- Data from epidemiological surveillance is crucial for decision-making

INTRODUCING A NEW VACCINE



Disease burden



Risk groups



Circulating serotypes



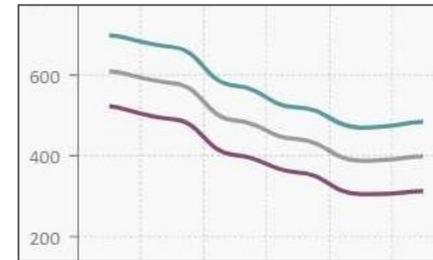
Modelling

Surveillance and vaccine policy

Surveillance of vaccine preventable diseases included within vaccine program:

- Provides important feedback
- Strengthen the program
- Refine or revise immunization policy.

VACCINES IMPLEMENTED



Intended effect?



Gaps in program?



New trends?
Serotype replacement
Change in age groups

Surveillance and vaccine policy

Other

- Elimination/eradication initiatives (Polio, Measles, Rubella)
 - Require intensive surveillance and investigation around each new suspected case
- Can answer research questions not answered in pre-marketing studies
 - Herd effect, vaccine effectiveness of various schedules, duration of protection etc
- Prioritization in vaccine policy, sustain awareness (immunization investments, public)
- International surveillance

Epidemiologic surveillance: principles

Passive surveillance



Routine data collection

Misclassification, underreporting, lack of timeliness, less expensive

Active surveillance



Searching actively for cases

Accurate, complete, expensive

Exhaustive surveillance

ALL

Involves all health care providers, with the aim of identifying all cases for rare or severe diseases

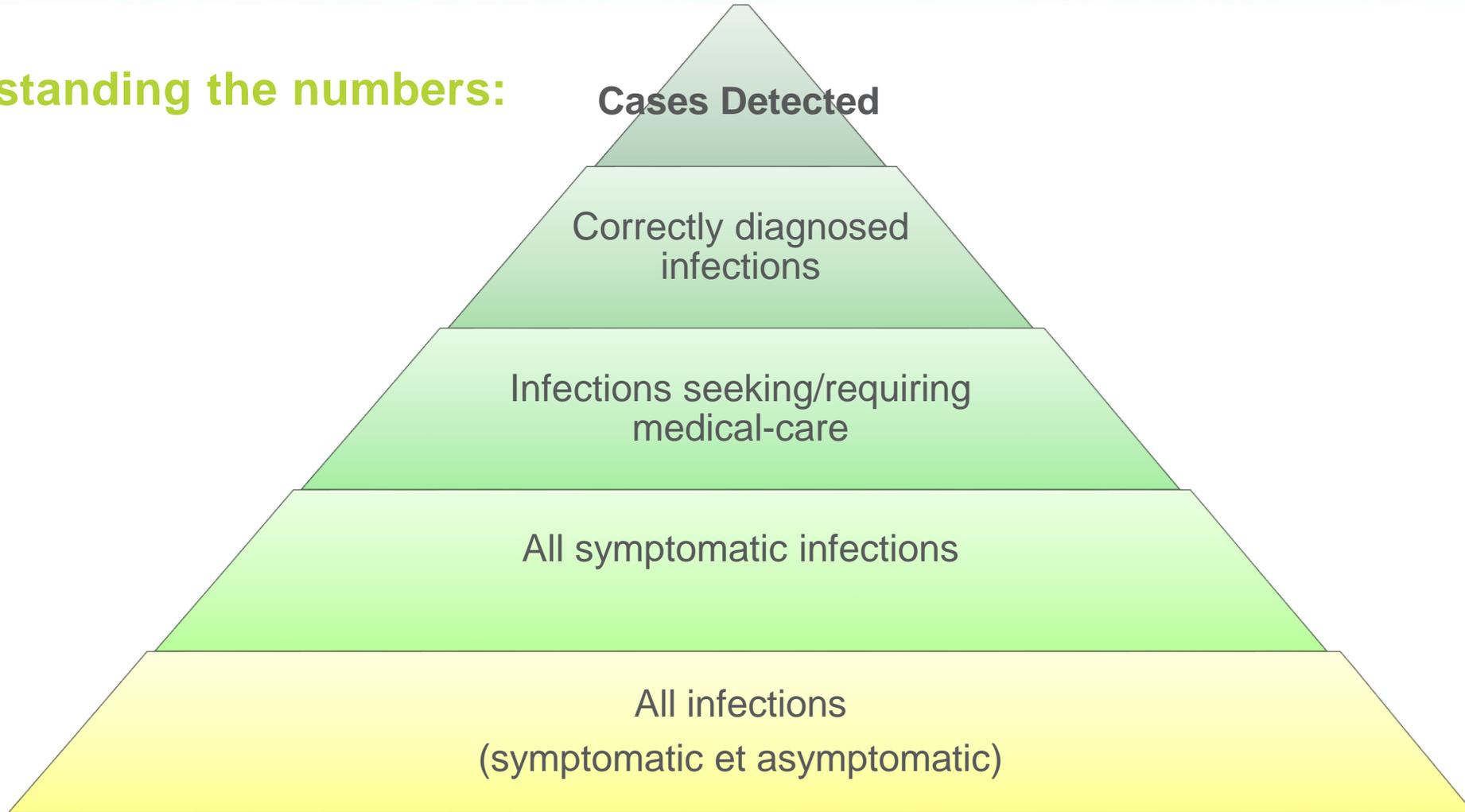
Sentinel surveillance



Involves a selection of care providers for frequent or less severe diseases

Epidemiologic surveillance: principles

- **Understanding the numbers:**



Epidemiologic surveillance: principles

Case Definitions:

- Set of uniform criteria
- To define a disease for PH surveillance
- To classify cases consistently
- Allow comparative analyses

*Not intended to be used for making
a clinical diagnosis!*

3.27. MEASLES

Clinical Criteria

Any person with fever

AND

— Maculo-papular rash

AND at least one of the following *three*:

— Cough

— Coryza

— Conjunctivitis

Laboratory Criteria

At least one of the following *four*:

— Isolation of measles virus from a clinical specimen

— Detection of measles virus nucleic acid in a clinical specimen

— Measles virus specific antibody response characteristic for acute infection in serum or saliva

— Detection of measles virus antigen by DFA in a clinical specimen using measles specific monoclonal antibodies

Laboratory results need to be interpreted according to the vaccination status. If recently vaccinated, investigate for wild virus

Epidemiological criteria

An epidemiological link by human to human transmission

Case Classification

A. Possible case

Any person meeting the clinical criteria

B. Probable case

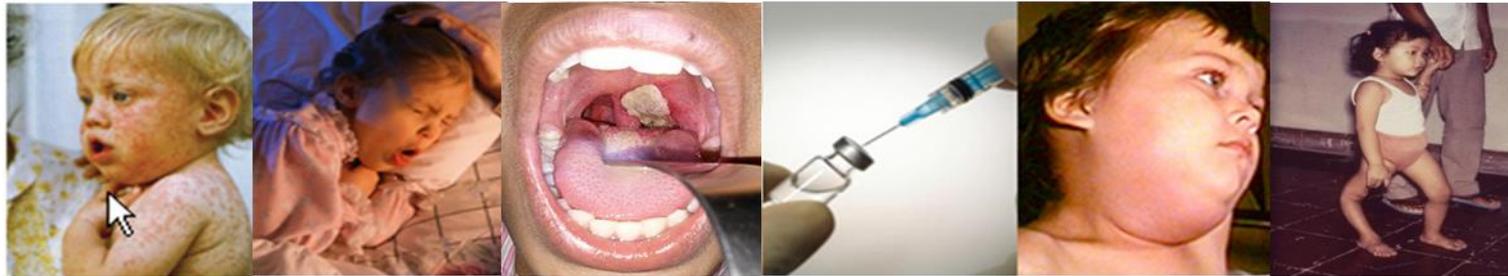
Any person meeting the clinical criteria with an epidemiological link

C. Confirmed case

Any person not recently vaccinated and meeting the clinical and the laboratory criteria

Surveillance of Vaccine preventable disease in Belgium

Epidemiology of Infectious Diseases
Epidemiology & Public Health
Sciensano



Measles

Pertussis

Varicella

Influenza

Mumps

Polio



Haemo.Infl

S.pneumo

Rubella

IMD

Rotavirus

Tetanus

Data sources for VPD Surveillance

Mandatory notification



Laboratory-based networks



Clinician and hospital-based
networks



Registers



Data sources:

1. Mandatory notification

- **Objective** : Health alert
→ implementation of specific preventive measures to prevent the spread of disease
- **Also used** for epidemiological surveillance purposes → notifiable diseases to be monitored over time
- **Legal obligation**
→ to be reported by person treating the disease &/or the laboratory that has detected/confirmed a case
- **Competence of the federated entities**, coordinated by AViQ, COCOM, Agentschap Zorg & Gezondheid

Data sources:

1. Mandatory notification

MANDATORY

Mandatory Notifiable VPD in Belgium

1. WHOOPING COUGH
2. DIPHTHERIA (*Corynebacterium tox+*)
3. HEPATITIS B (Bxl, Flanders)
4. INVASIVE *H. INFLUENZAE* (type B in Wallonia/Flanders, all types Bxl)
5. MENINGOCOCCAL, invasive disease
6. POLIO
7. MEASLES
8. RUBELLA (Bxl, only congenital rubella in Wallonia)
9. MUMPS (Bxl, clusters)

NOT

VPD without mandatory notification

1. PNEUMOCOCCAL, invasive disease
 2. INFLUENZA
 3. HPV
 4. ROTAVIRUS
 5. TETANUS
-

Data sources:

1. Mandatory notification



High sensitivity for certain diseases
Case-finding around case
Collaboration with NRCs
Timely

EX. Invasive Meningococcal Disease (2017):

- Based on mandatory notification: **112** cases declared
- Based on Hospital records (minimal hosp. data) **111** hospital-stays



Not sensitive for certain diseases
Lack of awareness (someone else will do it)
Variations between regions

Ex. Acute Flaccid Paralysis in <15 y olds (2017): (surveillance of Polio)

- Based on mandatory notification: **4** cases
- Based on Hospital records (Guillain barré Sd): **30 - 40** cases



Data sources:

2. Laboratory-based networks

1. Sentinel laboratory network (= laboratoires vigies, epilabo, peillaboratoria, labo sentinelles, labnet, sentinel labs):

- Since 1983, Group of laboratories, participating on voluntary basis
- Report on various infectious diseases - Demographic, geographical and microbiological data
- 43 pathogens: <https://nrchm.wiv-isp.be/fr/labovigies/germes/default.aspx>
- The coverage of this network varies according to the pathogen, 59 % of microbiologie labs



Longitudinal → Trends

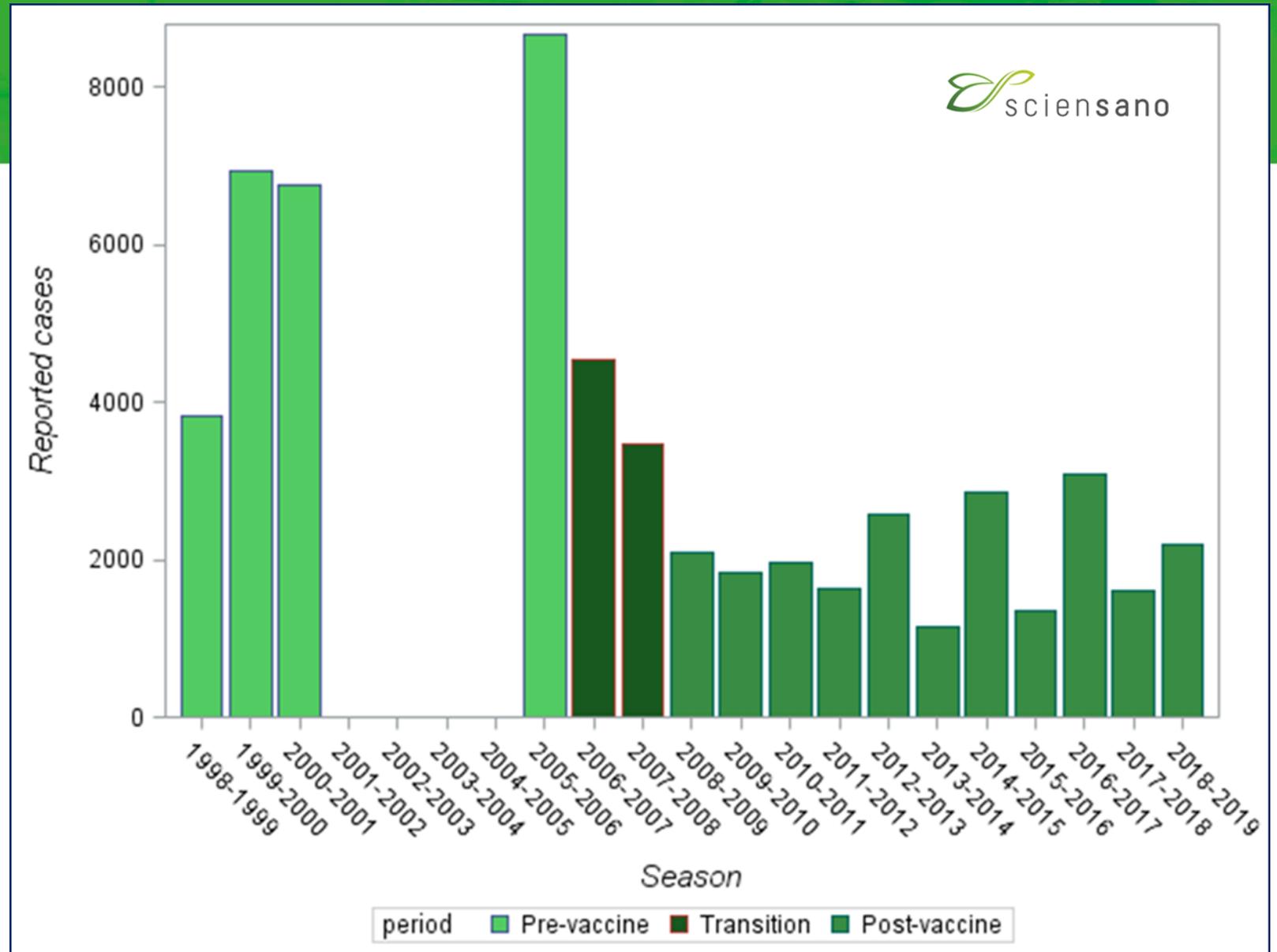


No clinical data, no vaccine status

LAB-based surveillance

Rotavirus

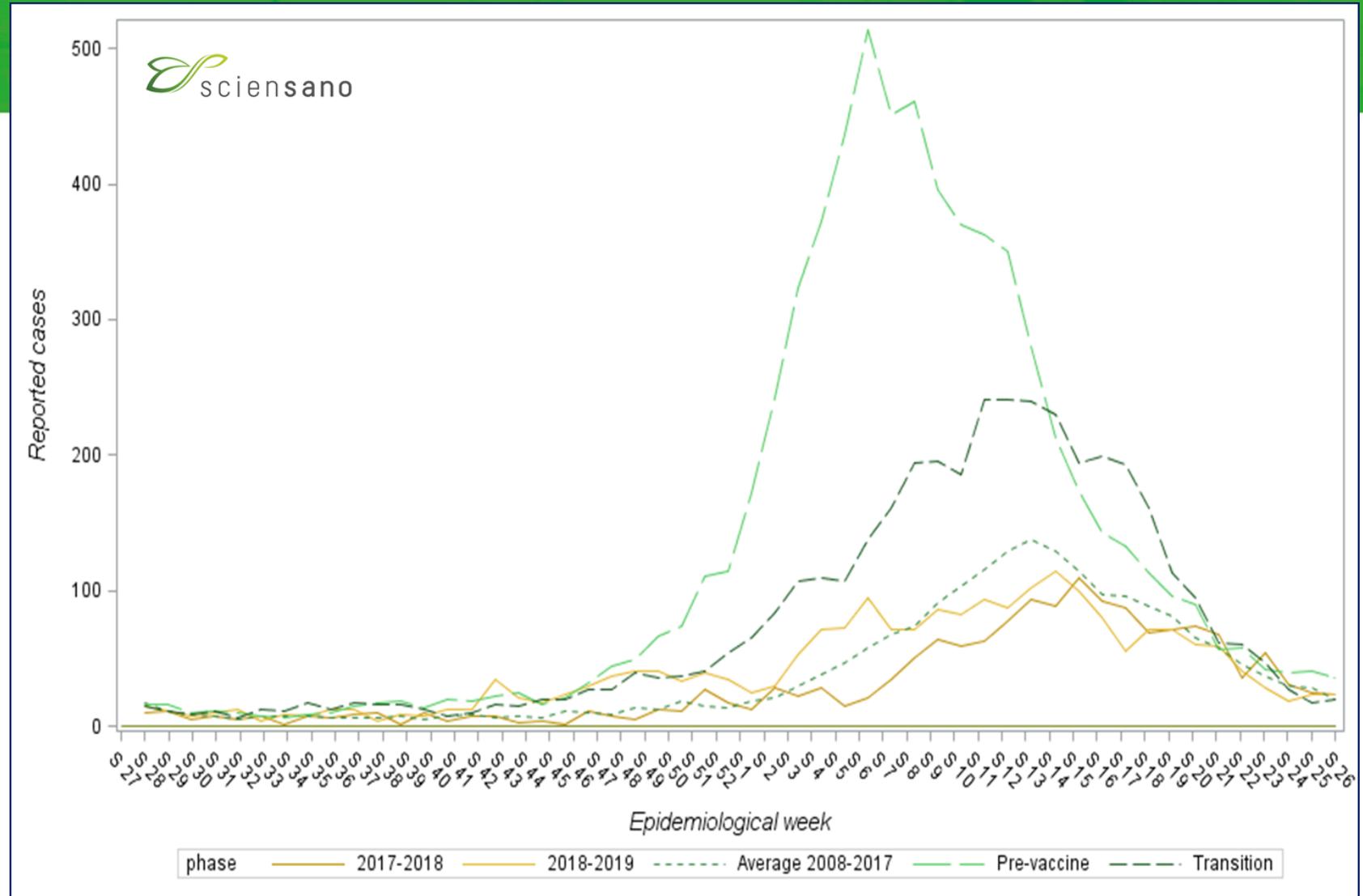
Source : sentinel lab



LAB-based surveillance

Rotavirus

Source : sentinel lab



Data sources:

2. Laboratory-based networks

2. National Reference Centre Project:

- Created in 2011
 - Their missions are multiple, including contributing to epidemiological research and public health
 - Specialized in the diagnosis of a particular germ
- confirmation of the diagnosis, strain typing (vaccine covered strains), antibiotic resistance, NGS...



Microbiological expertise (Serotyping, Vaccine covered strains, NGS etc)

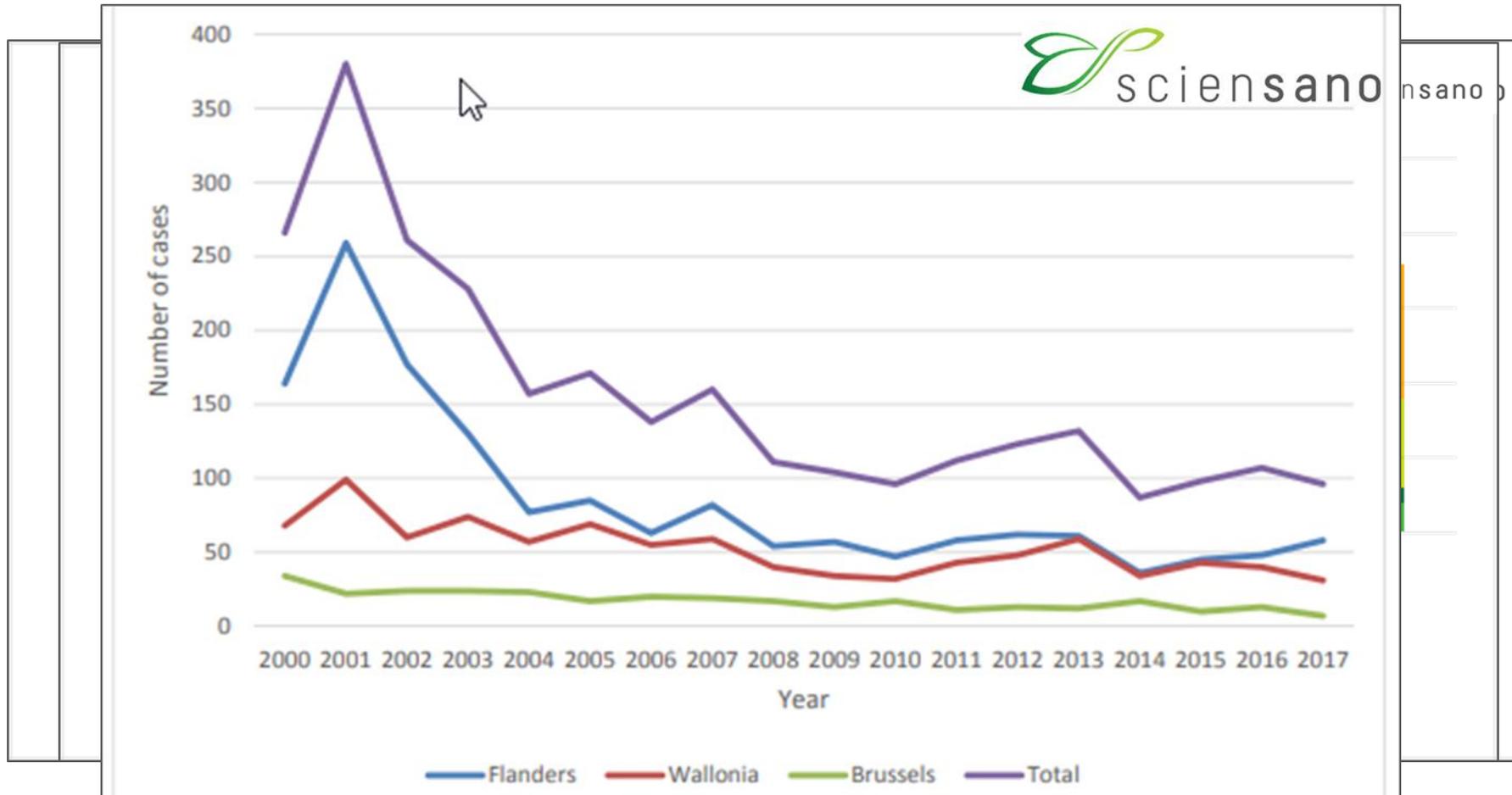


Clinical data (vaccination status) not always available



Data sources: 2. Laboratory-based networks

National Reference Center for *N. meningitidis* (Sciensano): N° of confirmed cases of invasive meningococcal disease



LAB-based surveillance

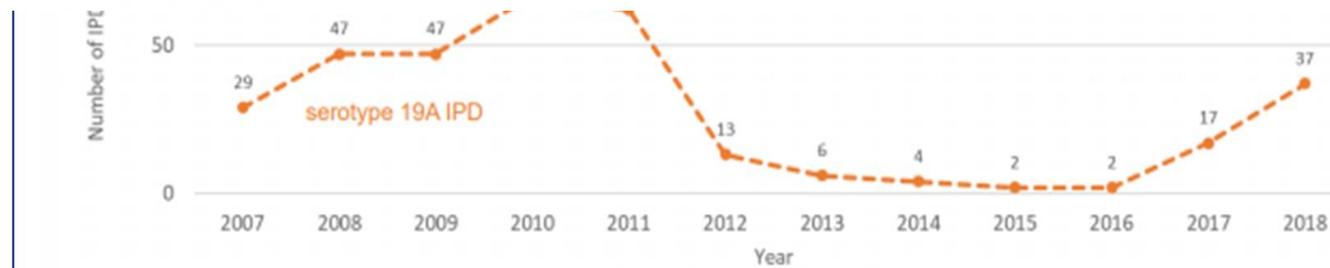
IPD children < 2 years old



Actualité ► Conseil Supérieur de la Santé ► Avis 9519 - Vaccination contre le pneumocoque enfants



Avis 9519 - Vaccination contre le pneumocoque enfants



8

Data sources:

3. Clinician & hospital-based networks



1. PediSurv:

- +/- 380 pediatricians from all over Belgium and general practitioners from Brussels
- Report on 6 diseases, including 5 VPD: AFP (polio), Mumps, Measles, Congenital Rubella Sd, IPD
- Monthly reminder emails to report CASES or NO CASES



Active surveillance, Zero-cases, Clinical data



Transfer to E-platform → linking data, loss in participation

Data sources:

3. Clinician & hospital-based networks

<https://www.sciensano.be/fr/surveillance-des-maladies-infectieuses-chez-les-enfants-pedisurv>

**AIDEZ-NOUS À AMÉLIORER
LA SURVEILLANCE
DES MALADIES
INFECTIEUSES
PÉDIATRIQUES !**

**ENCORE
DES QUESTIONS ?**

- › Contactez
Tine Grammens ou
Dr Chloé Wyndham-Thomas
- › pedisurv@sciensano.be
- › Tél.: 02/642 57 31
ou 02/642 57 47

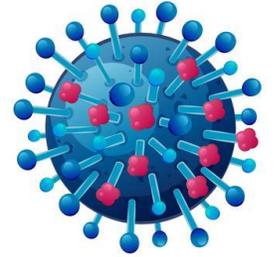
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Data sources:

3. Clinician & hospital-based networks



Influenza

2. Network of general practitioners:

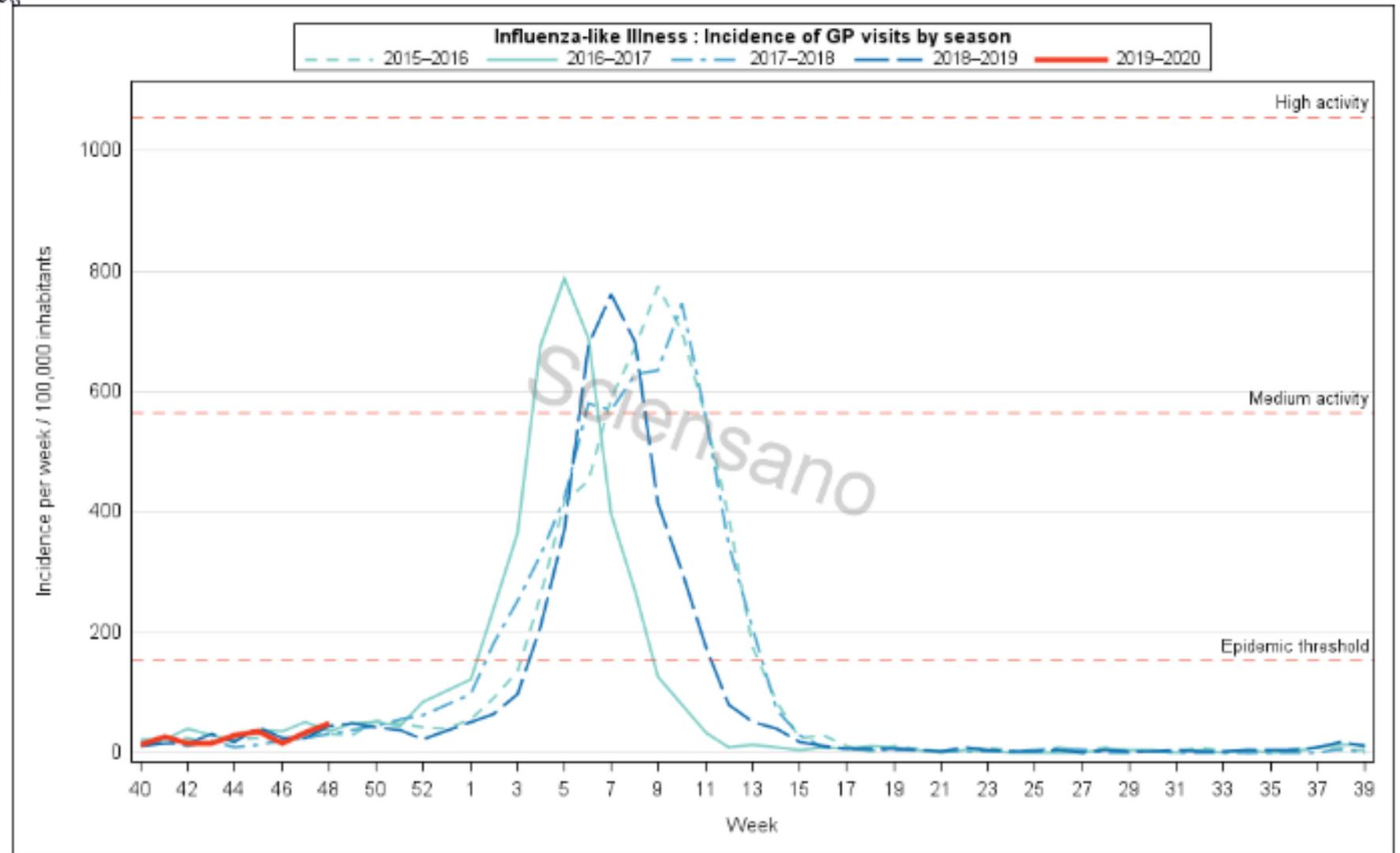
- Created 1979
- +/- about 120 general practices all over Belgium, report weekly data on 8 different health problems
- Influenza-like syndromes and acute respiratory tract infections.
- Age group, vaccination status, outcome and hospitalizations recorded.
- [NRC for Influenza](#) (Sciensano) conducts virological influenza research in a (arbitrary) subgroup

3. Network of sentinel hospitals:

- Since 2011-2012 season
- Network of six hospitals recording all episodes of severe acute respiratory infections (SARI) that occur during the period of high influenza activity. Data collection and microbiological sampling

Influenza Surveillance

Duration and intensity
Circulating viruses
Impact and severity
Antiviral resistance
Vaccine effectiveness



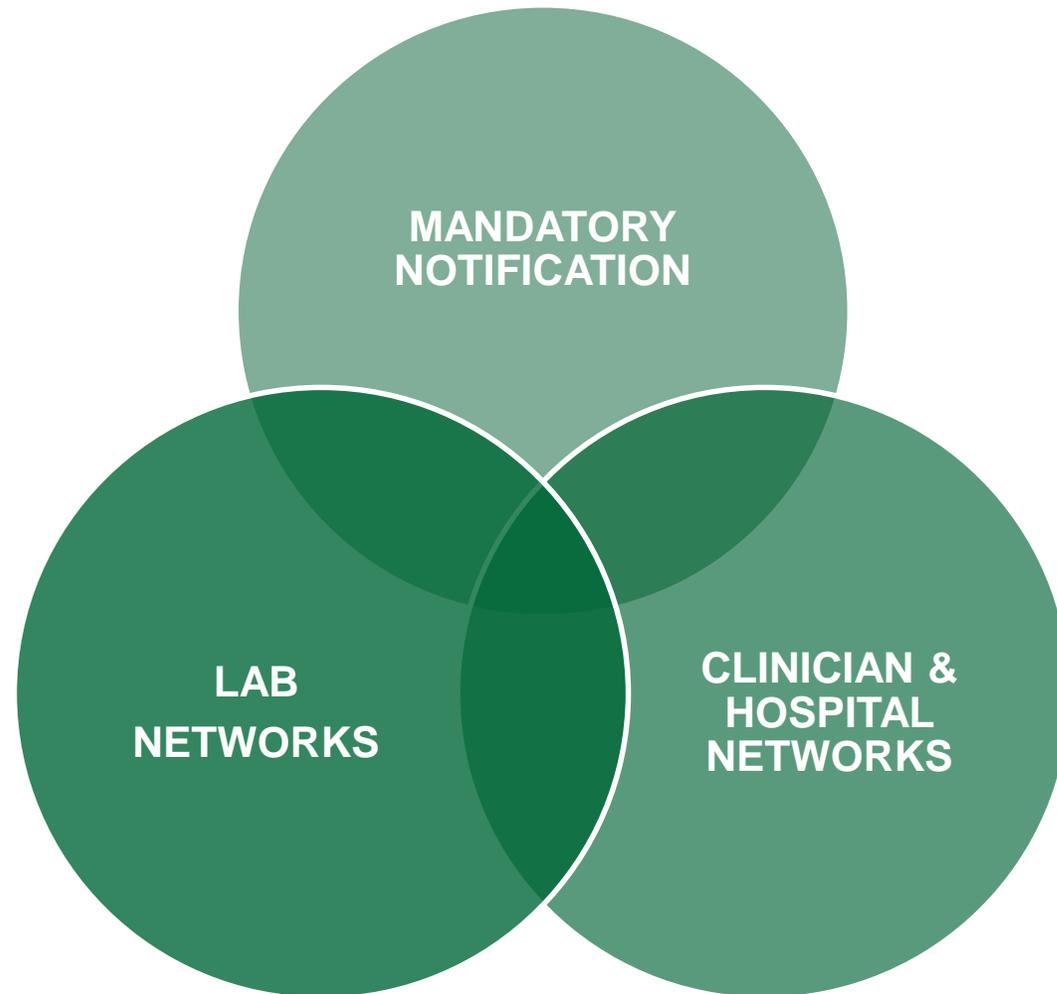
4. Data sources: Combining multiple sources

Disease	Mand.Notif	Sentinel Labs	NRC or RL	PediSurv
Pertussis	X	X	X	
Diphtheria	X		X	
Hepatitis B	X	X	X	
<i>H.influenzae</i> (invasive)	X	X	X	
<i>N. Meningitidis</i> (invasive)	X	X	X	
<i>S. Pneumoniae</i> (invasive)		X	X	X
Influenza		X	X	
Mumps		X	X	X
Polio (& AFP)	X	X	X	X
Rotavirus		X	X	
Measles	X	X	X	X
Rubella & Congenital Sd	X	X	X	X
Tetanus			X	

4. Data sources: Registers

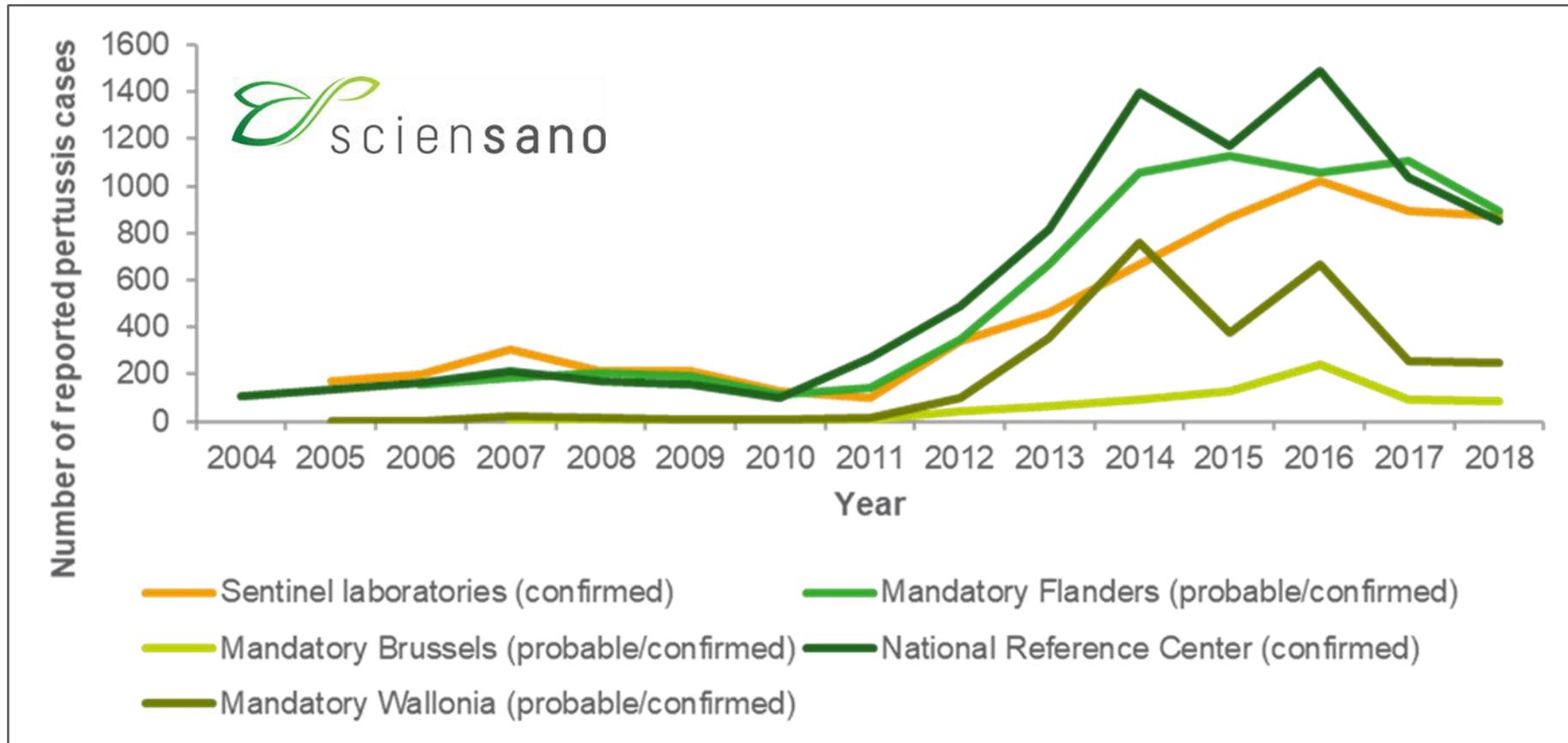
- Minimal Hospitalization Data (RHM/MZG)
- Population data (STATBEL)
- Mortality data (STATBEL, SPMA)
- INAMI data
- VACCINE registers

Data sources: Combination



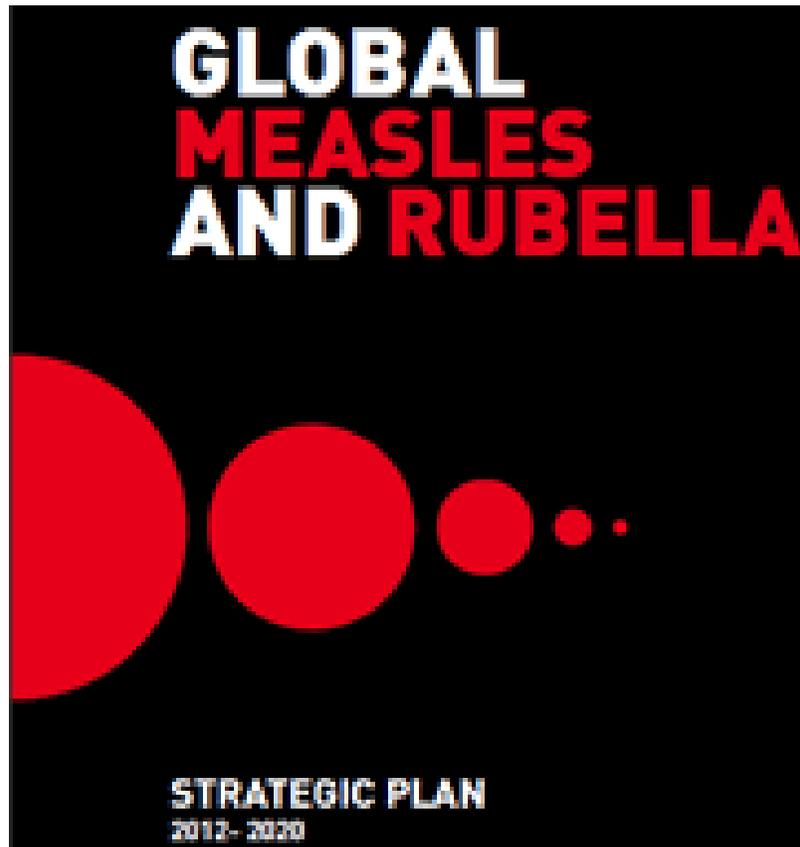
Examples

1. PERTUSSIS



Examples

2. MEASLES



- **ELIMINATION GOALS**

→ intensive surveillance and investigation around each new suspected case

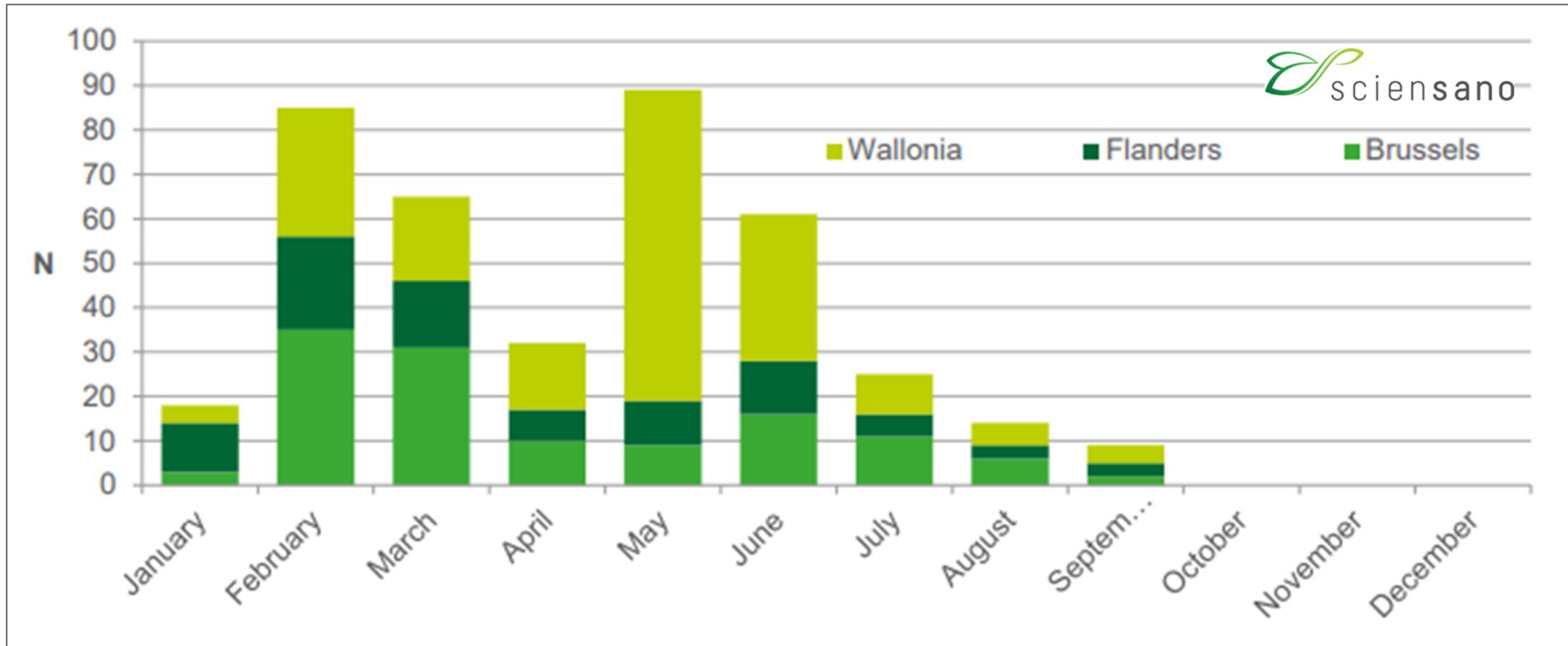
- **SOURCES OF DATA:**

- MANDATORY NOTIFICATION
- INTENSE CASE FINDING
- NRC Measles & Rubella (Sciensano)
- PediSURV

Examples

2. MEASLES

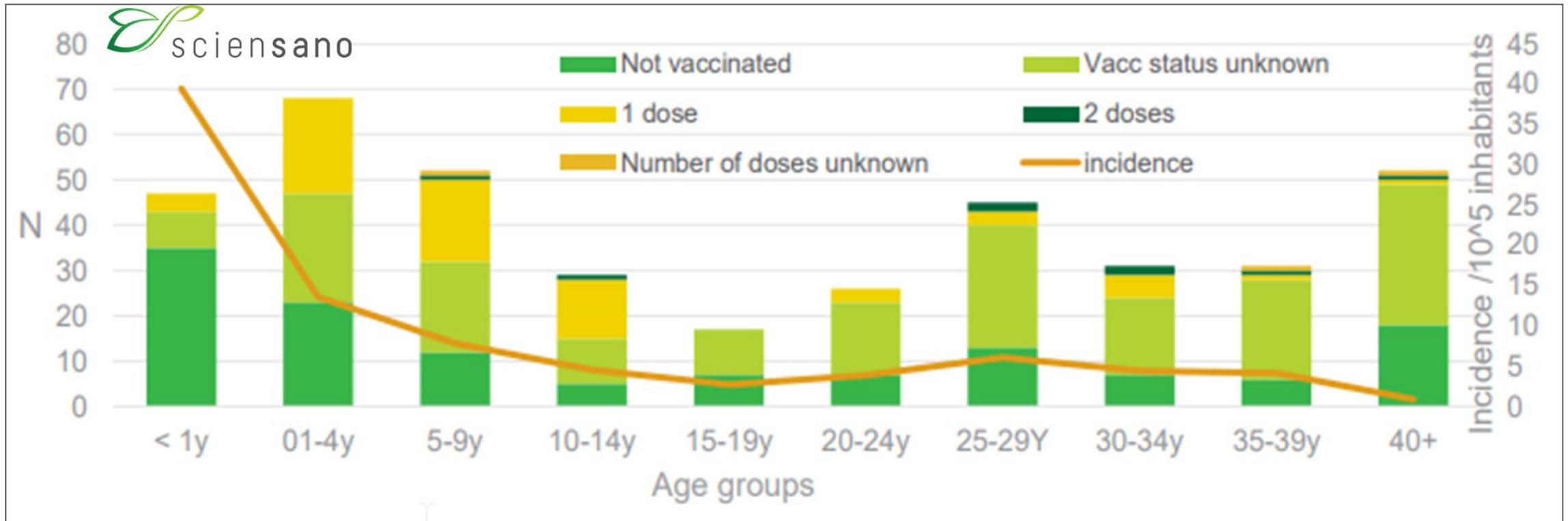
Monthly cases measles reported (01 Jan to 30 sept 2019)



N=405, **340 confirmed by NRC**

Examples

2. MEASLES

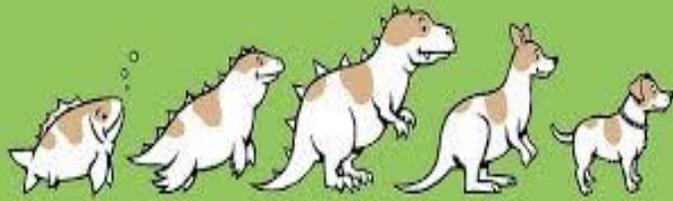


CHALLENGES



CHALLENGES

CONSTANT ADAPTATION



TIMELINESS



COMMUNICATION



LINKING DATA



VACCINATION STATUS



ALL CONCERNED



THANK-YOU

***Thank you to all clinicians, hospitals, laboratories participating in Surveillance
& colleagues of the Epidemiologie of Infectious Diseases Sciensano***

Laura Cornelissen	Measles/Rubella
Amber Litzroth	Mumps/Pertussis
Tine Grammens	<i>H.influenza</i> & PediSurv
Stéphanie Jacquinet	Invasive Meningococcal Disease
Sofieke Kramer	Hepatitis B
Toon Braeye	Invasive Pneumococcal Disease
Adrien Lajot	Rotavirus
Nathalie Bossuyt	Influenza
Chloé Wyndham-Thomas	Polio, Diphtheria, Tetanus chloe.wyndham-thomas@sciensano.be

MONTHLY “FLASH”: **<https://epidemiologie.wiv-isp.be/ID/Pages/flashes.aspx>**