



# Estimating HIV incidence and the undiagnosed HIV population in the European Union/European Economic Area

Ard van Sighem, Anastasia Pharris, Chantal Quinten, Teymur Noori, Andrew Amato-Gauci, and the ECDC HIV/AIDS Surveillance and Dublin Declaration Networks

NCHIV 2017, Amsterdam, 21 November 2017

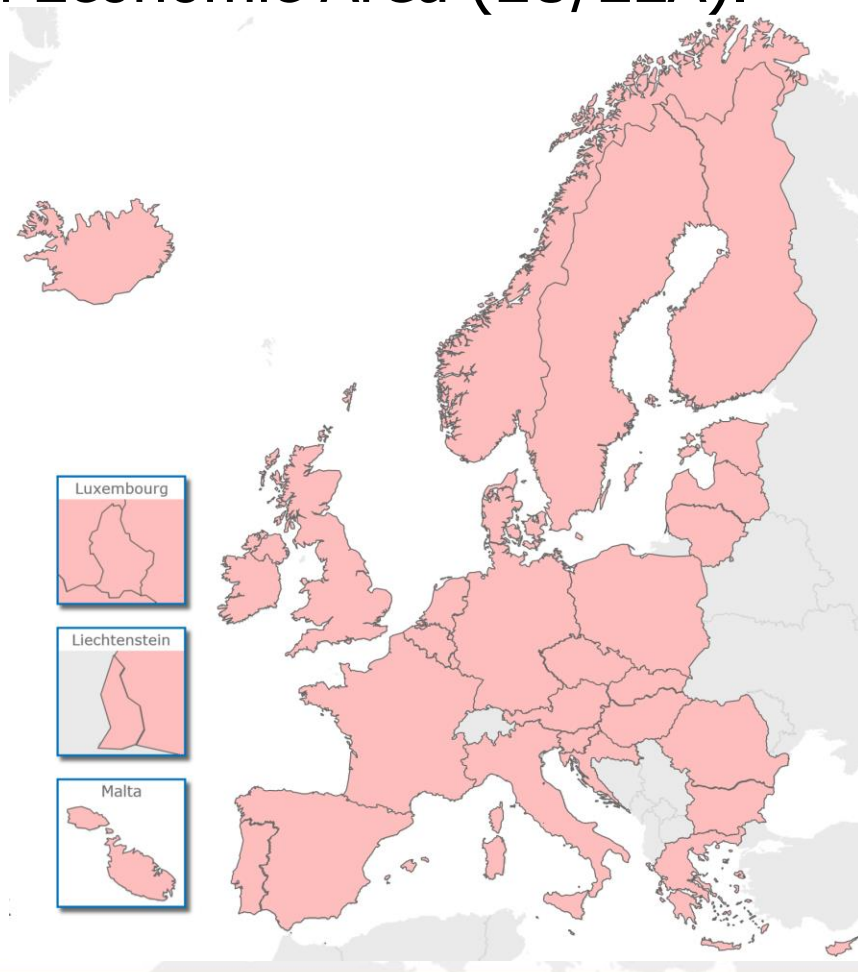
# Disclosures

Grants/honoraria paid to my institution from

- European Centre for Disease Prevention and Control
- WHO
- Gilead Sciences
- Janssen-Cilag
- Viiv Healthcare
- Dutch Ministry of Health, Welfare and Sport through the Centre for Infectious Disease Control of the National Institute for Public Health and the Environment

# Introduction

- Each year, ca. 30,000 people are newly diagnosed with HIV in the European Union/European Economic Area (EU/EEA).
- 122,000 people living with HIV (PLHIV) estimated to be undiagnosed in 2015, or 15% of all PLHIV<sup>1</sup>.
- Aim: estimate number undiagnosed by sub-region and stratified by CD4 cell count.



<sup>1</sup>Pharris *et al*, Euro Surveill. 2016

# TESSy HIV/AIDS



- Joint database for reporting HIV and AIDS within The European Surveillance System (TESSy).
- Coordinated by the European Centre for Disease Prevention and Control (ECDC) and WHO Regional Office for Europe.
- Data on HIV and AIDS diagnoses from all 53 countries in the European Region.
- Data collection is focussed on:
  - surveillance of HIV and AIDS
  - monitoring of the HIV care continuum

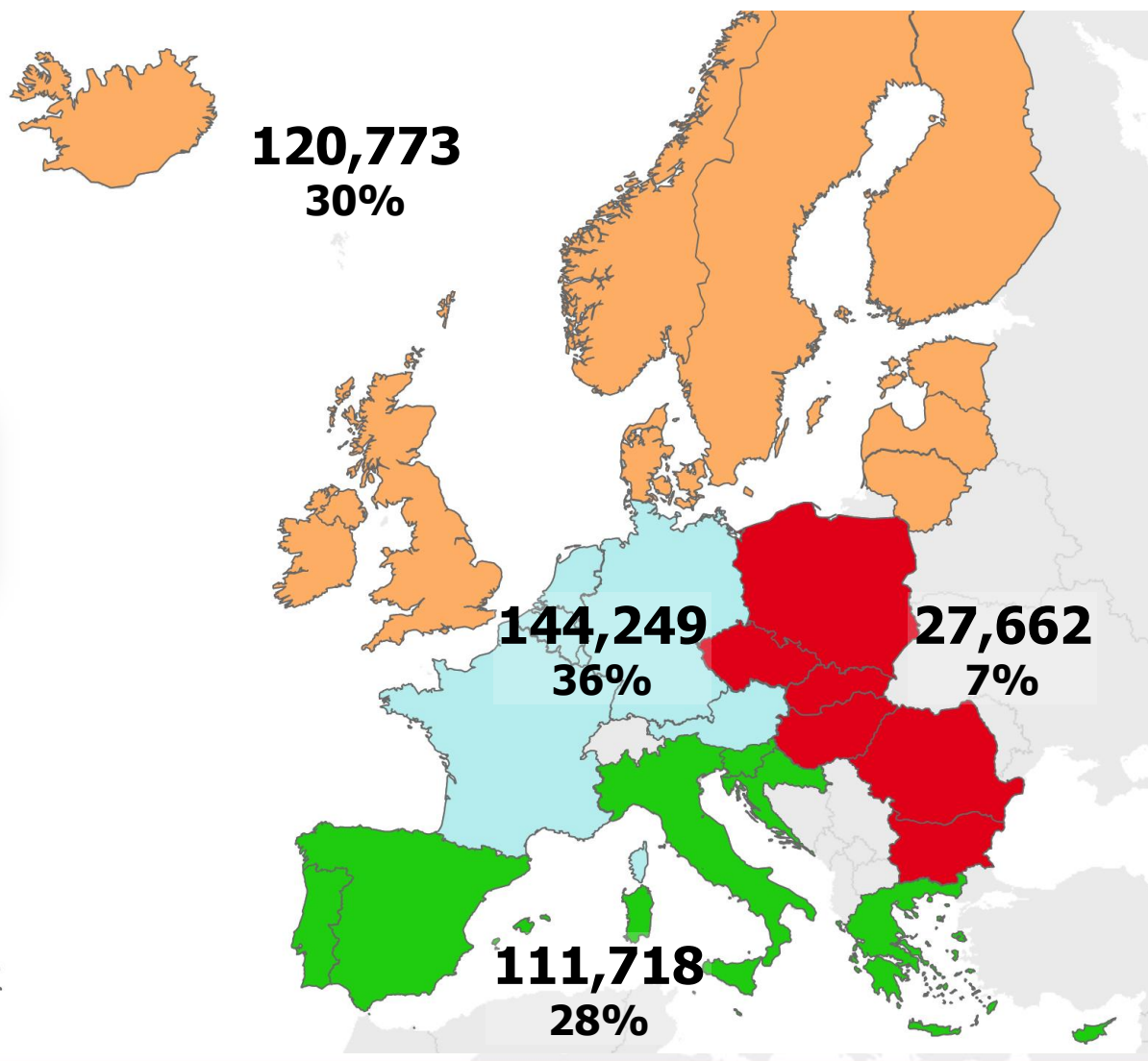
# Surveillance data

- Annual data on HIV diagnoses in 2003-2015<sup>1</sup>, stratified by:
  - presence of a concurrent AIDS diagnosis ( $\leq 3$  months)
  - CD4 cell count category at diagnosis in people with no concurrent AIDS
- Adjusted for reporting delay and underreporting.
- Countries were grouped in four sub-regions based on the definition used by United Nations<sup>2</sup>.
- Assume measured CD4 distribution to be representative of entire sub-region.

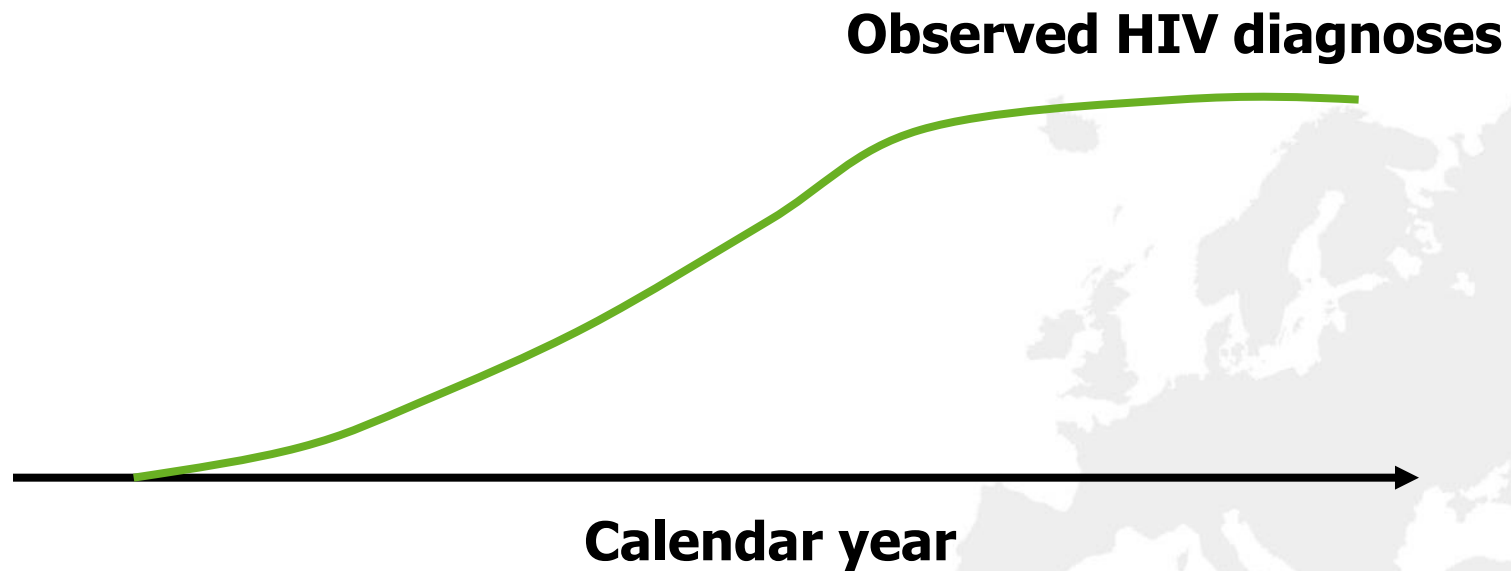
<sup>1</sup>ECDC/WHO. HIV/AIDS surveillance in Europe 2015; <sup>2</sup><https://unstats.un.org/unsd/methodology/m49/>

# HIV diagnoses 2003-2015

EU/EEA total  
404,402



# Back-calculation



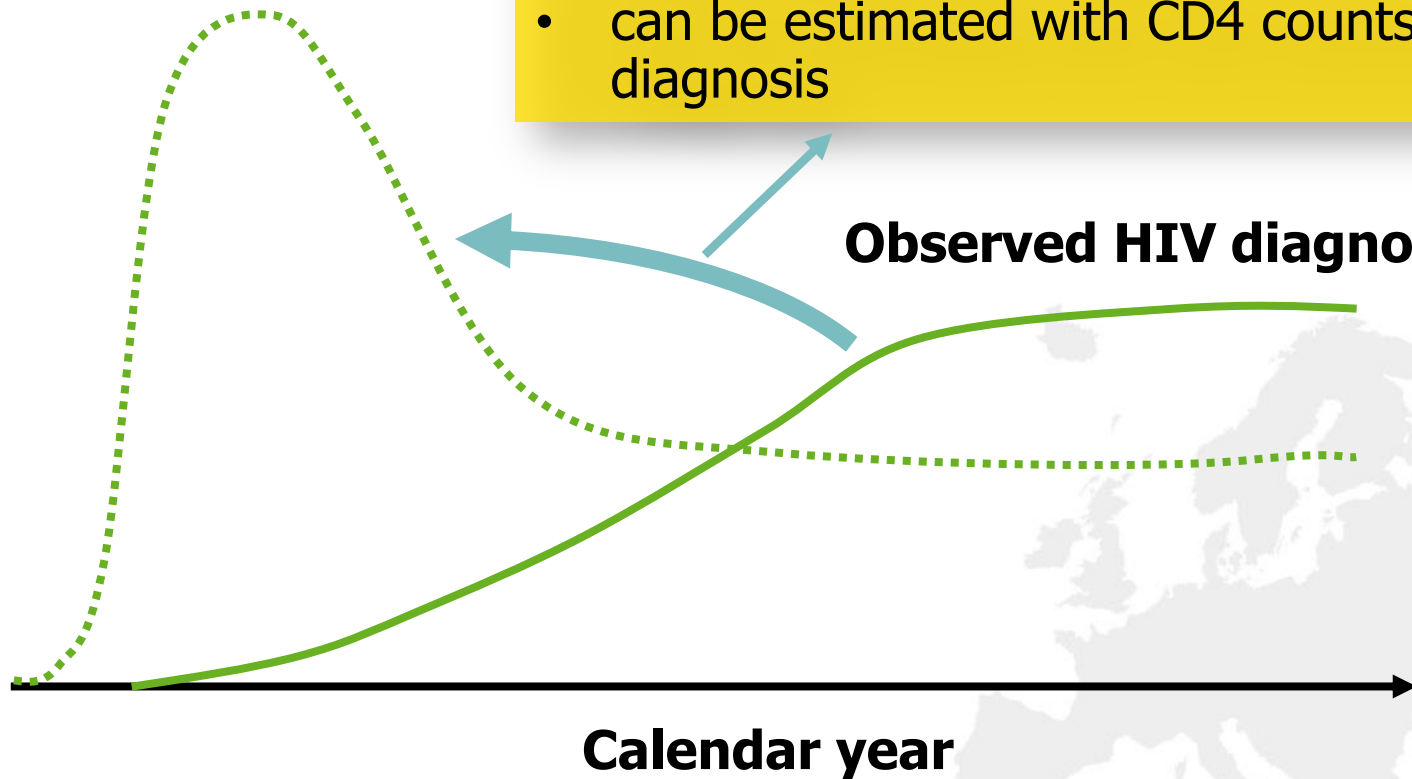
# Back-calculation

**HIV infections**

Time between infection and diagnosis

- is *a priori* unknown
- may change over calendar time
- can be estimated with CD4 counts at diagnosis

**Observed HIV diagnoses**



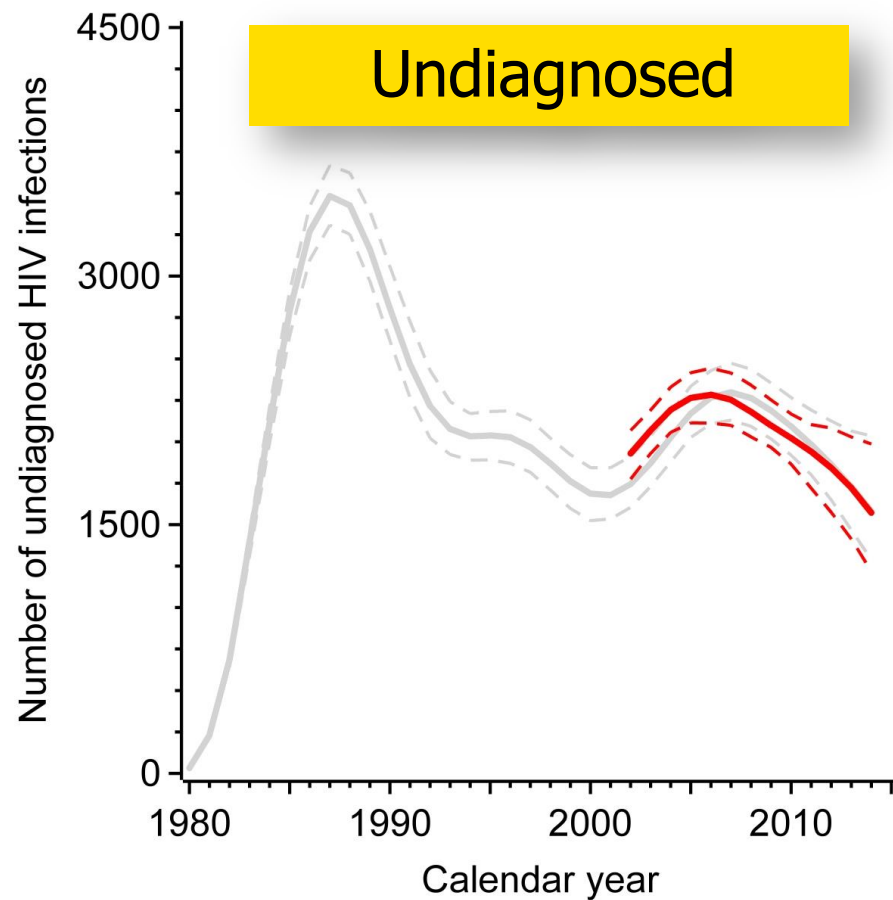
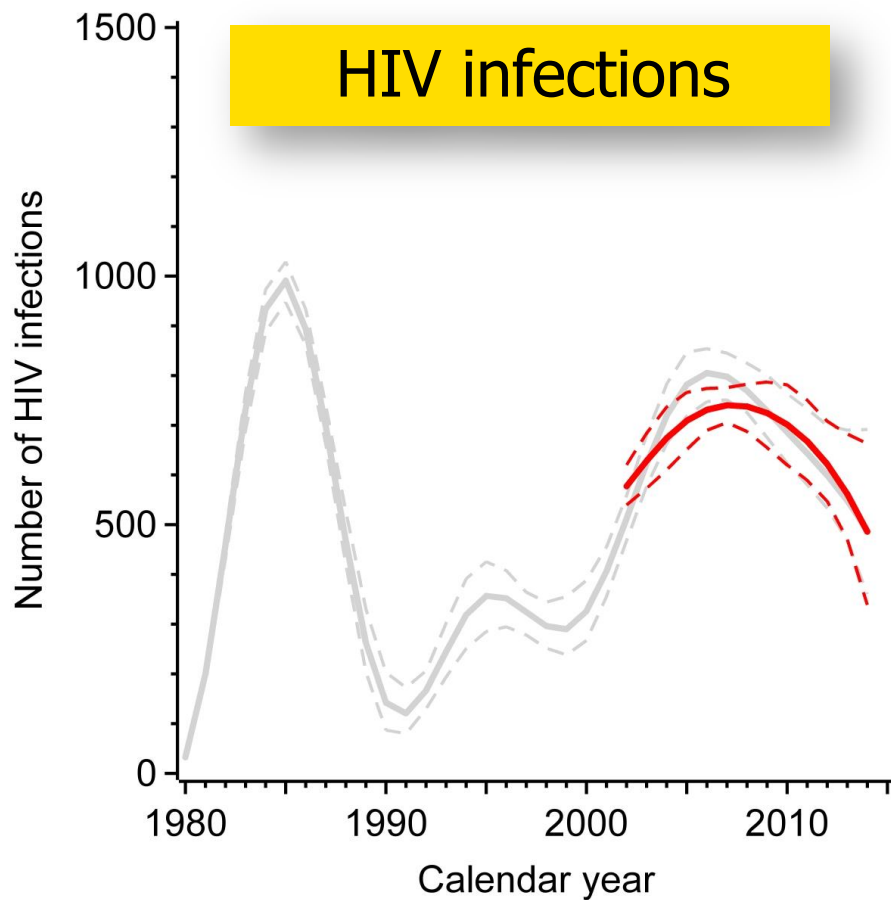


# Estimates

- Back-calculation similar to ECDC HIV Modelling Tool<sup>1</sup>:
  - annual number of newly acquired HIV infections
  - distribution of time between infection and diagnosis.
- For each calendar year of infection, we calculated the number of people still undiagnosed by the end of 2015.
- No data on HIV diagnoses before 2003:
  - small proportion of infections acquired before 2003 were still undiagnosed in 2015.
  - estimates of HIV infections and number undiagnosed only reliable for most recent calendar years.

<sup>1</sup><https://ecdc.europa.eu/en/publications-data/hiv-modelling-tool>

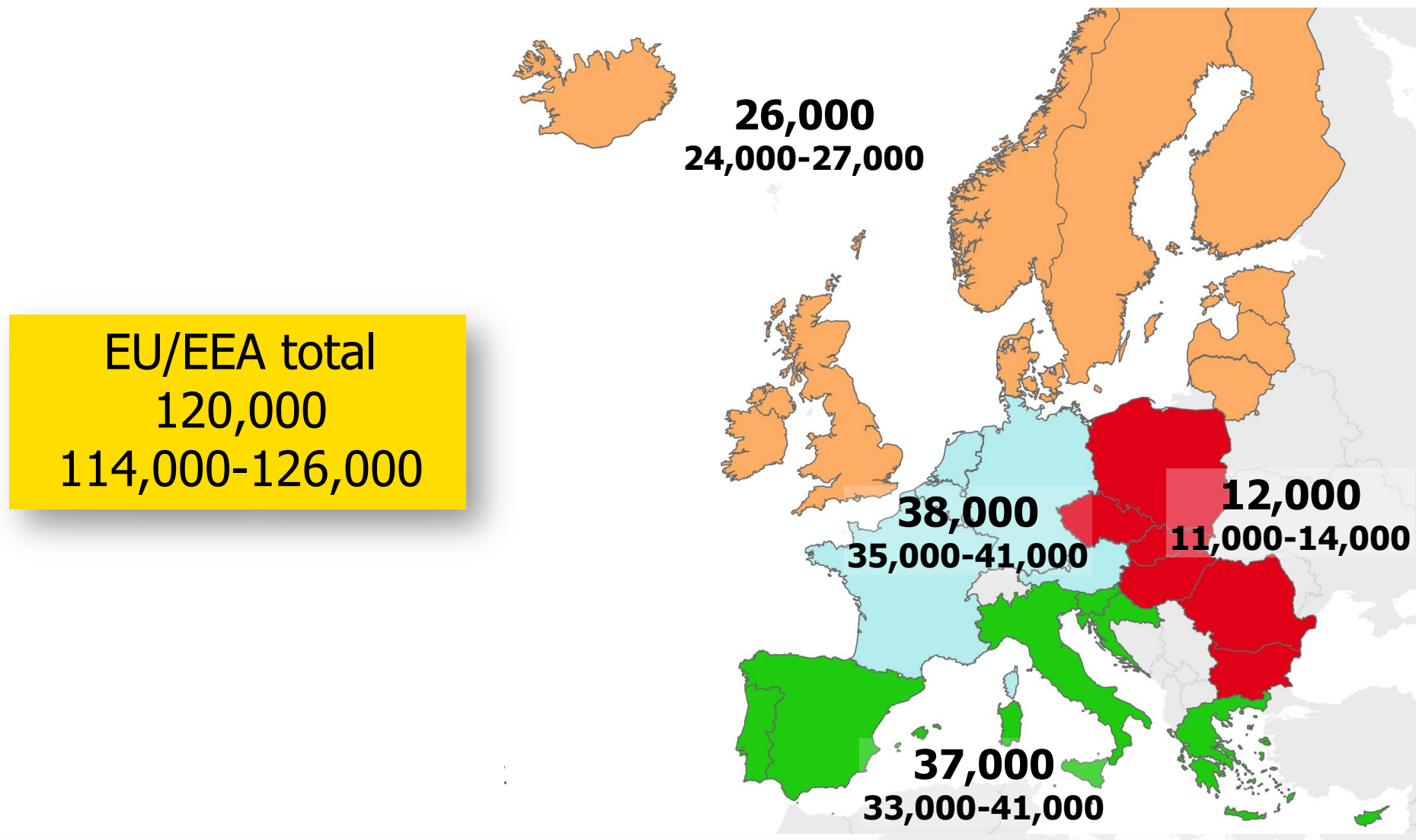
# Does it work?



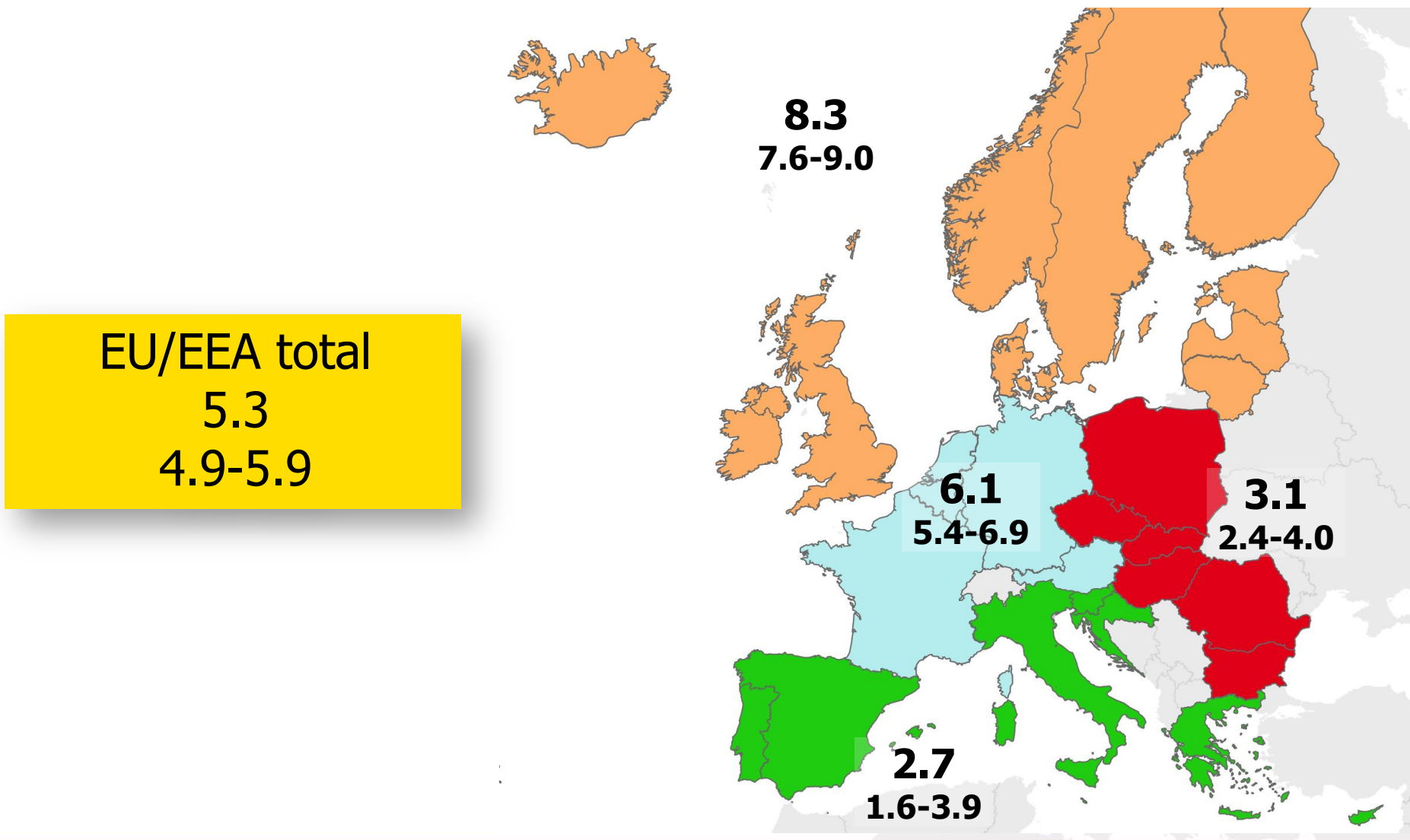
— all ATHENA data

— ATHENA data  $\geq 2002$

# People living with undiagnosed HIV 2015



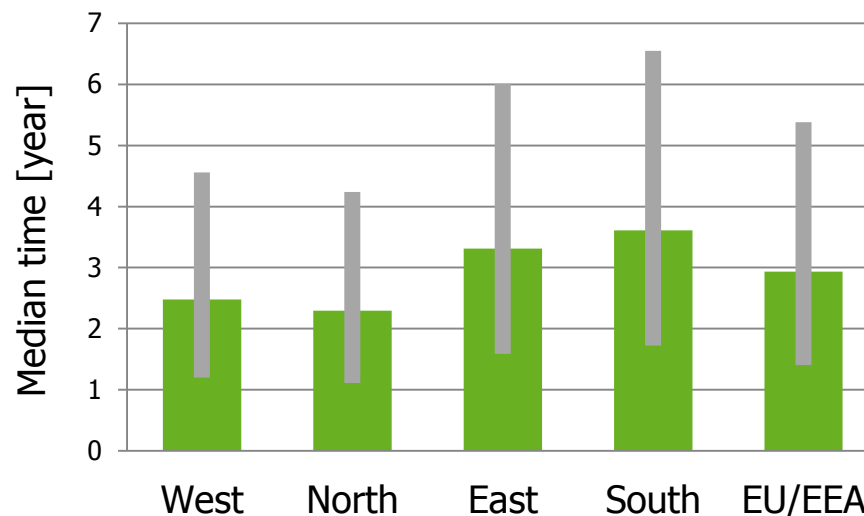
# Infection rate per 100,000 population



# Time to diagnosis and CD4 cell distribution in undiagnosed PLHIV

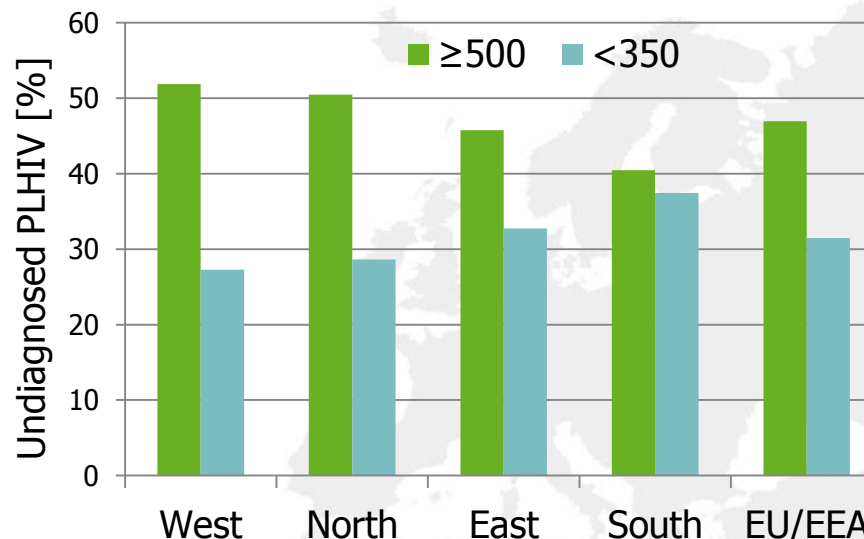
## Time to diagnosis

<b>EU/EEA</b>	
2.9 year	IQR, 1.4-5.4



## CD4 distribution

<b>EU/EEA</b>	
≥500	47%
<350	31%



# Strengths and limitations

## Strengths

- Only need routine surveillance data.
- No need for historical data.
- May be stimulus for countries to improve data collection.

## Limitations

- No estimate of total HIV epidemic: need additional data to estimate all PLHIV.
- No adjustment done for incomplete coverage (Italy, Spain).
- Adjustment for underreporting could only be done for the most recent calendar years.
- Effect of migration not accounted for.

# Conclusions

- A substantial number of people in the EU/EEA are living with undiagnosed HIV.
- Number of undiagnosed PLHIV highest in Western and Southern Europe.
- Infection rates highest in Northern Europe.
- The estimated CD4 distribution suggests that approximately half of them are in an early stage of infection.
- A significant proportion are estimated to have late stage infection, suggesting more efforts are needed to test and diagnose these people.

# Acknowledgements



## ECDC HIV/AIDS Surveillance and Dublin Declaration Monitoring Networks

Austria: Daniela Schmid, Irene Rueckerl, Robert Zangerle; Belgium: Andre Sasse, Dominique Van Beckhoven, Frédéric Denauw; Bulgaria: Tonka Varleva, Vyara Georgieva; Croatia: Tatjana Nemeth Blazic, Jasmina Pavlic, Josip Begovac; Cyprus: Maria Koliou, Linos Hadjihannas, Anna Demetriou; Czech Republic: Marek Maly, Veronika Sikolová; Denmark: Susan Cowan, Jan Fouchard; Estonia: Kristi Rüütel, Anna-Liisa Pääsukene; Finland: Kirsi Liitsola, Mika Salminen, Henrikki Brummer-Korvenkontio; France: Françoise Cazein, Josiane Pillonel, Florence Lot, Jean-Christophe Comboroure; Germany: Barbara Gunsenheimer-Bartmeyer, Matthias an der Heiden, Gesa Kupfer, Ulrich Marcus; Greece: Georgios Nikolopoulos, Dimitra Paraskeva, Vasileia Konte; Hungary: Maria Dudas, Katalin Szalay; Iceland: Haraldur Briem, Gudrun Sigmundsdottir; Ireland: Derval Igoe, Kate O'Donnell, Caroline Hurley, Fiona Lyons; Italy: Barbara Suligoj, Anna Caraglia; Latvia: Šarlote Konova; Liechtenstein: Sabine Erne; Lithuania: Irma Čaplinskienė; Luxembourg: Aurelie Fischer, Patrick Hoffmann; Malta: Jackie Maistre Melillo, Tanya Melillo; Netherlands: Eline Op de Coul, Silke David; Norway: Hans Blystad, Arild Johan Myrberg; Poland: Magdalena Rosinska, Iwona Wawer; Portugal: Kamal Mansinho, Helena Cortes Martins, Teresa Melo; Romania: Mariana Mardarescu; Slovakia: Peter Truska, Jan Mikas; Slovenia: Irena Klavs; Spain: Asuncion Diaz, Oliver Nuñez, Olivia Castillo; Sweden: Maria Axelsson, Anders Sönnernborg; United Kingdom: Peter Kirwan, Cuong Chau, Sandra Okala, Alison Brown, Valerie Delpech.