# Estimating the Size of the Undiagnosed HIV Population in the Netherlands by Disease Stage

Ard van Sighem[1], Fumiyo Nakagawa[2], Daniela Bezemer[1], Daniela De Angelis[3], Eline Op de Coul[4], Matthias Egger[5], Frank de Wolf[6], Christophe Fraser[6], Andrew Phillips[2]

[1]Stichting HIV Monitoring, Amsterdam, NL; [2]University College London, London; [3]MRC Biostatistics Unit, Cambridge, UK; [4]National Institute for Public Health and the Environment, Bilthoven, NL; [5]Institute for Social and Preventive Medicine, Bern, CH; [6]Imperial College School of Medicine, London, UK

## Background

- Previous studies showed that a large proportion of HIV-infected individuals in the Netherlands are unaware of their HIV infection[1,2].
- However, recent estimates of the size of this group are not available.
- We sought to estimate the number and proportion of undiagnosed individuals stratified by risk group and by CD4 cell count stratum.

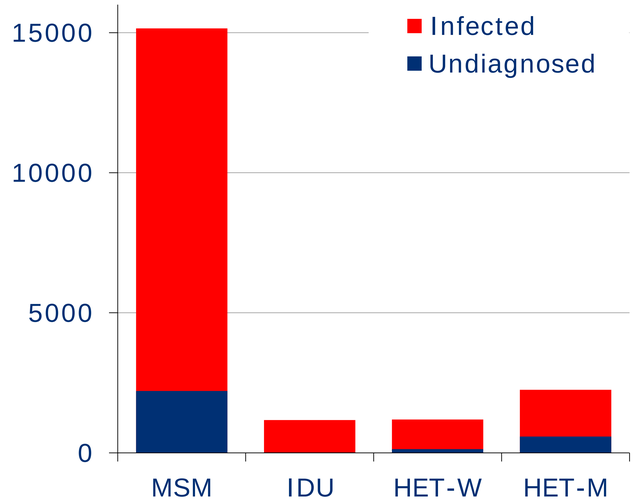
## Methods

- We used a newly developed adaptation of a back-calculation method by Sweeting *et al*[3].
- The method describes disease progression in the absence of antiretroviral treatment from infection to HIV diagnosis or onset of AIDS through stages of CD4 counts.
- Rates of progression between CD4 stages are based on data from untreated HIV-infected patients in the CASCADE collaboration[4].
- By fitting to observed data from the ATHENA national observational cohort we can simultaneously estimate
  - number of annual new HIV infections since the start of the epidemic in 1980.
  - CD4 stratum-specific diagnosis rates.
- Data items include
  - annual number of new HIV diagnoses
  - annual total number of AIDS cases
  - annual number of HIV/AIDS diagnoses
  - CD4 cell counts at diagnosis

## Results

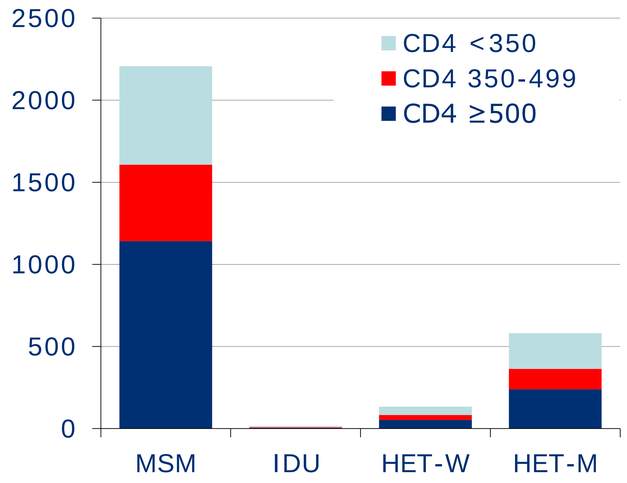
- Cumulative 19,671 infections by the end of 2011.
- In 2011 there were 767 new infections of which 642 (84%) in men who have sex with men (MSM).
- 2938 (15%) of all infections were still undiagnosed.

***Figure 1**: Cumulative number of HIV infections in the Netherlands by risk group by the end of 2011. MSM: men who have sex with men; IDU: injection drug users; HET-W: heterosexual women, Dutch origin; HET-M: heterosexual men, Dutch origin.*




| | MSM | IDU | HET-W | HET-M |
|---|---|---|---|---|
| Infected | 15152 | 1170 | 1189 | 2250 |
| Undiagnosed | 2207 | 16 | 134 | 581 |
| | 15% | 1% | 11% | 26% |

***Figure 2**: Total number of HIV infections still undiagnosed by the end of 2011 stratified by CD4 count. MSM: men who have sex with men; IDU: injection drug users; HET-W: heterosexual women, Dutch origin; HET-M: heterosexual men, Dutch origin.*




| CD4 | MSM N | MSM % | IDU N | IDU % | HET-W N | HET-W % | HET-M N | HET-M % |
|---|---|---|---|---|---|---|---|---|
| ≥500 | 1142 | 52 | 4 | 28 | 53 | 40 | 240 | 41 |
| 350-499 | 465 | 21 | 4 | 28 | 30 | 22 | 124 | 21 |
| <350 | 600 | 27 | 8 | 51 | 51 | 38 | 217 | 37 |

## Conclusions

- Although MSM form the largest group of HIV-infected individuals unaware of their infection, the estimated CD4 distribution suggests that approximately half of them are in an early stage of infection and have been infected only recently.
- Approximately 30% of the undiagnosed individuals are already in immediate need of treatment.
- This proportion is even higher in groups other than MSM although absolute numbers of undiagnosed individuals in these groups are much smaller.

## References

[1]Bezemer *et al*, *Epidemics* 2010, 2:66-79.
[2]Van Veen *et al*, *AIDS* 2011: 25:229-237.
[3]Sweeting *et al*, *Stat Med* 2005, 24:3991-4007.
[4]Lodi *et al*, *CID* 2011, 53:817-825.

## Contact

Ard van Sighem
Stichting HIV Monitoring
E: a.i.vansighem@amc.uva.nl
T: +31205666781
www.hiv-monitoring.nl