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Impact of the bias of three Demographic and Health Surveys (DHS) in Africa on estimated national HIV prevalence

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Context

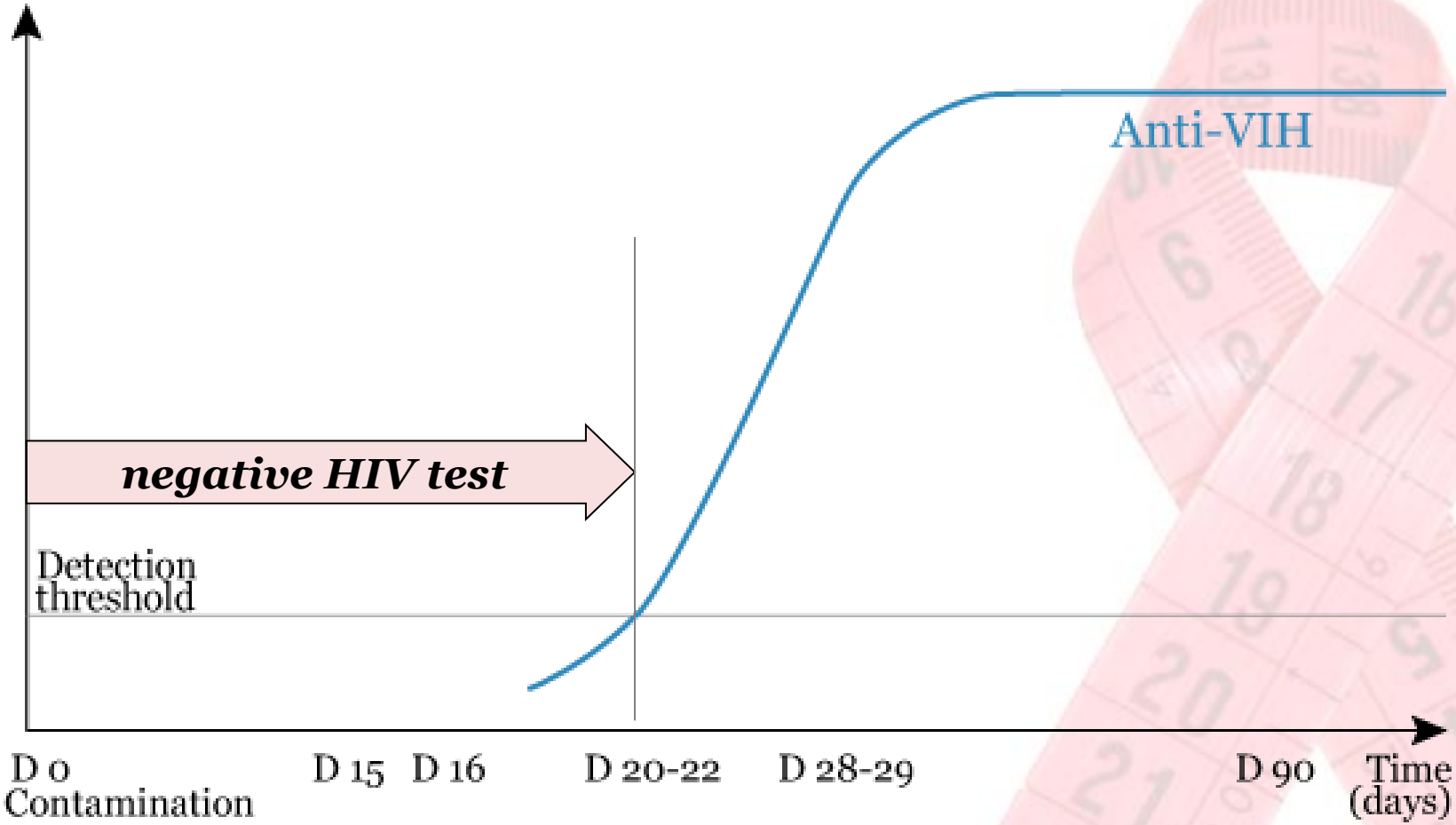
- Since 2001, several Demographic and Health Surveys (DHS) have include HIV tests.
- In some countries, results diverged with estimation based on antenatal clinics surveillance.
- Refusal rates in DHS were often cited to explain this differences.

Objective and Method

- Exploring several sources of bias in 3 DHS:
  - Burkina Faso 2003
  - Cameroon 2004
  - Kenya 2003
- Estimating adjusted HIV prevalence.
- Comparing adjusted prevalence with observed prevalence.

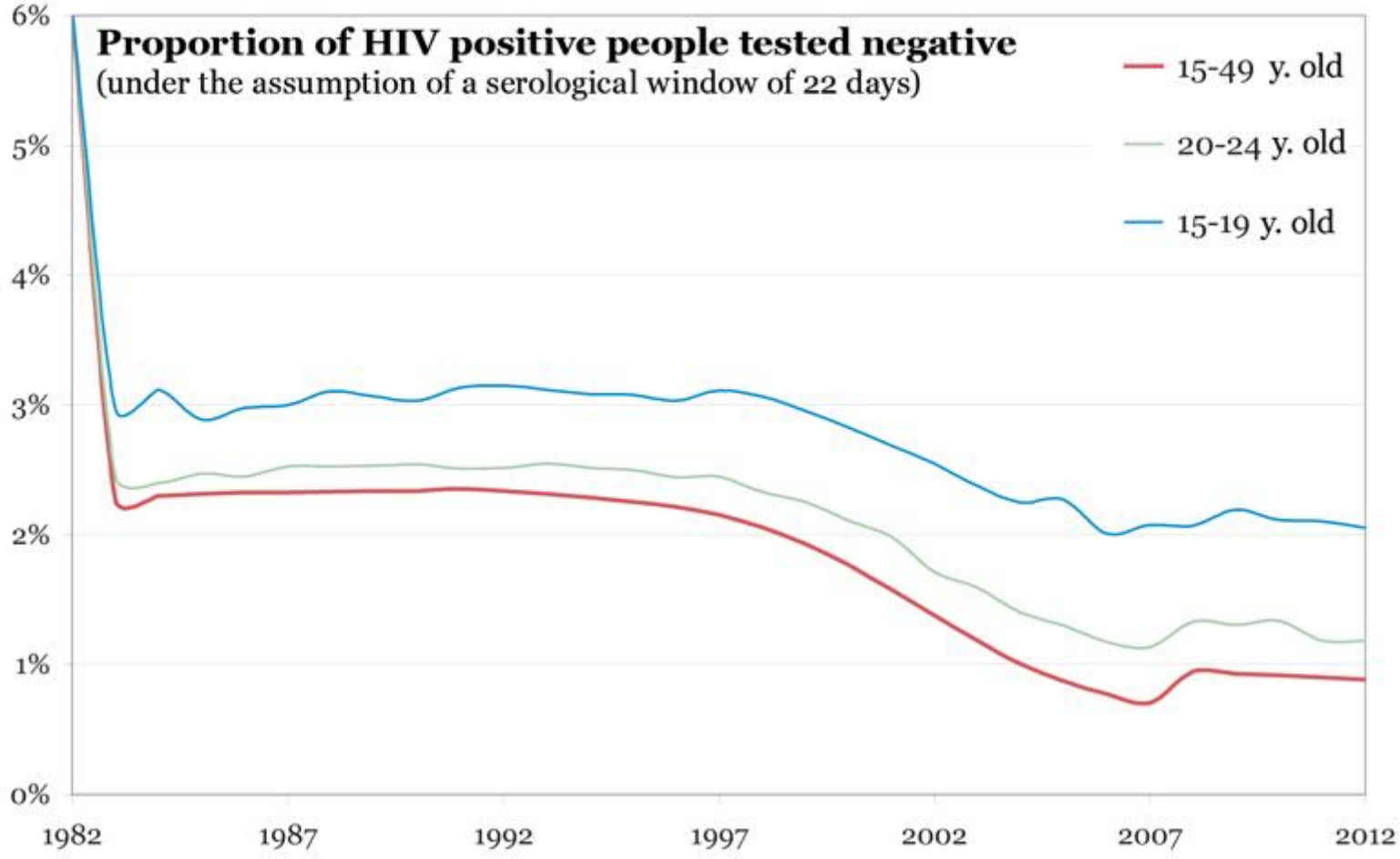
Window of HIV tests

- During 17 to 22 days after infection, HIV test remains negative.



Non observable people

- Using a projection made with Spectrum:
  - in a mature epidemic, around 1% of 15-49 years old HIV positive people are not tested positive.



Non ordinary household population

- Prisons, hospitals, university, hotels, etc. are not surveyed in DHS:
  - Census reports don't give figures by age.
  - Maximization of the bias considering that all this people are 15-49 years old.
- 15-49 years old not living in an ordinary household (except refugees camps):
  - Burkina Faso: 0.43%
  - Cameroon: 1.81%
  - Kenya: 2.34%
- Two hypothesis about the prevalence of this population:
  - High: observed prevalence × 2
  - Low: observed prevalence × 0.5

Refugees camps (only Kenya concerned)

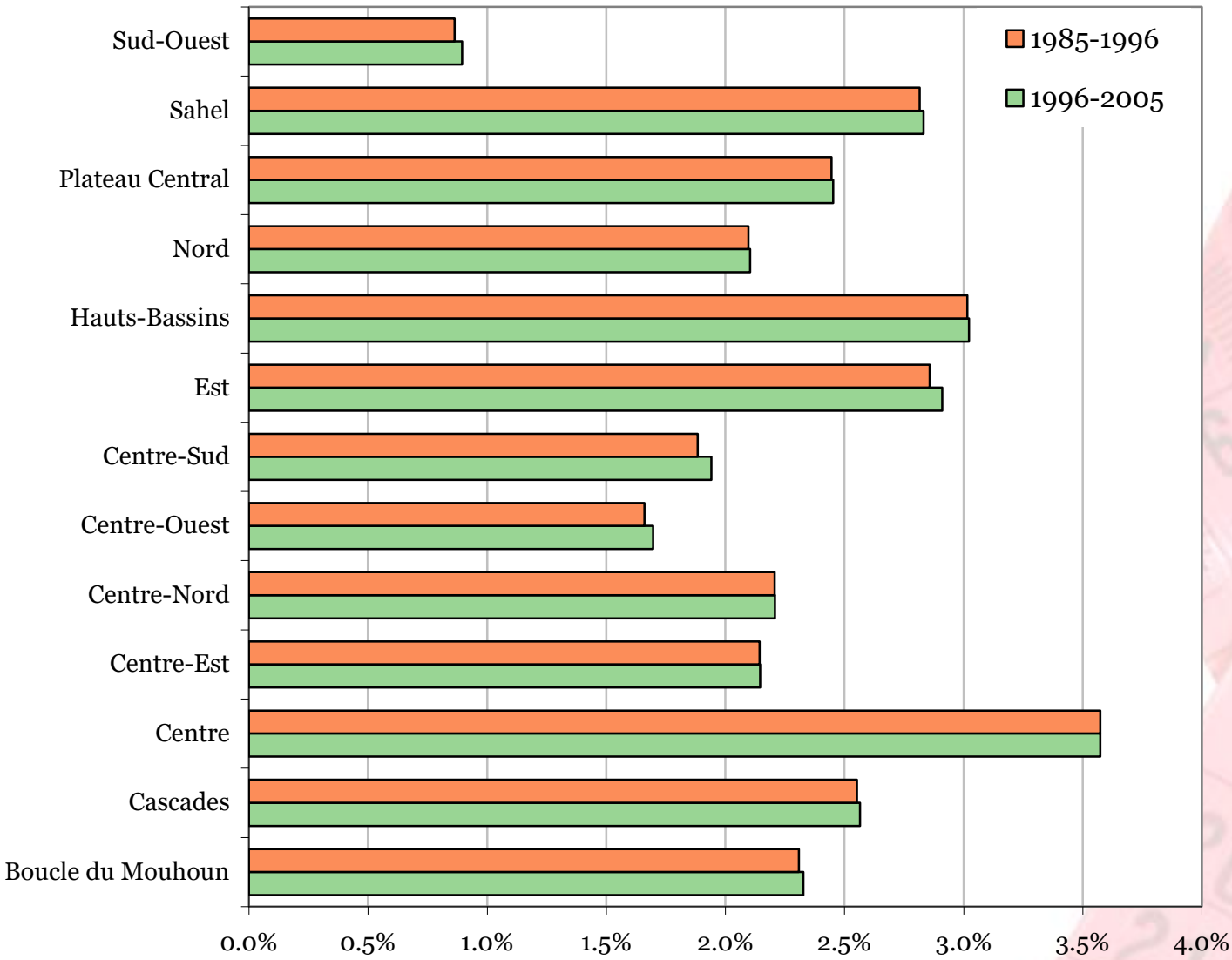
- Data from UNHCR Reports and Spiegel Lancet 2007:
  - Kakuma (1 camp):
    - 15-49 years old population in 2003: 44 689
    - HIV prevalence in 2002: 5.0 %
  - Dadaab (3 camps):
    - 15-49 years old population in 2003: 67 358
    - HIV prevalence in 2003: 0.6%
- At national level, we calculate that in 2003:
  - 0.71% of 15-49 years old are living in refugees camp
  - HIV prevalence of this population is 2.35%

Oldness of sampling base

- DHS are sampled from Population Census to be representative at national and regional level.

- There are several years between DHS and Census:
  - Burkina Faso: DHS in 2003 – Census in 1996
  - Cameroon: DHS in 2004 – Census in 2002-2003
  - Kenya: DHS in 2003 – Census in 1999.

Population growth by region in Burkina Faso



All regions don't grow at the same velocity.

All regions have not the same HIV prevalence.

Correcting oldness of sampling base

- Structures of 15-49 years old population by sex and region have been calculated from demographic projections realized by Central Bureau of Statistics of each country.

- These structures have been applied to calculate adjusted prevalence at the national level.

Not surveyed households

- In each DHS, some households are not surveyed because they were absent or refused to participate.
- Household participation rate:
  - Burkina Faso 2003: 99.3%
  - Cameroon 2004: 97.0%
  - Kenya 2003: 96.3%
- Two hypothesis about the prevalence of these households:
  - High: observed prevalence × 2
  - Low: observed prevalence × 0.5

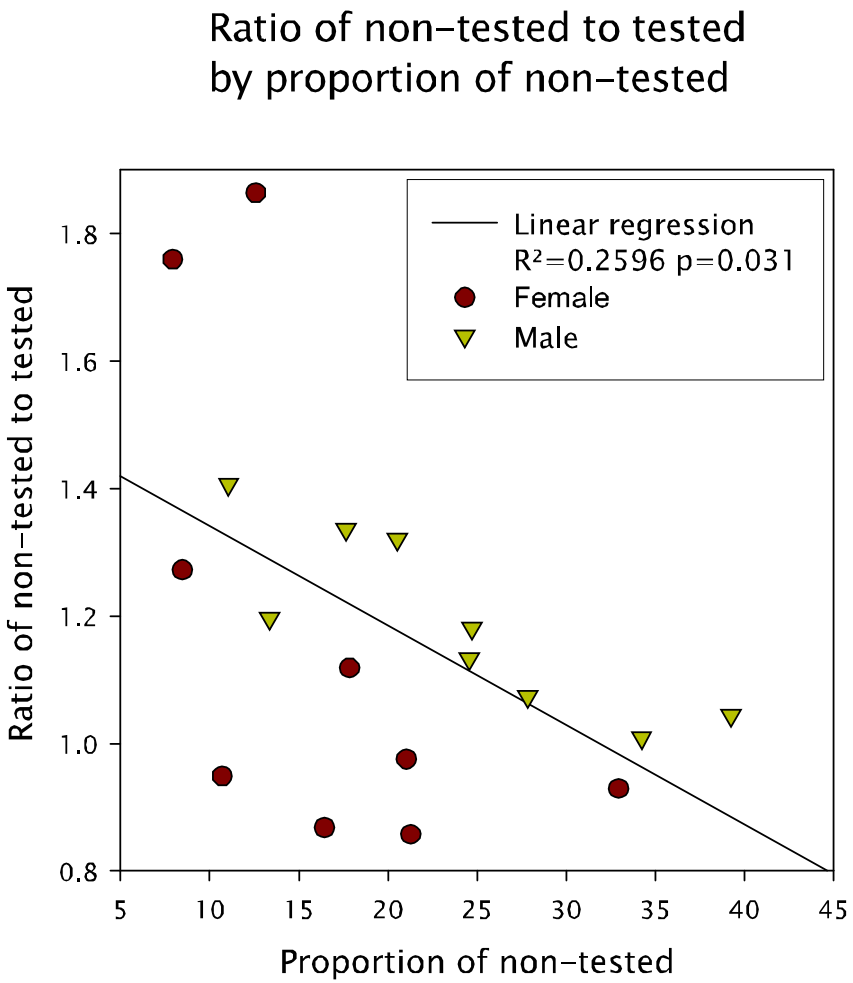
Not tested people

- Some eligible people are not tested in DHS (absence or refus).
- Participation rate:
  - Burkina Faso: 10.3%
  - Cameroon: 9.7%
  - Kenya: 24.4%
- If we don't know their HIV status, we have information in household and individual questionnaires.

Estimation of HIV prevalence of non-tested

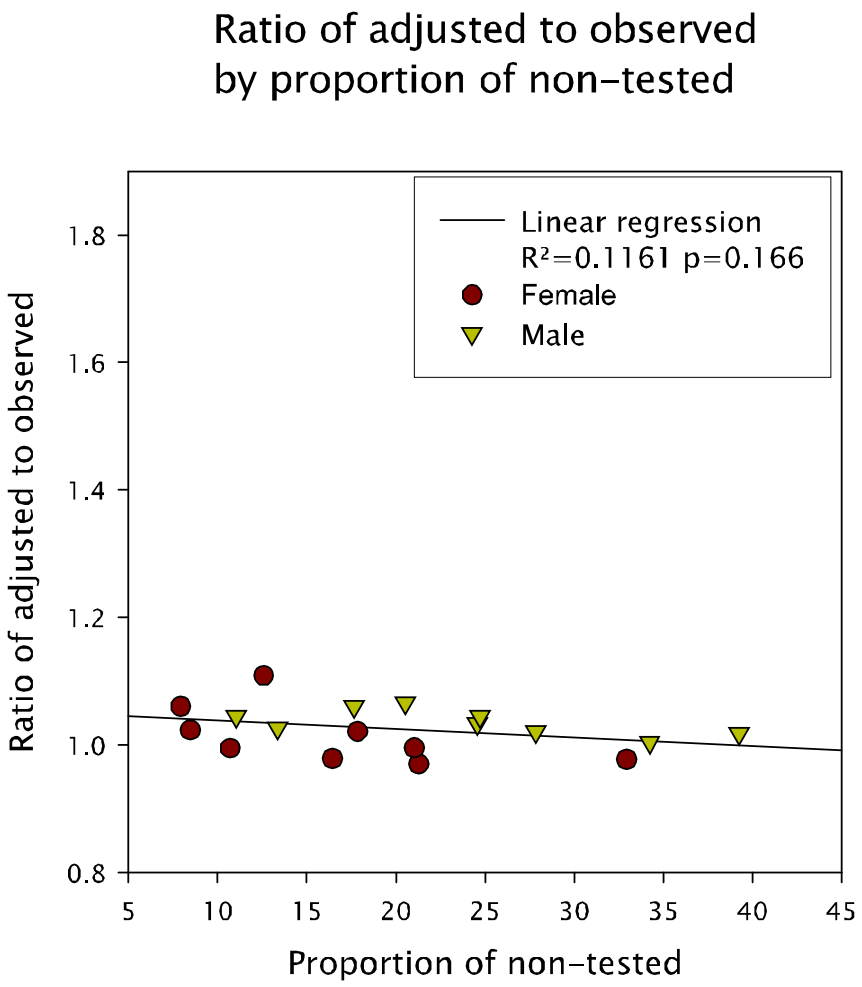
- Logistic regression were used to estimate the probability for each non-tested person to be HIV positive.
- For non-tested persons, a model was calculated on all tested persons with several variables from the household and the individual questionnaire.
- A similar method have been used by other authors (Mishra et al).
- Adjusted prevalence was calculated by using observed HIV status for tested persons and probability to be HIV positive, estimated by the models, for non-tested persons.

Selection bias and proportion of non-tested



- When the proportion of non-tested persons increases, the selection effect decreases.

Two effects compensating themselves



- There is no correlation between ratio of adjusted to observed and proportion of non-tested.

Final adjustment

	Burkina Faso 2003	Cameroon 2004	Kenya 2003
Observed prevalence	1.77	5.44	6.88
Confidence interval at 75%	1.59-1.96	5.18-5.71	6.51-7.27
Confidence interval at 95%	1.49-2.11	5.00-5.91	6.27-7.54
Adjusted prevalence high hypothesis	1.86	5.84	7.16
Adjusted prevalence low hypothesis	1.82	5.43	6.55

Conclusion

- Systematic error remains inferior to sample error.
- DHS constitute a good indicator of the national level of HIV prevalence.
- UNAIDS approach using DHS to estimate prevalence levels is pertinent.

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Thank you

for your attention

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