Fitting the ASSA2000 Urban-Rural AIDS and Demographic model to 10 sub-Saharan Countries

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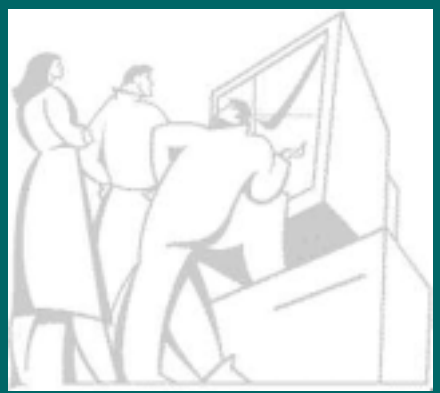
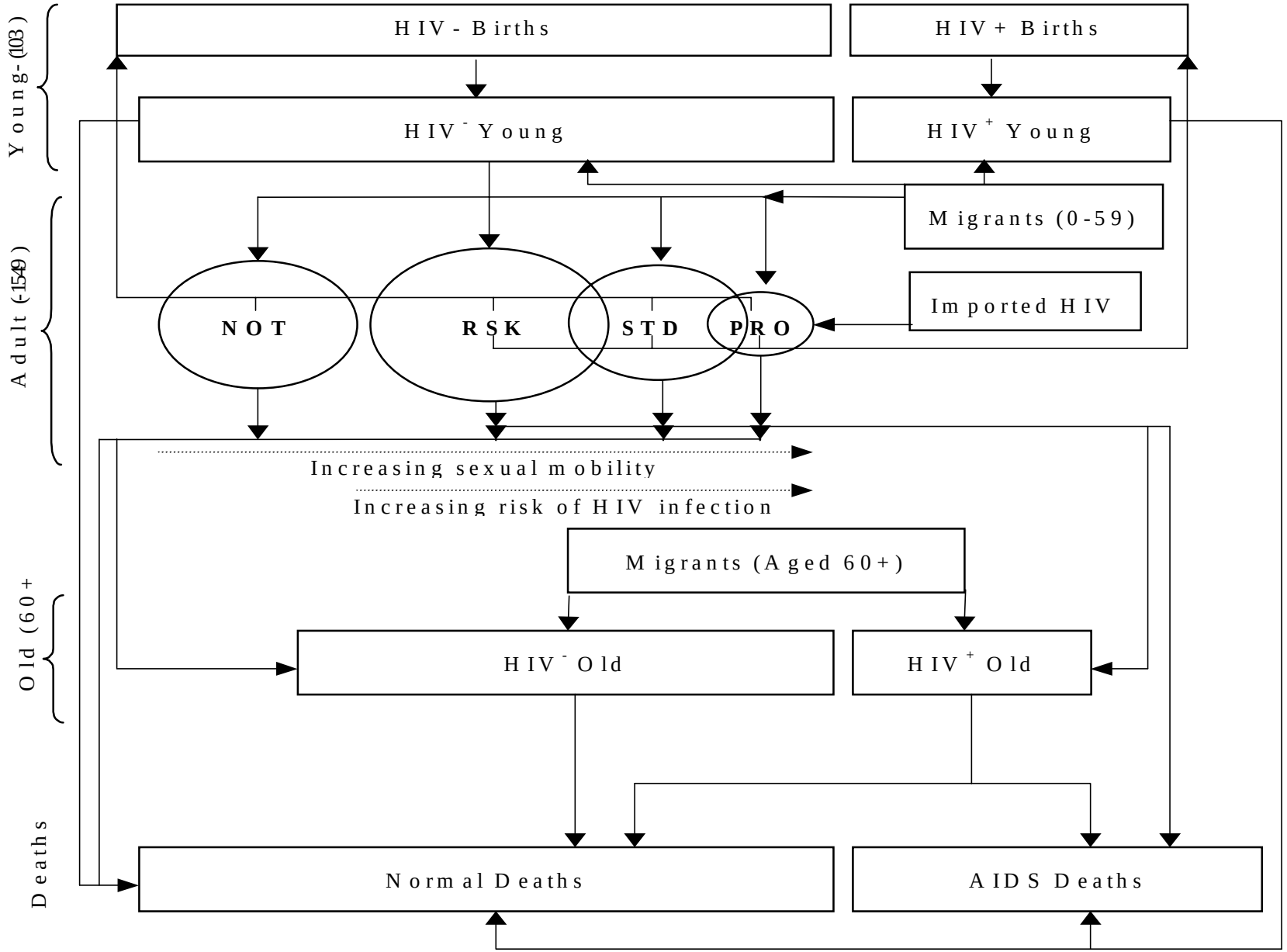


Overview

- Brief description of the ASSA2000 model
- Adaptations to produce the Urban-Rural version
- Data used and assumptions made
- Results
- Discussion

Features of the ASSA2000 suite of models

- A heterosexual behavioural demographic component projection model (Pattern II)
- Combines demography and epidemiology into a single model
- Population divided by risk by:
  - Age (young, adult, old)
  - 'behaviour' (PRO, STD, RSK, NOT)
  - 'social' (race)
  - Geography (province)
- Sex activity (Mixing of risk groups, the number of new partners p.a., number of contacts per partner, probability of transmission by risk group and gender, age of partner, condom use, sexual activity by age/gender etc)


Young-(0-14)
Adult (15-59)
Old (60+
Deaths
HIV- Births
HIV+ Births
HIV- Young
HIV+ Young
Migrants (0-59)
Imported HIV
NOT
RSK
STD
PRO
Increasing sexual mobility
Increasing risk of HIV infection
Migrants (Aged 60+)
HIV- Old
HIV+ Old
Normal Deaths
AIDS Deaths

Why develop the Urban Rural Model?

- Urban vs Rural is a key difference especially if…
  - Large Rural population
  - Relatively different prevalence within the rural regions
  - Rate of urbanisation such that the propn urbanised is changing
  - Hence National Data distorts Urban epidemic
  - …and we insure/underwrite the Urban Formal sectors of the economy!

Urban-Rural Adaptations

- Overview
- Additional data
- Overcoming shortage of data
  - Non-AIDS mortality rates
  - Fertility
  - Migration
  - Other
- Calibration

Overview of changes

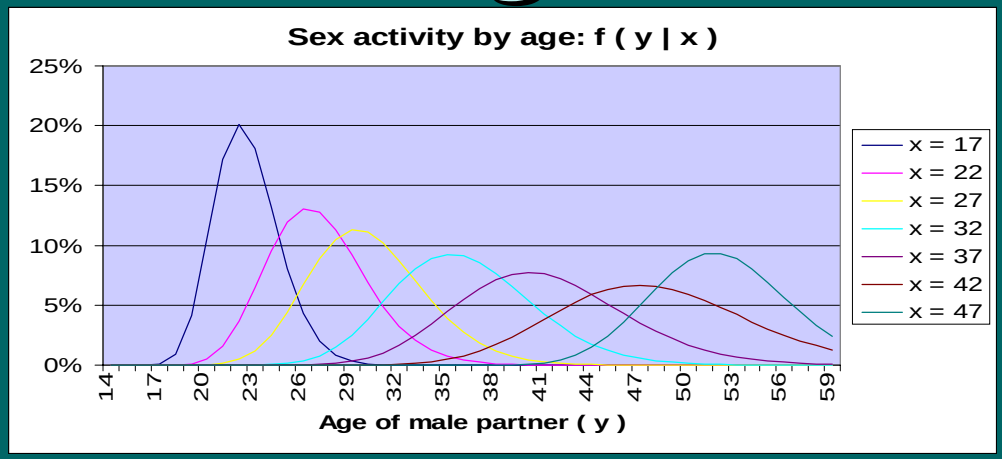
- Fundamental Change:
  - Allow 2 sub-populations to interact
  - Individuals who urbanise, carry the epidemic with them (by prevalence and duration since sero-conversion)
- Lack of Data
  - “Macros” => sparse data to individual-age based values which change over calendar years

Data used and assumptions made

- Base population pyramids (urban/rural)
- Pre-AIDS population mortality rates (+improvements)
- Sentinel site antenatal data
- Migration and urbanisation
- Non-HIV fertility
- HIV/AIDS survival

- Other assumptions
  - Sexual activity
  - Risk group weightings
  - etc

Modeling the force of infection



PRO	2.5%
STD	25.0%
RSK	48.0%
NOT	24.5%
TOTAL	100.0%

Urban Epidemic Start year	1985
Proportion of perinatal infection	0.25
Proportion infected via breast-feeding	0.1

Female risk group	Source of male partner				TOTAL
	PRO	STD	RSK	NOT	
PRO	75%	25%	0%	0%	100%
STD	20%	70%	10%	0%	100%
RSK	0%	40%	60%	0%	100%
NOT	0%	0%	0%	100%	100%

Male risk group	Source of female partner			
	PRO	STD	RSK	NOT
PRO	83%	17%	0%	0%
STD	30%	62%	8%	0%
RSK	0%	42%	58%	0%
NOT	0%	0%	0%	100%

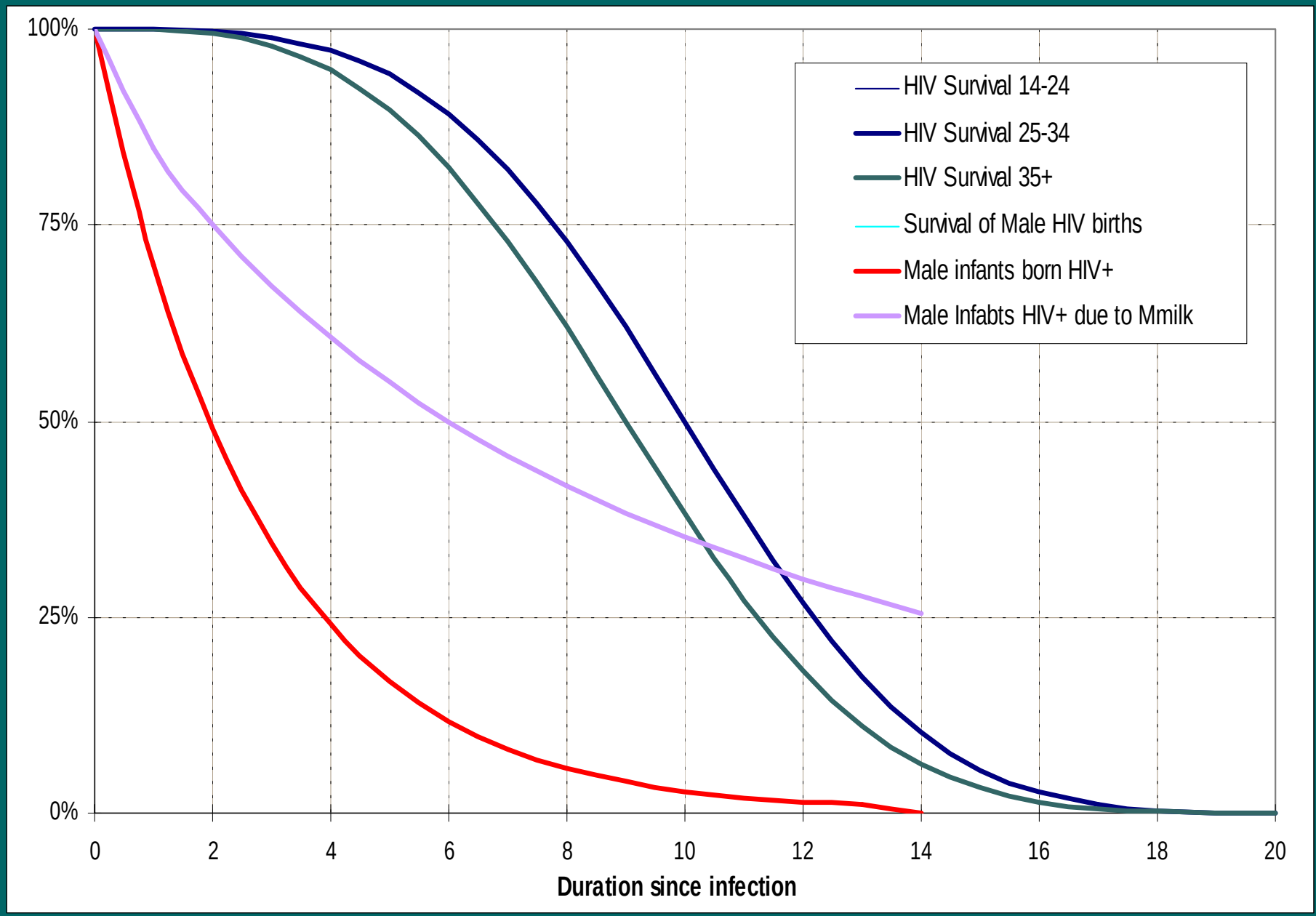
Female risk group	Male to female - Probability of transmission			
	PRO	STD	RSK	NOT
PRO	0.90%	0.90%		0.00%
STD	0.90%	0.60%	0.40%	0.00%
RSK		0.40%	0.20%	0.00%
NOT	0.00%	0.00%	0.00%	0.00%

Male risk group	Female to male - Probability of transmission			
	PRO	STD	RSK	NOT
PRO	0.60%	0.60%		0.00%
STD	0.60%	0.40%	0.30%	0.00%
RSK		0.20%	0.10%	0.00%
NOT	0.00%	0.00%	0.00%	0.00%

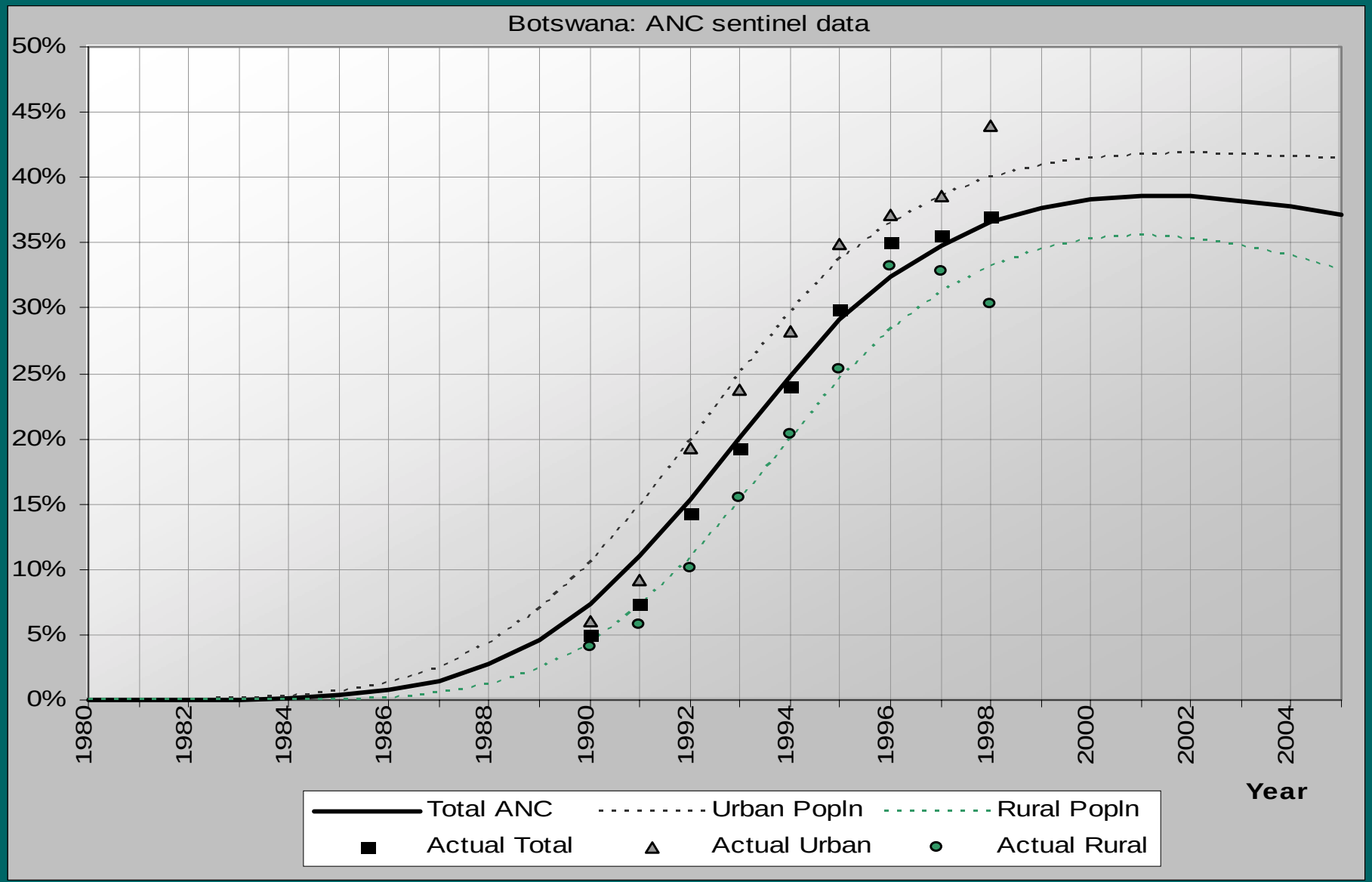
Risk group	Female	Male
	New partners p.a.	New partners p.a.
PRO	200	180
STD	15	17
RSK	1.8	2

Female risk group	Contacts per male partner			Average contacts / partner
	PRO	STD	RSK	
PRO	1	3	-	1.5
STD	3	13	45	14.2
RSK	-	45	90	72.0
Average	1.3	12.7	71.1	

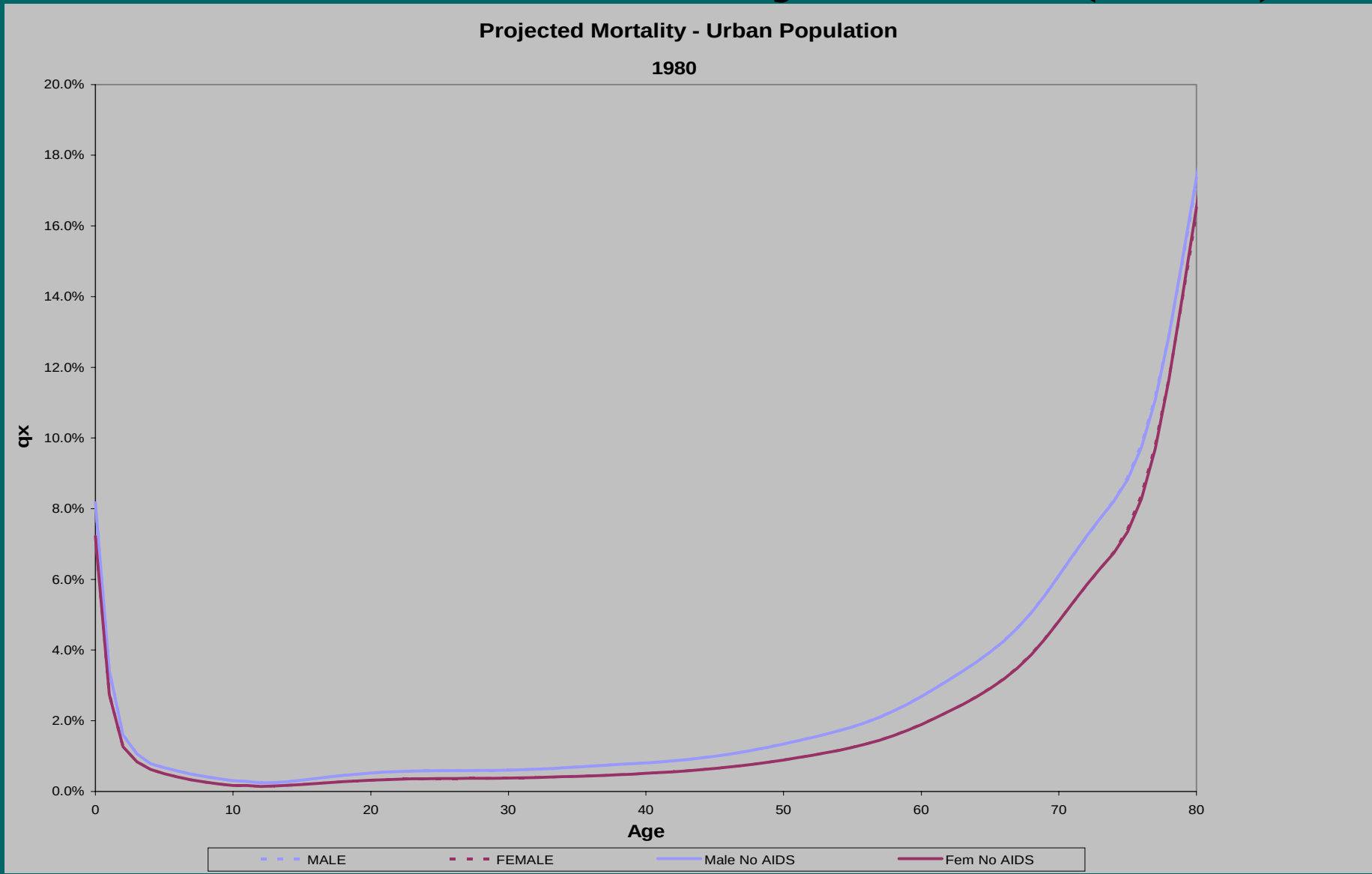
Survival curves since infection



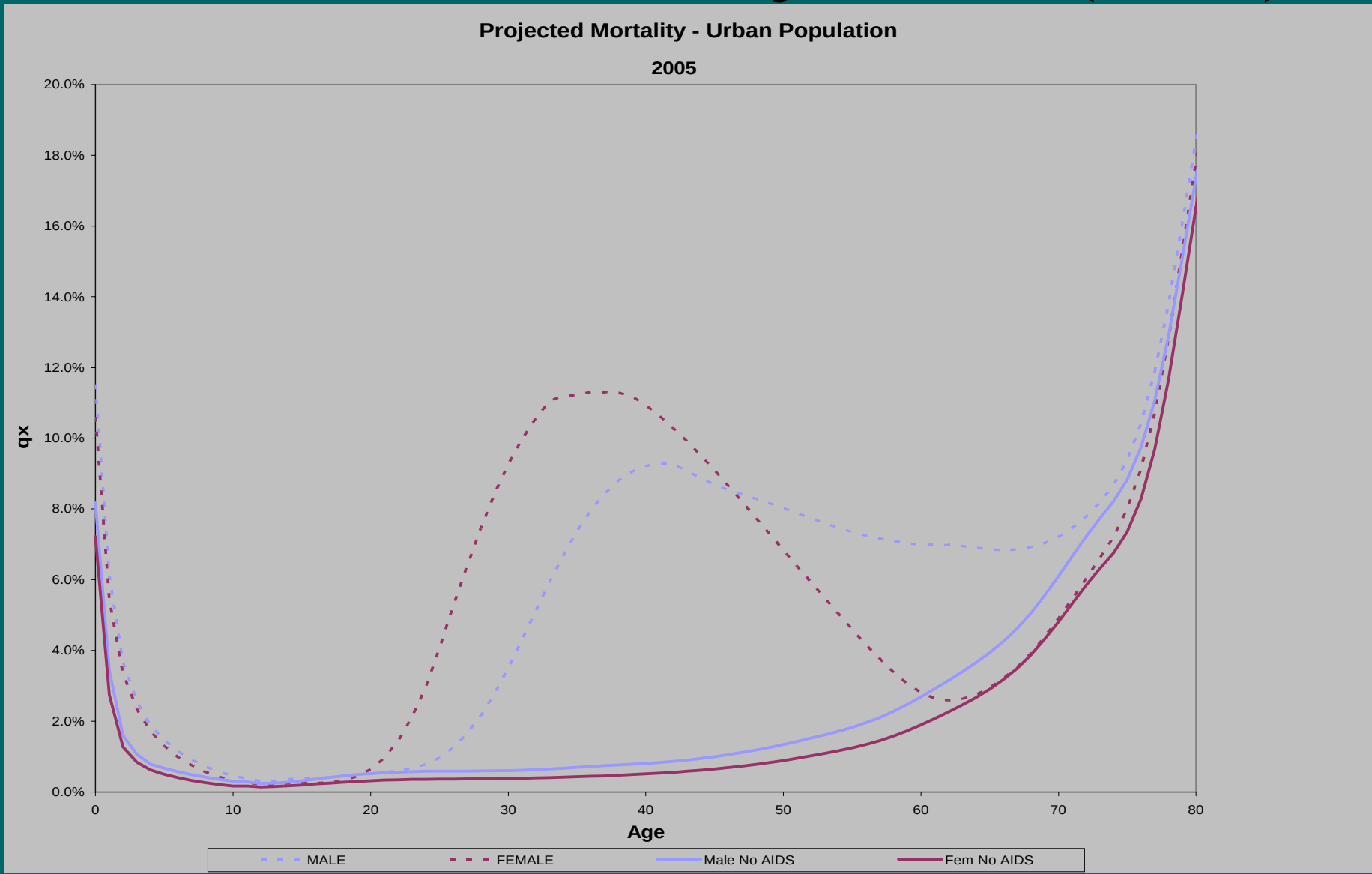
Calibration (eg Botswana): ANC data



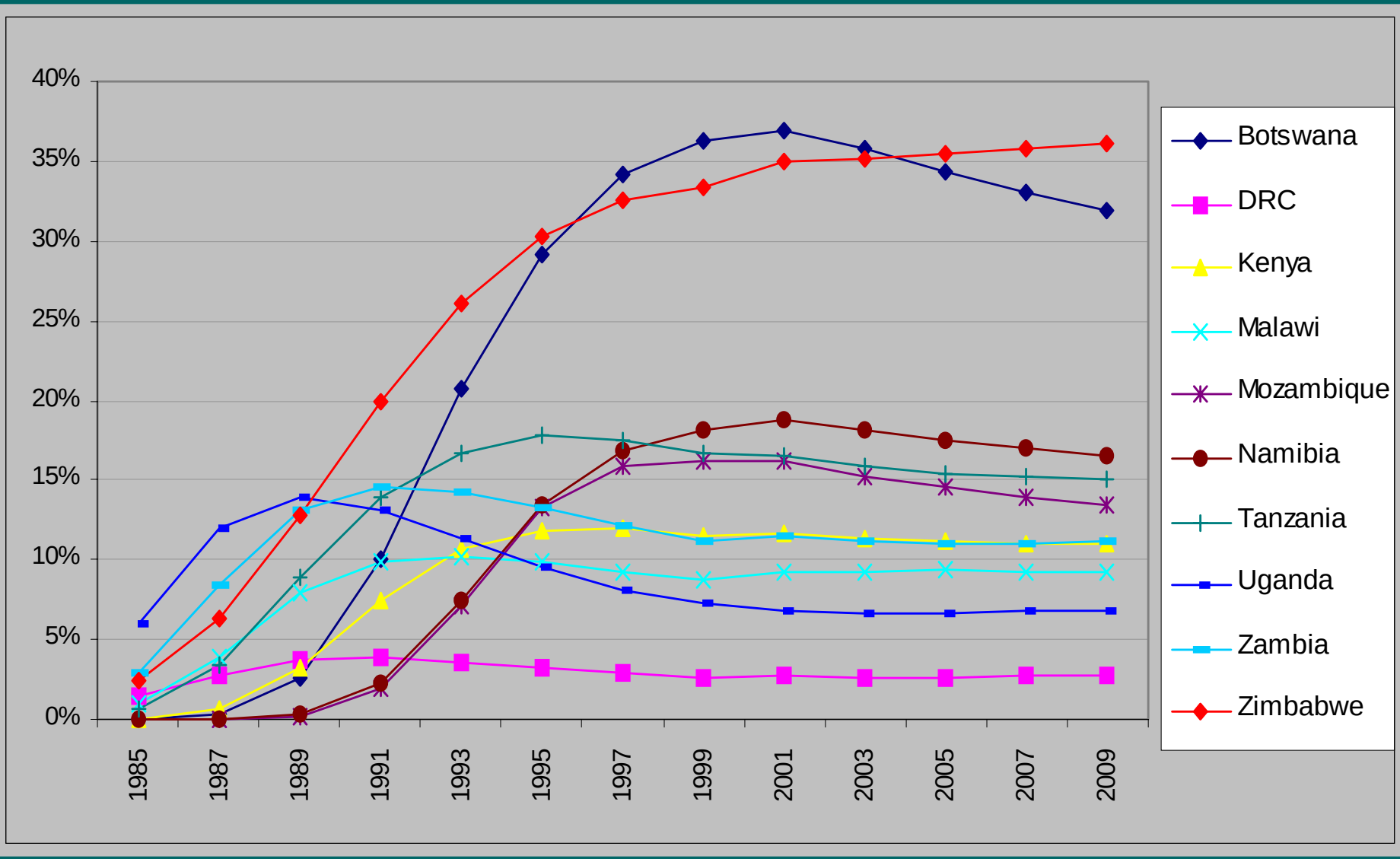
Botswana Mortality Rates (1980)



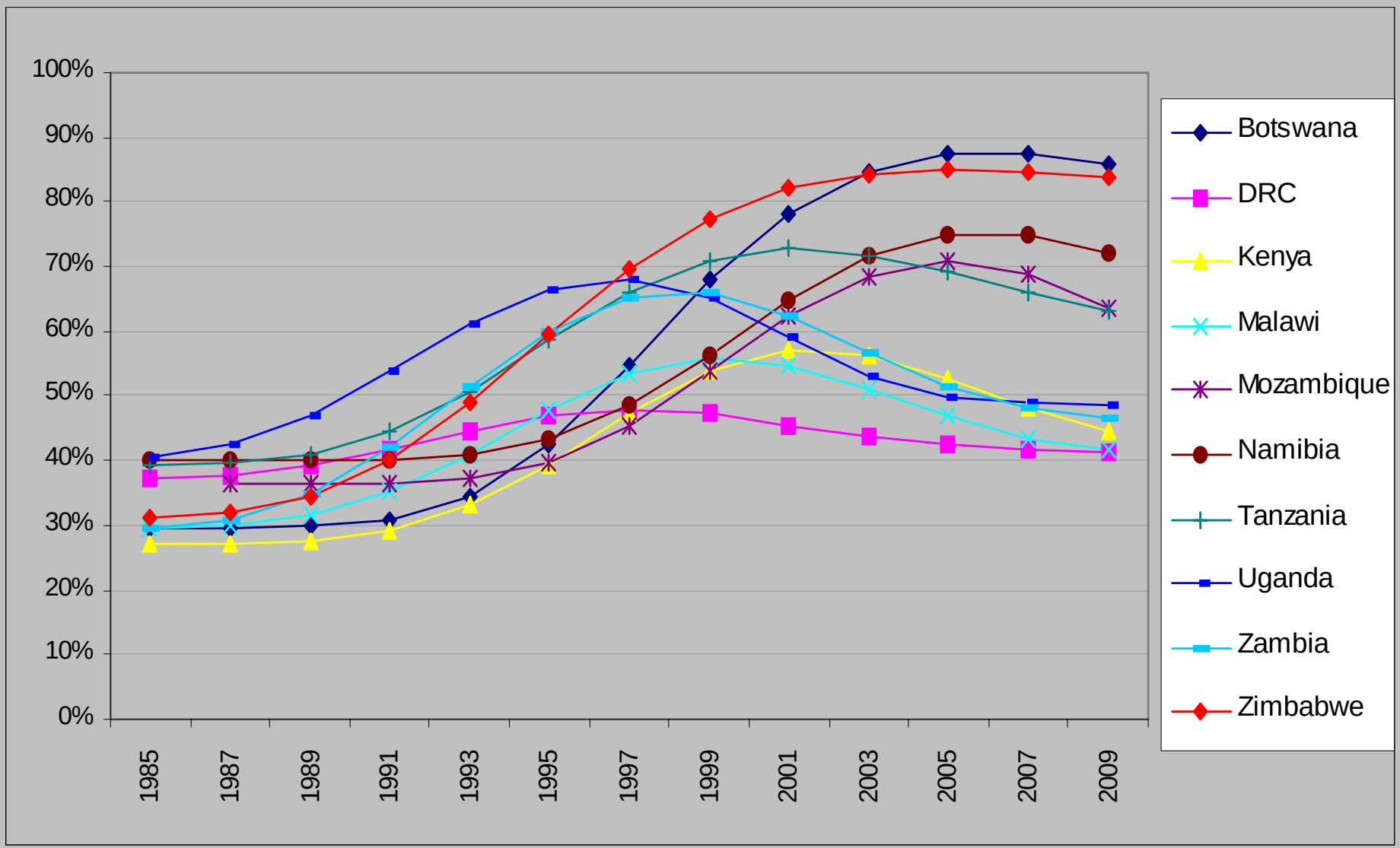
Botswana Mortality Rates (2005)



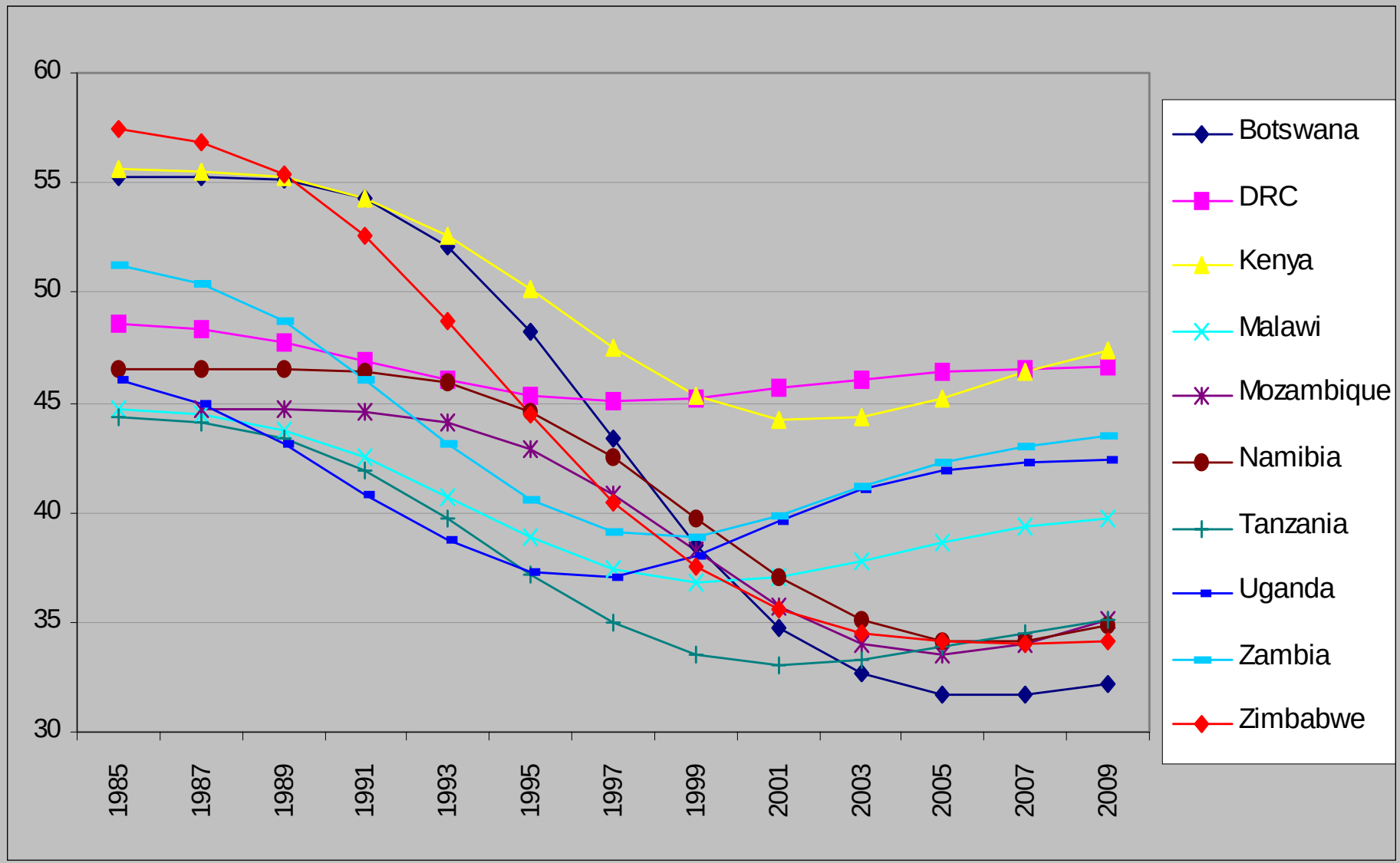
ANC prevalences



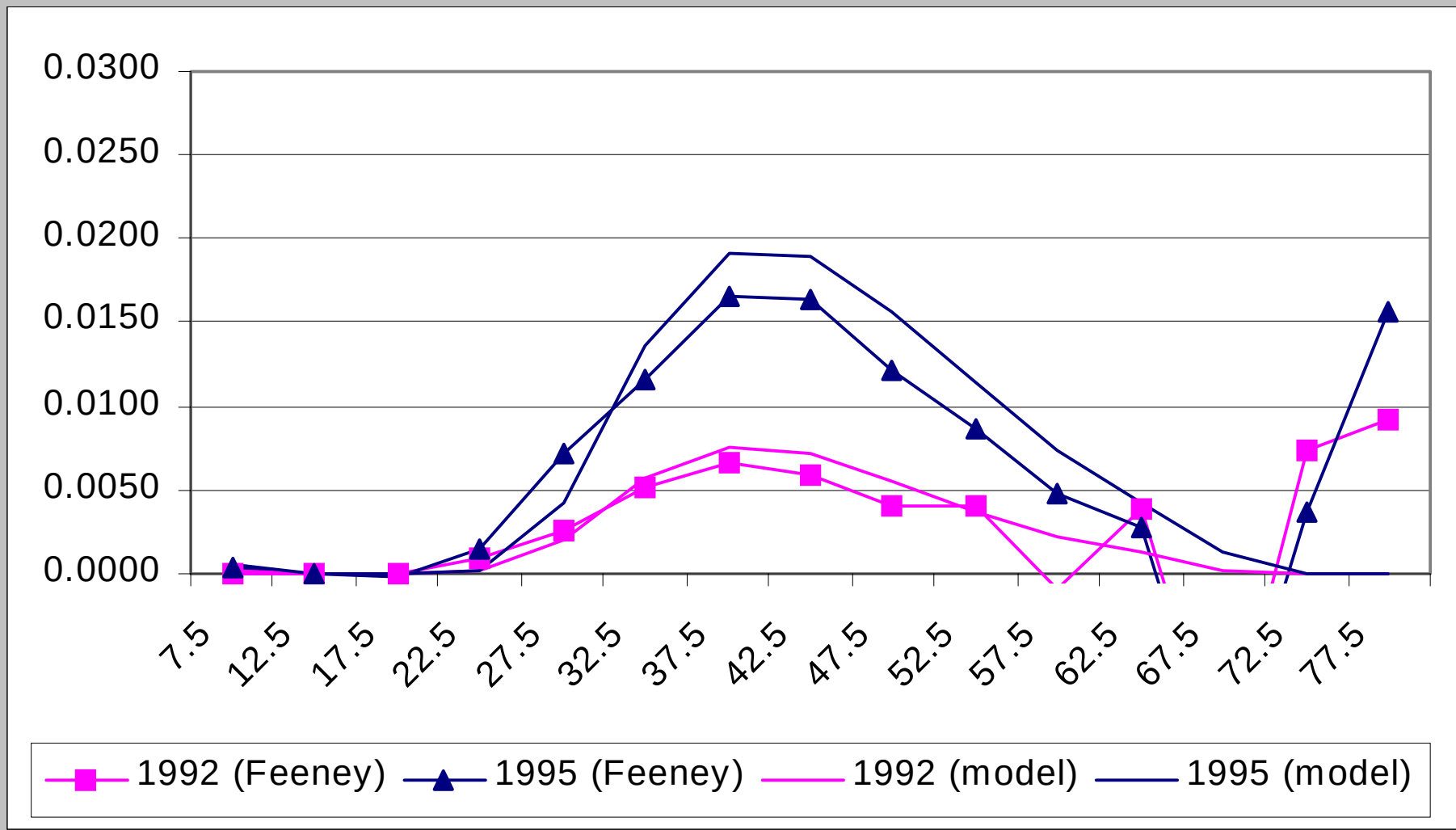
Adult mortality ($_{45}q_{15}$)



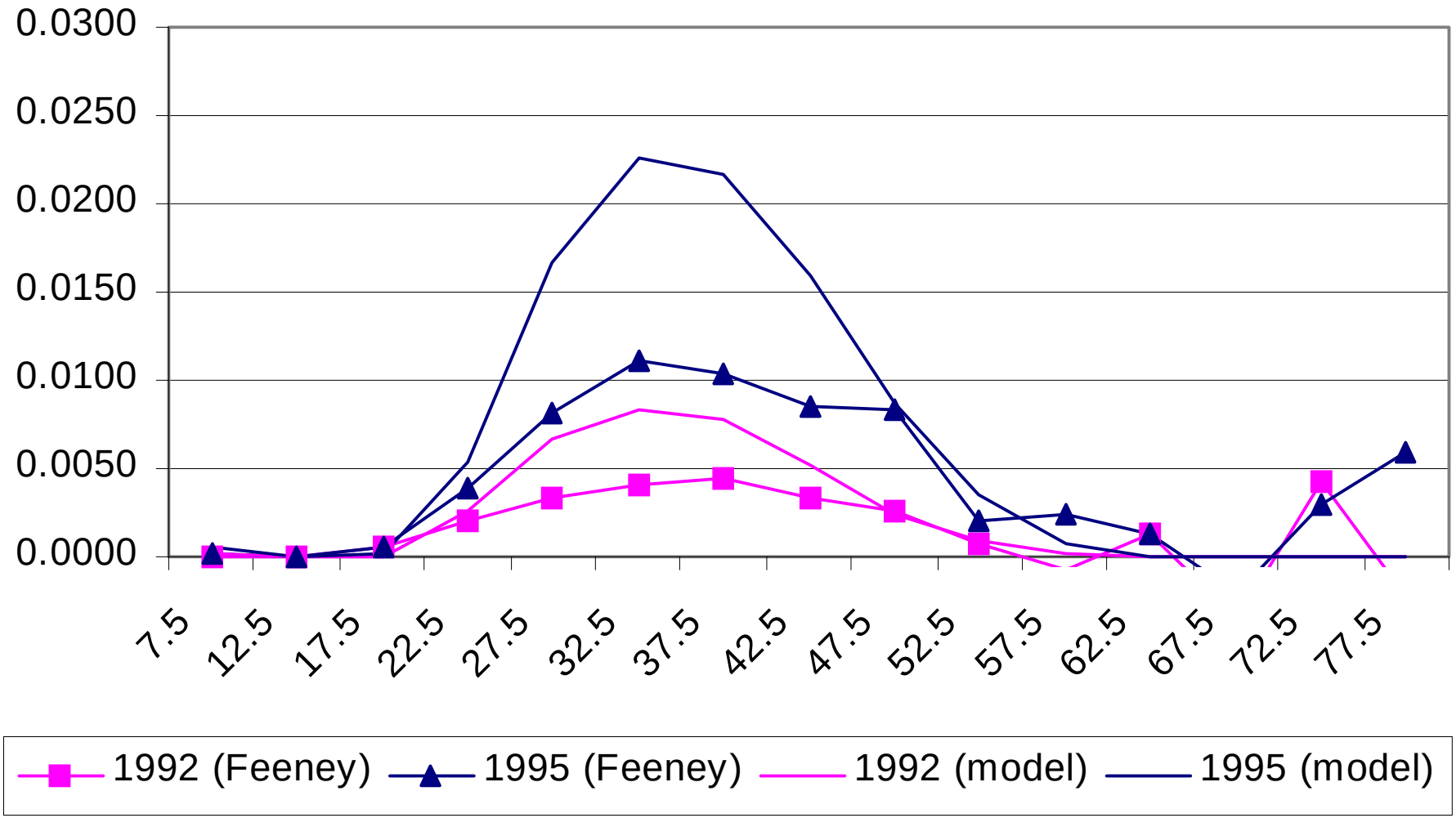
Life expectancy (e_0)



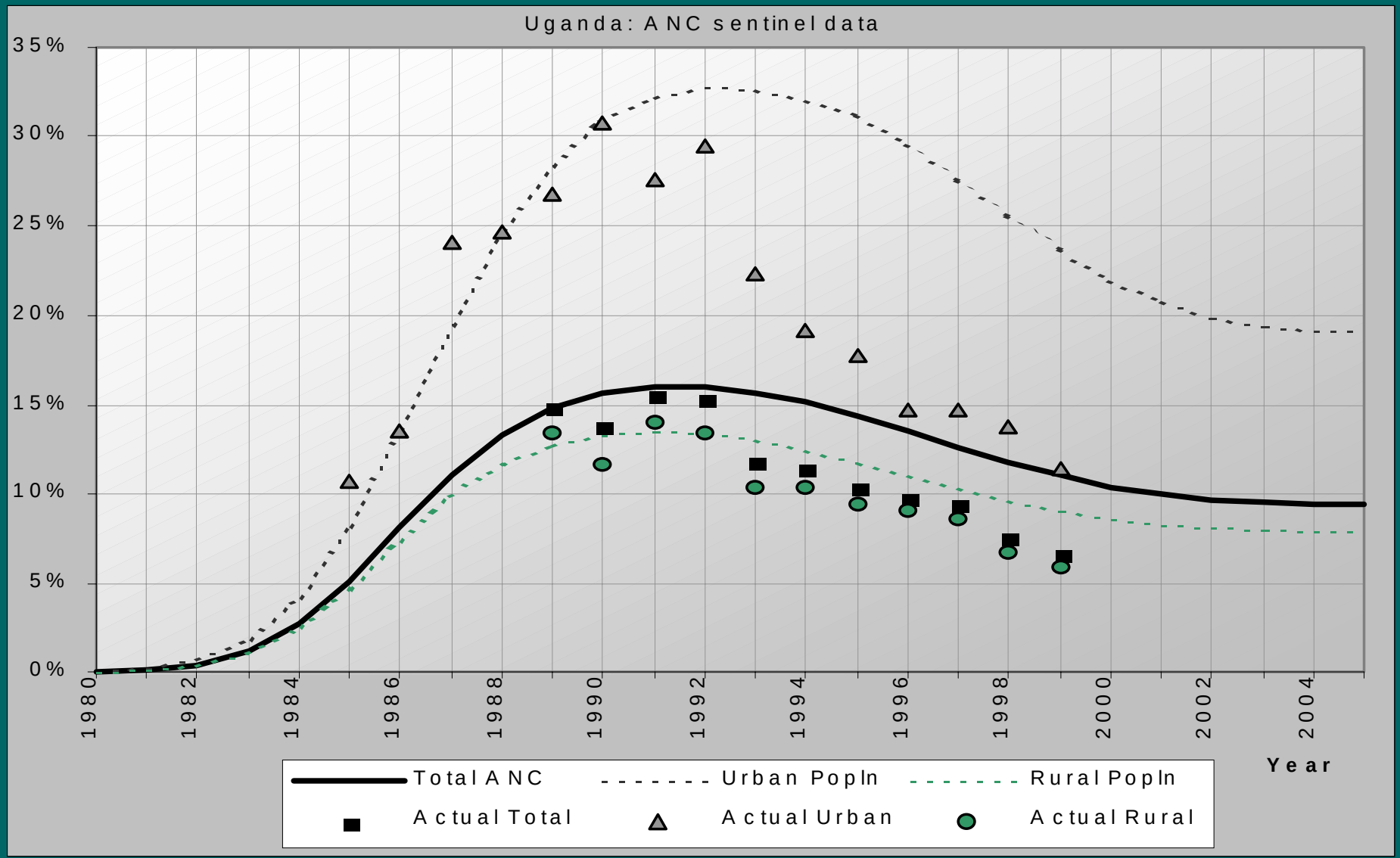
Zimbabwean AIDS mortality: Model vs Feeney - males



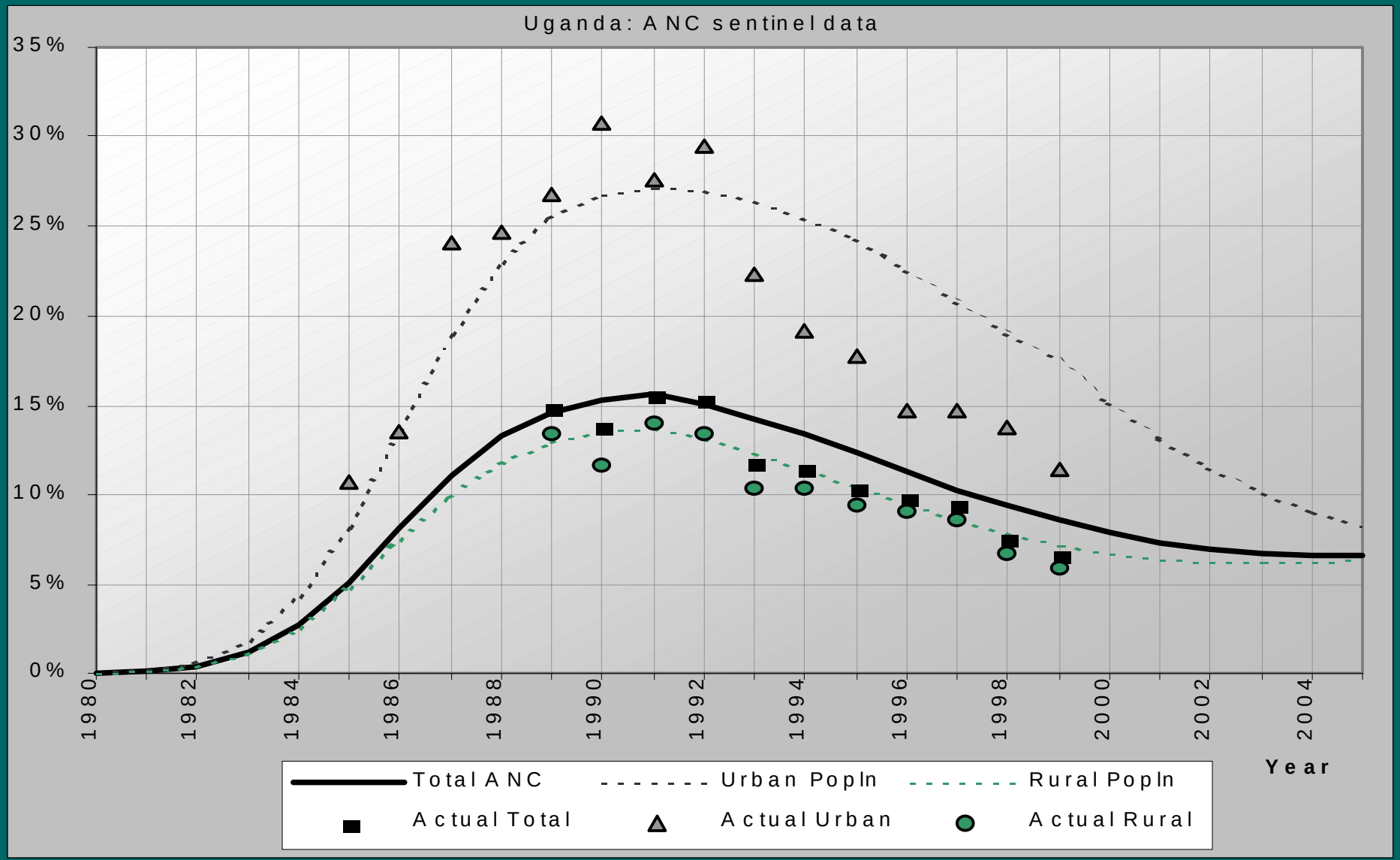
Zimbabwean AIDS mortality: Model vs Feeney - females



Uganda: no change



Uganda: behavioural change



Discussion

- Quality of the data
- Results
- Further improvements to the model
  - Calibration + data accuracy
  - Trigger's for changes/intervention
- Potential uses of the model
  - Policy
  - With an MSM model…