



# Comparing HIV incidence in different populations: the Life Time Risk approach



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## Introduction

Comparisons of HIV incidence levels between different populations, or over time in the same population are complicated by differences in the age structure of the uninfected, and differences in incidence rate age patterns, making standardization and other linear adjustments inappropriate. Alternative measures based on lifetime cumulated probability of infection constructed using survival analysis techniques are proposed, illustrated using data from the Kisesa open cohort study in North West Tanzania.

## Methods

- The study has accumulated 38,592 person-years of observation of HIV negative adults (aged 15+, but restricted to 15-46 in surveys prior to 1997), who participated in at least two of the four serological surveys between 1994 and 2004
- Approximate infection dates were established for individual sero-converters by randomly allocating a date between last negative and first positive test if these tests were up to 3 years apart
- Kaplan-Meier methods were used to cumulate risk of infection after age 15 in different sub-populations, allowing for left and right censoring; age 65 was chosen as a cut-off point, so life time risk was defined as cumulated risk up to age 65: LTR(65)
- Smoothed age-specific hazard rates were obtained (using a weighted kernel-density estimate based on the observed hazard contribution at each sero-conversion age) to find the location of the peak age for infection and spread of the incidence curve

## Results

Figure 1: Cumulated probability of infection by age for sub-populations

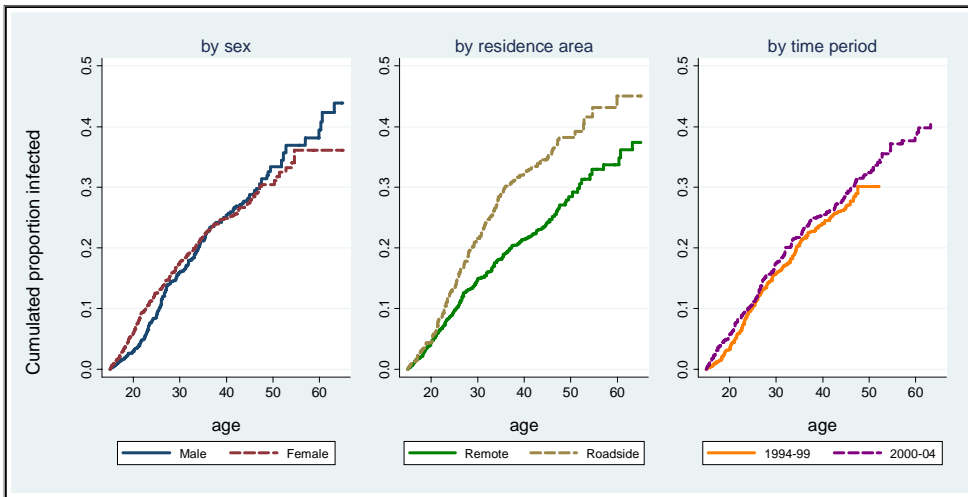


Figure 2: Incidence hazard by sex

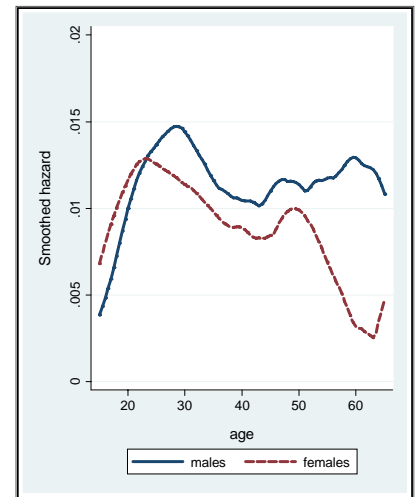


Table 1: Measures of incidence level and pattern

Factor	Category	Incidence level	Location of hazard schedule		Spread of hazard
		LTR(65) %	Peak age	Mean age	Standard deviation
Sex	males	42	29	41	14
	females	37	23	36	13
Residence	remote	37	24	40	15
	roadside	44	29	36	12
Time *	1994-99	30	27	31	9
	2000-04	32	25	32	10

\* limited to ages < 50 because of survey age eligibility restrictions prior to 1997

- For the population as a whole, the Life Time Risk of HIV infection by age 65 reaches 39% [CI 35% - 44%]
- LTR(65) was about five times the level of HIV prevalence which rose from 6% to 8% between 1994 and 2004.
- Males experienced a higher LTR(65) than females, their age at infection was older, and spread of risk ages wider
- Roadside areas had a much higher LTR(65) with a more concentrated infection schedule than remote rural areas
- LTR(65) increased over time but with little change in the overall age pattern
- There is no evidence that higher levels of infection are associated with a particular age pattern of incidence

## Discussion and conclusion

Life time risk of infection is a useful metric for comparing overall incidence level in different populations, and survival analysis can also show whether age patterns of infection have a transient or lasting effect on life time risk.