HIV-related Causes of Death in the Era of Antiretroviral Therapy: Analysis of Verbal Autopsy Data

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[1] INTRODUCTION

Mortality rates remain higher in HIV positive than HIV negative individuals despite the introduction of antiretroviral therapy (ART). Understanding the causes of death in HIV positive individuals, and how these have altered with ART treatment, will help direct interventions to prevent these deaths. Since causes of death are not medically certified in sub-Saharan Africa we rely on interpretation of verbal autopsy (VA) data to generate cause of death information. VA is an interview where family members and/or caregivers of the deceased are asked about the signs and symptoms occurring before the death.

[2] OBJECTIVE

To ascertain causes of death by HIV status and ART availability using VA data from Eastern and Southern Africa.

[3] METHODS

DATA SOURCES

We used VA data from three community-based HIV cohorts: Tanzania (Kisesa), Malawi (Karonga) and South Africa (uMkhanyakude), which form part of the ALPHA network.



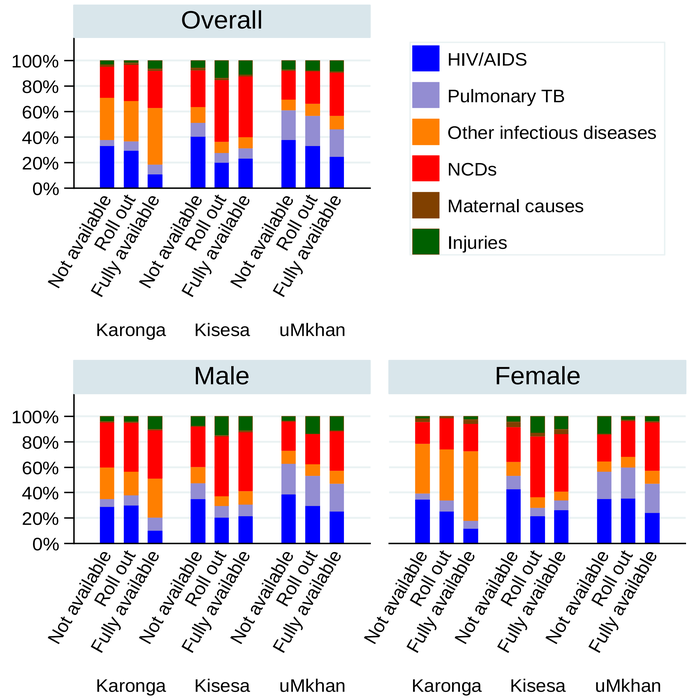
INSILICOVA

Data on symptoms and circumstances were processed using the InSilicoVA algorithm.[1] InSilicoVA is a fully-specified probabilistic model that uses inputs similar to InterVA. The method uses a Bayesian framework that characterises and shares uncertainty across individual cause of death estimates and population cause distributions.

DATA ANALYSIS

Cause of death distributions were classified by ART availability and HIV status of the deceased. The percentage of deaths assigned to HIV/AIDS using the algorithm were compared to age-standardized HIV attributable mortality calculated by comparing the observed numbers of deaths in HIV positive individuals to the number expected if age-specific mortality rates were the same as those observed in the HIV negative group.

Figure 1: Cause of death distribution by ART availability and site, overall and stratified by sex
***NCD = non-communicable disease**



[4] RESULTS

- Overall there were 11,366 adult deaths with a VA: 1,450 in Karonga; 1,371 in Kisesa; and 8,545 in uMkhanyakude.
- Following ART introduction, there were substantial declines in the percentage of deaths assigned to HIV/AIDS in the population (Figure 1). In Kisesa, declines were observed in the percentage of deaths attributed to HIV among HIV positive deaths using InSilicoVA and, to a lesser extent, using the attributable fraction (Table 1).
- There were corresponding increases in other causes of death among HIV positive individuals:
  - Kisesa: TB increased; neoplasms increased in women but not men.
  - uMkhanyakude:TB increased in women but not men; no changed observed in non communicable disease.

Table 1: Percentage of deaths to HIV positive individuals attributed to HIV based on InSilicoVA, and on the attributable fraction (AF)

	Pre-ART			ART widely available		
	N	AF	InSilicoVA (95% CI)	N	AF	InSilicoVA (95% CI)
Karonga						
Men	0	-	-	51	78.9	18.8 (10.8-27.8)
Women	0	-	-	49	82.2	26.0 (17.2-36.4)
Kisesa						
Men	66	92.9	47.3 (37.3-57.2)	19	85.7	38.3 (26.6-50.2)
Women	90	93.9	55.6 (46.7-65.2)	24	90.8	41.3 (30.1-53.2)
uMkhanyakude						
Men	9	-	29.1 (18.1-41.9)	390	81.4	49.4 (44.0-54.9)
Women	13	-	27.7 (17.3-40.4)	544	88.3	45.3 (40.9-49.9)

[5] DISCUSSION

Increases in the percentage of deaths from neoplasms among the HIV positive are to be expected as deaths from classic HIV-related causes are suppressed by ART. The fact that TB continues to rise as a proportion of all assigned causes among the HIV positive suggests better management of TB cases is needed at treatment start.

Reference: [1]McCormick, T. H., Li, Z., Calvert, C., Crampin, A. C., Kahn, K., and Clark, S. J. (2014) Probabilistic Cause-of-death Assignment using Verbal Autopsies. arXiv: 1411:3042
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