# Estimating AIDS mortality from burial surveillance data in Addis Ababa, Ethiopia

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*Objectives and methodology*

The main obstacle for monitoring AIDS mortality in developing countries is the availability of adequate data, vital statistics in particular. This contribution uses burial surveillance data as a partial substitute for a proper vital registration system. The surveillance was initiated in February 2001 at all cemeteries of Addis Ababa (currently 81) and is ongoing. Trained cemetery clerks record age, sex, ethnicity, marital status, religion, region of birth (as a measure of migration status), and the lay diagnosis of the cause of death from relatives who make the arrangements for burial. To date, over 70,000 burials were registered. The CDR estimated from the burial registration and official population projections fluctuates around 10/1000. In addition to the burial surveillance data, we use a) outcomes of verbal autopsies that were administered on a random sample of burial records (2004, n=1200 adults), b) a sample of cemetery records that were linked with records from a one-year surveillance of hospital deaths (2001, n=1060 adults), and c) a sample of cemetery records matched with a record from an 8-month surveillance of admissions in the Zewditu Memorial Hospital that includes the serostatus of the patient (2003-2004, n=150 adults).

We use two approaches to generate estimates of age, sex and migration-status specific patterns in AIDS mortality. The first and most direct estimate of the share of AIDS deaths by a number of background characteristics is derived from the physician review of verbal autopsies[1]. The second and more innovative method is based on the lay diagnosis of the cause of death. In a first step, we investigate the diagnostic validity of the lay diagnoses of causes of death, and subsequently use the diagnostic indicators (sensitivity, specificity and positive predictive value) from that analysis to extrapolate estimates of AIDS mortality to the population of Addis Ababa. For investigating the diagnostic value of the lay diagnoses, we use three gold standards: a) the hospital discharge diagnosis in the set of burial records linked with a record from the one year surveillance of hospital

[1] A serostatus based validation of the physician review of these verbal autopsies for identifying AIDS deaths in Addis Ababa is the topic of another paper and the results should be available by the end of 2004.

deaths, b) the physician review of the verbal autopsies and c) a combination of serostatus and admission diagnosis in a set of burial records linked with a record from the 8-month surveillance in the Zewditu Memorial Hospital.

Estimation of diagnostic indicators in the samples of linked records (or those with a VA outcome) is done by means of logistic regression, and the regression parameters are used for modeling the share of AIDS mortality in the total population. Compared to an earlier study where we used a similar approach (Araya et al 2004), the greater sample sizes now allow us to break down estimates of AIDS mortality by sex, age and migration status (as well as other background characteristics). Because the lay diagnosis method is based on a vital events type registration, it allows us to investigate trends in AIDS mortality as well.

*Preliminary results*

Despite a reluctance to label deaths explicitly as AIDS related deaths, the community uses various euphemisms that are consistently used to refer to AIDS deaths and that can be used for monitoring AIDS mortality. Most frequently mentioned lay diagnoses are *lung disease* and *cold*. Close to 90% of adult deaths attributed to these causes are de facto AIDS deaths, and together they account for 50-60% of the total number of AIDS deaths in the population. Less frequently mentioned are *diarrhea*, *TB*, *AIDS* itself, *shingles* and *mental or nerve problems*. Their positive predictive value is around 80% and together this group of diagnoses accounts for close to 10% of AIDS deaths. The specificity of most AIDS-indicative diagnoses is higher than 90%.

Estimates based on the lay diagnosis of causes of death attribute between 60-70% of adult deaths (age 20-54) to AIDS and these results are corroborated by verbal autopsy results. The sex and age pattern of these estimates are comparable to those published in other studies, but intriguing gender differences in AIDS mortality appear when the results are disaggregated by migration status. They suggest that AIDS mortality is higher for men than for women among native-born Addis Ababa residents, and vice versa among migrants. One interpretation of this result is that migrant women are often selected into prostitution and exposed to a higher risk of infection. This result is not unimportant as female migration to Addis Ababa is substantial and female migrants are greater in number than male migrants.

We also investigate whether the introduction of antiretroviral therapy in Ethiopia in 2003 has had an (differential) impact on levels of AIDS mortality over time, but these results are not yet available.

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Araya, T., Reniers, G., Schaap, A., Kebede, D., Kumie, A., Nagelkerke, N., Coutinho, R., Sanders, E. (2004). Lay diagnosis of causes of death for monitoring AIDS mortality in Addis Ababa, Ethiopia. Tropical Medicine and International Health, vol.9(1):1-9.