

## Using vital registration to quantify HIV mortality between 1997 and 2009

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In South Africa the numbers of HIV/AIDS deaths have been under reported due to a greater proportion of AIDS deaths being mis-attributed to other causes. There has been a tendency to record indicator conditions without mentioning HIV or else use a pseudonym such as "retroviral disease". This research outlines a statistical method used to estimate the numbers of mis-allocated AIDS deaths for South Africa between 1997 and 2009. Cause specific death rates were calculated from the official vital registration data obtained from Statistics SA for the period 1997 to 2009 (corrected for incompleteness of registration) and population estimates from the ASSA2008 population projection model. Causes of death with misclassified AIDS deaths were identified based on a distinct HIV/AIDS age pattern and extreme increase in death-rates akin to the increase in HIV/AIDS death rates. An exponential regression model relating the aggregate mortality rate from identified conditions on lagged antenatal clinic HIV prevalence for the period 1997-2003 provided estimates of the mortality level in the absence of AIDS and the increase in mortality related to prevalence. The background trend in the indicator causes was assessed in the 75-84 and using a stringent significance level ( $p \leq 0.01$ ) was applied to the mortality level in the absence of HIV to estimate the excess AIDS deaths in each cause. The resultant aggregate AIDS proportions were compared to national estimates from various HIV models. Out of 214 causes of death, 19 met the criteria of potentially containing mis-classified AIDS deaths. AIDS deaths were estimated for 18 of these. Overall, the derived estimates of deaths due to AIDS were consistent with existing AIDS models, with results suggesting that approximately 92% of AIDS deaths in South Africa were mis-attributed to other causes for the period 1997 to 2009. Results also suggest peaking of AIDS mortality in 2005 for females and 2006 for males. From the results, we conclude that applying statistical techniques on vital registration data allows one to correct it for some of the systematic and random errors that can exist, in particular misclassification of AIDS deaths. Subtracting the mis-attributed AIDS deaths from each cause provides a more realistic profile of the underlying causes of death and the total number of deaths due to AIDS.

Key words: Cause of death, vital registration, systematic and random errors, HIV/AIDS mortality.