

## HIV testing in South Africa: successes and challenges

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HIV testing is critically important to HIV prevention and treatment. High testing rates are necessary to ensure that HIV-positive individuals are diagnosed early and start antiretroviral treatment (ART) before they progress to advanced stages of immunosuppression. Diagnosed individuals are also more likely to engage in safer sex practices (1), and diagnosis is therefore also important in reducing rates of HIV transmission from untreated individuals.

Because of the importance of HIV testing and diagnosis, UNAIDS has called for 90% of all HIV-positive individuals to be diagnosed by 2020 (2). Although this is a commendable goal, there has unfortunately been little consideration of the practical challenges associated with measuring progress towards this target. These challenges are particularly acute in developing countries with weak monitoring and evaluation systems. Many countries simply quote the proportion of adults who report having ever been tested for HIV in national household surveys, but this is problematic because: (a) self-reported data may be affected by recall bias and social desirability bias; and (b) HIV-positive individuals who have been tested will not necessarily have been diagnosed with HIV as the test might have been conducted before the person acquired HIV. Some countries attempt to address the latter problem by instead relying on self-reporting of “knowing your HIV status”, but this is also problematic for people who want to avoid discussing their HIV status with interviewers.

### *Obtaining accurate estimates of HIV testing rates*

In a recent study, we attempted to obtain more accurate estimates of rates of HIV testing in South Africa (3). We used a mathematical model of HIV in South Africa that was calibrated to HIV testing data from various sources. The model includes a flexible function to represent the effect of age, sex, calendar year and past HIV testing history on the rate at which individuals get tested for HIV. Total numbers of HIV tests performed in South Africa over the period from 2002 to 2012 were estimated by aggregating data from the public and private health sectors, and these estimates were used as inputs in the model. The model was calibrated to self-reported data on past HIV testing from the 2005, 2008 and 2012 Human Sciences Research Council (HSRC) household surveys (4), allowing for potential bias in the self-reported data, and

stratifying the data by age, sex and HIV status. In addition, the model was calibrated to data on the proportion of people seeking HIV counselling and testing (HCT) who tested positive, over different periods.

The good news, according to the model estimates, is that overall rates of HIV testing in South Africa have increased dramatically since 2009. As a result, the fraction of HIV-positive adults who were diagnosed increased from around 20% in the early 2000s to 76% by 2012, which is comparable to recent estimates of 71-86% in various high-income countries (5). The model was used to project what would happen over the 2012-2020 period if the Department of Health targets of 10 million tests per annum were met, and the model projected that the 90% target would be reached a couple of years ahead of 2020. The target of 10 million appears achievable, as the number of HIV tests performed in 2011/12 was around 10.4 million. These results suggest that South Africa is making good progress in scaling up access to HIV testing.

However, there are a number of problem areas. Firstly, the age patterns in the self-reported data suggest a substantial drop off in rates of HIV testing at older ages. As a result, people who become infected with HIV at older ages are much less likely to get diagnosed, and many will only get diagnosed in the very advanced stages of HIV disease, when their prognosis is poor. Secondly, rates of HIV testing appear to be substantially lower in men than in women, particularly at young ages. This difference persists even after excluding antenatal HIV testing, which accounts for some of the gender differential. These age and sex differences reflect societal norms and perceptions of risk; older adults are typically not perceived to be at risk of infection, and are therefore less likely to be offered HIV testing, while men are expected to be resilient and many seek healthcare only once their health problems have progressed to an advanced stage. If we are to address the problems around low testing rates in men and older adults, norms around HIV testing need to change, both among healthcare providers and the population generally.

### *Problems with self-reported HIV testing data*

The model results also provide a number of important insights into the likely biases in self-

reported data on past HIV testing. Firstly, HIV-negative individuals tend to over-report past testing. This is in fact consistent with studies on the accuracy of self-reported uptake of screening services for other health conditions, such as cancer (6). This may be a form of social desirability bias: people want to appear to the interviewer as if they are responsible and are taking care of their health. However, in HIV-positive individuals there appears to be little bias in the reporting of past testing – if anything, they tend to slightly *under*-report past testing. The explanations for this are not clear, but we suspect that in HIV-positive adults, the social desirability bias mentioned previously may be offset by a reluctance to discuss their HIV testing history with interviewers. Of individuals who were HIV-positive in 2012, and who reported not knowing their HIV status, 26% had antiretroviral drugs detectable in their blood specimens. This is a very clear indication of the problems with self-reported data on “knowing your status”, and it suggests that HIV-diagnosed individuals are often reluctant to discuss their HIV status with researchers. Answering “no” to questions about past HIV testing may be the easiest way to avoid potentially uncomfortable conversations about being HIV-positive.

These results point to the significant problems with relying only on self-reported survey data when attempting to estimate the fraction of the HIV-positive population that is diagnosed. We recommend that survey data be combined with routine data on numbers of tests performed and levels of HIV prevalence in individuals tested for HIV when estimating rates of HIV testing and diagnosis. This process of data synthesis is challenging, but in an integrated mathematical modelling framework that includes HIV prevalence data and demographic data from other sources, it is achievable.

A limitation of this analysis is that it only includes HCT data collected up to 2012. Since the time when this analysis was done, more recent data have become available, showing a drop-off in the numbers of HIV tests performed in the public health sector – from 8.8 million in 2011/12 to 6.7 million in 2013/14 (7). This is worrying, as it implies that the target of 10 million HIV tests per annum is not being met. The reduction in testing numbers may be a reflection of testing fatigue following the intense campaigns of 2010 and 2011. New methods of reaching previously-untested segments of the population need to be considered,

such as home-based HIV testing, which involves HIV testing teams offering HIV testing in communities on a door-to-door basis. Incentivized HIV testing (offering vouchers or lottery-style rewards to individuals who undergo testing) may also be a way to increase testing. Self-testing for HIV (over-the-counter HIV tests that can be purchased at pharmacies) could be an attractive alternative for individuals who wish to avoid going to clinics for HIV testing, although this is not yet recommended in South Africa (8). Mobile HIV testing services will also be important in making HIV testing accessible in rural communities located far from clinics. These and other strategies need to be explored if South Africa is to make substantial future progress in preventing and treating HIV.

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