



## HIV prevalence in three predominantly Muslim residential areas in the Cape Town metropole

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**Objective.** To report on the results of a random and representative household survey of HIV prevalence in 3 predominantly Muslim areas in the Cape Town metropole.

**Method.** A cross-sectional representative community household survey was conducted in 3 residential areas. Aerial photographs were used in the selection of a random sample of 548 households, with the objective of obtaining an oral fluid sample and behavioural data from 2 inhabitants per household. Phase 1 of the study involved preparing the communities and notifying the household residents of the study. In phase 2, trained nurses collected oral fluid specimens for HIV testing and administered a confidential and anonymous behavioural questionnaire to household inhabitants aged 15 years and older.

**Results.** A total of 717 people completed a behavioural interview and 512 were tested for HIV, yielding response rates of 65% and 47% respectively. The specimens of 503 respondents

were correctly matched with behavioural data; 352 of these respondents indicated that they were Muslim. Of these oral fluid specimens 9 were reactive and 341 were non-reactive. We therefore calculated HIV prevalence among Muslims living in the three areas at 2.56% (95% confidence interval (CI): 1.18 - 4.80%). None of the individuals who tested HIV-positive had been previously tested for HIV. There were no HIV infections in the remainder of the sample.

**Conclusion.** The results indicate that HIV prevalence among Muslims living in the 3 targeted residential areas of the Cape Town metropole, while not trivial, is significantly lower than the national prevalence for South Africa. These results imply the need for ongoing prevention and education programmes specifically targeting Muslim youth and adults and support and assistance for Muslims infected with and affected by HIV.

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Obtaining accurate prevalence data on the HIV epidemic in South Africa is methodologically complex. Three estimates are commonly used to estimate the HIV prevalence rate of a population.

### Antenatal data

Based on its sample of more than 16 000 women attending antenatal clinics across all 9 provinces, the Department of Health survey<sup>1</sup> estimated that 27.9% of pregnant women were living with HIV in 2003. Using simple calculations, the study estimated that 5.6 million South Africans were HIV-positive at the end of 2003, of whom 55% were female and 96 228 were babies. In producing these figures it was assumed that pregnant women accurately represented all women aged 15 - 49 years, that men were 85% as likely to be infected as women, and that 30% of babies born to infected mothers would themselves be HIV-positive (ignoring any reductions as a result

of preventive action). According to these figures then, around 22.8% of all South Africans over 15 years old were HIV-positive in 2003.

### National household survey data

The Nelson Mandela/Human Sciences Research Council (HSRC) study<sup>2</sup> on HIV/AIDS conducted in 2002, involving<sup>8</sup> 8 428 participants, estimated that 11.4% of all South Africans over the age of 2 years were HIV-positive in that year. Among those between 15 and 49 years old, the estimated prevalence rate was 15.6% in 2002. Among females, prevalence was highest among 25 - 29-year-olds, while among males the highest prevalence was in the 30 - 34-year age group. According to these results, males were 74% as likely to be infected as females.

### Death notification data

In a report published by Statistics South Africa<sup>3</sup> it was noted that there was a substantial rise in the proportion of deaths among persons aged 25 - 49 years over the past several years. In 1997 people in this age group accounted for 23% of all deaths, but in 2003 they made up 34%. A study conducted by the Medical Research Council (MRC) claimed that the majority of deaths from HIV during this time period were misclassified because of stigmatisation.<sup>4</sup> The study concluded that HIV caused the deaths of 53 185 men aged 15 - 59 years, 59 445 women aged 15 - 59 years, and 40 727 children under 5 years old in the year 2000 - 2001.

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The disparity between the estimates stems from the fact that each uses a standard surveillance technique to obtain its estimates and clearly explains all of its methods, calculations and shortcomings. In order to resolve these inconsistencies the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) recommend that antenatal and population-based studies should both be conducted at regular intervals to obtain a more conclusive picture of the epidemic.

It is well established that HIV is not evenly distributed across South Africa and there is considerable variation in HIV infection rates across racial, ethnic, and religious subgroups. To date there has been no research on the prevalence of HIV among South African Muslims, a religious group that represents an estimated 1.45% of the South African population.<sup>5</sup> One study<sup>6</sup> used data from several sub-Saharan African countries to conduct a correlational analysis between the percentage of Muslims living in each country and that country's HIV prevalence rate. The results showed that HIV incidence was lower among Muslims than non-Muslims living in sub-Saharan Africa. Possible reasons for this association included higher rates of circumcision, lower rates of alcohol consumption, and lower rates of extramarital sex among Muslims. However, as the author acknowledges, 'the data used in the analysis were obtained from different sources by different methods and almost certainly vary with respect to accuracy'.<sup>6</sup> Therefore the extent to which these data are valid and applicable among South African Muslims is unclear.

Research on sexual risk behaviours suggests that in general the risk of HIV infection among South African Muslims is similar to the risk among other religious groups. For example, Toefy<sup>7</sup> studied the records of the Muslim Judicial Council of South Africa as a means to determine the reasons couples cited for initiating divorce proceedings. In a sample of records from 600 couples, 57% had cited pregnancy as the original reason for getting married and 20% cited spousal infidelity as the primary reason for initiating divorce proceedings. These data suggest that the proportion of Muslims engaging in unprotected sex outside of marriage is not insubstantial and that behavioural risks for HIV infection among Muslims may be higher than has been commonly acknowledged.

Unfortunately, the absence of empirical data on HIV prevalence among South African Muslims hinders further understanding of HIV risks in the Muslim communities of South Africa. The present study was undertaken to provide an estimate of HIV prevalence among Muslims living in Cape Town. To this end an initial investigation was undertaken in 3 areas in the Cape Town metropole inhabited predominantly by Muslims.

## Method

The study methodology was modelled on the Nelson Mandela/ HSRC study of HIV/AIDS.<sup>2</sup> It involved conducting anonymous linked HIV testing in order to determine the relationship between HIV status and socio-demographic and behavioural variables. The purpose of the study was to provide data to be used as a basis for designing interventions to prevent new infections among South African Muslims and to forecast the likely development of the epidemic in this religious group. Ethical approval for conduct of the study was obtained from the Faculty of Medicine Institutional Review Board at Stellenbosch University.

## Defining geographical areas

High-resolution, colour digital aerial photographs of the 3 targeted areas were obtained from the Geographic Information Systems Department of the City of Cape Town. These photographs had already been taken before commencement of the study and were made available to the investigators on request. The use of digital aerial photography for the household sampling process and field data collection was unique, and greatly enhanced the validity and efficiency of the study. It enabled us to identify and randomly select households in office, and thus obviated the need for field listing. We over-sampled the structures in the region by 30% so that when structures were identified that were not households we could omit these from the list of structures to be approached to participate.

## Procedure

### Phase 1 – Preparation of communities for the study

Given the sensitive nature of the research, a high rate of refusal to participate in the study was anticipated. For this reason it was necessary to prepare residents in the 3 targeted areas for the study. The process of preparing communities for the study took place between the months of November 2003 and February 2004 using the following procedures:

1. A discussion on Voice of the Cape, a Muslim community radio station serving the Cape Town area, informed listeners about the study and encouraged participation in the targeted areas.
2. Meetings were held with community and religious leaders in the 3 targeted areas to explain the study to them and to obtain their support for conduct of the study.
3. Positive Muslims, the faith-based organisation that collaborated in the study, prepared a sermon to be read at various mosques around the Cape peninsula on the Friday before World AIDS Day. In the 3 areas where the study was to



be conducted a component describing the present study was included in the sermon. The assumption was that if congregants heard about the study from a religious leader they would be more likely to agree to participate when approached by study personnel than if this was not the case.

4. A cadre of qualified nurses hired by the project approached the heads of the selected households 1 week before actual data collection began to inform them of the study, to request their participation and to obtain an indication of the likelihood of their participation.

### *Pilot study procedures*

A pilot study involving 50 households was conducted in December 2003. The aim of the pilot study was to determine the acceptability and readability of the behavioural questionnaire and to provide opportunities for the nurses to streamline the procedures for obtaining saliva specimens and collating these with the questionnaires using a bar coding system for anonymous unique identifiers.

### **Phase 2 – Main study procedures**

#### *Sampling*

The study population comprised all persons over the age of 15 years living in homes in 3 targeted residential areas inhabited predominantly by Muslims. The sampling frame thus excluded individuals living in educational institutions, old age homes, hospitals, hostels, and uniformed service barracks. A sample of 500 households was estimated to be appropriately representative of the total number of households in the 3 areas. Given the sensitive nature of the study and based on the refusal rate of 26.3% in the Nelson Mandela/ HSRC study<sup>2</sup> it was estimated that approximately 30% of the households approached would decline participation. For this reason we over-sampled by 30% and approached a total sample of 650 households. Of these, 102 were non-valid visiting points as defined by being businesses, churches, mosques, or empty fields. Of the remaining 548 households, 533 households participated in the study and 15 refused to participate.

The nurses hired by the project recorded the names and ages of each household member on a record sheet. Two members of each household, 1 between the ages of 15 and 24 years, and the other aged 25 and above were then randomly selected to participate in the study. The sampling frame was identified by means of street addresses and plot numbers on the aerial photographs of the 3 residential areas. The data were collected in the early evenings and over weekends so that the likelihood of recruiting working people in the sample was high.

#### **Data collection**

On agreeing to participate in the study, participants were asked to sign an informed consent form. Each person was then asked to contribute a saliva specimen by placing a specimen

collection pad between his/her lower cheek and gum. This was left for a few minutes, and then placed in a vial. Each subject was also asked to complete a self-administered behavioural questionnaire that assessed AIDS awareness, attitudes towards people with AIDS, condom use, HIV testing, risk behaviours and demographic information. The religious affiliation of respondents was only determined after data collection as this information was included in the demographic data elicited by the questionnaire. Besides basic demographic information, no other identifying information concerning the subject was asked for or obtained outside of the survey. Participants were provided with brochures that included contact information on voluntary counselling and testing centres in the area where the study was conducted.

#### *HIV testing*

We used the Orasure HIV-1 oral specimen collection device in combination with the Vironostika HIV UNI-FORM II plus O enzyme-linked immunosorbent assay (ELISA) test kits to collect specimens for HIV testing. The Orasure/Vironostika testing methodology is the only 1 approved by the United States Food and Drug Administration for use on oral fluids. According to the manufacturers the sensitivity and specificity of the Orasure device when tested with the Vironostika enzyme immunoassay are 99% and 99%, respectively. The advantages of the Orasure device include the ease with which oral fluid specimens are obtained and the fact that the specimen remains stable in ambient conditions for up to 21 days after specimen collection. All specimens were collected, transported, stored, and tested according to detailed standard procedures.

#### *Laboratory testing procedures*

It was important to ensure that HIV testing conducted by the laboratory was of the highest standard possible. The laboratory had substantial experience in conducting HIV ELISA tests, conducted such tests as part of routine operations, and had internal and external quality control measures in place.

## **Results**

### **Enrolment rate into the study**

Regardless of religion, we obtained data from 548 households altogether, indicating a response rate of 84%. We obtained a total of 512 oral fluid specimens, which was much lower than the expected number of 2 specimens per household. The reason for this discrepancy was that 227 (41.4%) households were inhabited by persons in both age groups, while 260 (47.4%) households were inhabited only by persons aged 25 years and above. These results indicate that demographically the sample was skewed toward the older age group.

We obtained a total of 726 valid behavioural questionnaires regardless of religion. Of the 726 persons who completed



behavioural questionnaires, 205 declined to give an oral fluid specimen. Of the 512 participants for whom oral fluid specimens were obtained, 9 cases had no questionnaire data, so we were not able to determine their religious affiliation. We therefore had a total of 503 valid oral fluid specimens matched with behavioural questionnaires; of these respondents, 352 indicated that they were Muslim. Therefore 70% of the valid sample of Orasure tests and matching questionnaires were obtained from Muslim participants.

We obtained a total of 470 valid behavioural questionnaires completed by Muslims only. This includes the 352 who gave oral fluid specimens and the 118 who declined to give an oral fluid specimen. We therefore do not know the HIV status of the 118 who declined to give oral fluid specimens. Comparison of Muslims who provided specimens with those who declined failed to indicate any significant differences in age, gender, education, employment status, marital status, having known a person living with HIV/AIDS, history of previous HIV testing, or history of a sexually transmitted infection (STI).

Tables I and II present the demographic data for the whole sample and the Muslim sub-sample, respectively.

## HIV results

We obtained a total of 512 valid oral fluid samples, of which 9

**Table I. Demographic variables for all respondents**

| Demographic variables               | %    |
|-------------------------------------|------|
| Age (years)                         |      |
| 15 - 24                             | 31.8 |
| 25 - 49                             | 38.8 |
| 50+                                 | 29.3 |
| Gender                              |      |
| Male                                | 36.9 |
| Female                              | 59.9 |
| Racial group                        |      |
| Black                               | 2.0  |
| White                               | 2.0  |
| Indian                              | 6.4  |
| Coloured                            | 81.3 |
| Other                               | 5.3  |
| Religion                            |      |
| Muslim                              | 65.1 |
| Christian                           | 31.3 |
| Other                               | 2.9  |
| Employment status                   |      |
| Employed                            | 37.0 |
| Unemployed                          | 61.4 |
| Marital status                      |      |
| Single                              | 38.6 |
| Married                             | 52.3 |
| Separated/divorced                  | 7.0  |
| Resident status                     |      |
| Lived in the area their whole lives | 91   |
| Has not always lived in the area    | 9    |

**Table II. Demographic variables for Muslim respondents only**

| Demographic variables               | %    |
|-------------------------------------|------|
| Age (years)                         |      |
| 15 - 24                             | 33.6 |
| 25 - 49                             | 41.8 |
| 50+                                 | 24.6 |
| Gender                              |      |
| Male                                | 35.5 |
| Female                              | 64.5 |
| Racial group                        |      |
| Black                               | 0.7  |
| White                               | 0.2  |
| Indian                              | 7    |
| Coloured                            | 81.5 |
| Education                           |      |
| Primary school                      | 24.3 |
| High school                         | 49   |
| University                          | 26.7 |
| Employment status                   |      |
| Employed                            | 38.1 |
| Unemployed                          | 61.1 |
| Marital status                      |      |
| Single                              | 36.7 |
| Married                             | 54.6 |
| Separated/divorced                  | 6.3  |
| Resident status                     |      |
| Lived in the area their whole lives | 93   |
| Has not always lived in the area    | 7    |

were HIV-positive and 503 were negative, yielding an overall prevalence rate regardless of religious affiliation of 1.76% (95% CI: 0.81 - 3.31%). Of the total of 352 oral fluid samples we obtained from Muslims, 9 were HIV-positive and 341 were HIV-negative, yielding a prevalence rate in the Muslim portion of the sample of 2.56% (95% CI: 1.18 - 4.80%). In 2 cases the Orasure results were ambiguous. These were resolved by means of casewise deletion. Table I presents demographic data of the HIV-positive cases together with their history of testing. As can be seen, none of the cases had previously had an HIV test.

Table III presents demographic data and information on the history of sexually transmitted diseases (STDs) and previous HIV testing for the cases found to be HIV-reactive.

## Discussion

To the best of our knowledge, this was the first-ever community-based HIV prevalence study specifically targeting a predominantly Muslim population conducted anywhere in the world. Using a community-based random sample is clearly advantageous in generating estimates of HIV prevalence. The fact that 65% of the sample indicated their religious affiliation as being Muslim suggests that the data yielded by the study is a valid indication of HIV prevalence among Muslims in the



Table III. Characteristics of HIV-positive respondents in the sample

| Gender | Age (years) | Race     | Employment status | Marital status | History of STDs | Ever been tested for HIV |
|--------|-------------|----------|-------------------|----------------|-----------------|--------------------------|
| Female | 40          | Coloured | Employed          | Single         | None            | No                       |
| Female | 79          | Indian   | Unemployed        | Married        | None            | No                       |
| Male   | 36          | --       | Employed          | Married        | None            | No                       |
| Female | 17          | Coloured | Unemployed        | Single         | None            | No                       |
| Male   | 18          | Coloured | Unemployed        | Single         | None            | No                       |
| Female | 43          | Coloured | Employed          | Married        | None            | No                       |
| Female | 32          | White    | Unemployed        | Divorced       | None            | No                       |
| Female | 50          | Coloured | Employed          | Divorced       | None            | No                       |
| Female | 23          | Coloured | Employed          | Married        | None            | No                       |

targeted areas. Moreover, the sample size was large enough to allow for a meaningful analysis of the data as a whole.

The fact that the sample was mostly over 25 years of age indicates that the results obtained in the study may be less applicable to Muslims aged 24 years and younger. Moreover, the extent to which these results permit generalisation beyond the three residential areas is an important consideration. Given the racial and middle- to lower-income socio-economic status of the sample, it is doubtful that the results of the study are generalisable to all South African Muslims regardless of race, ethnicity, and socio-economic status. The 3 areas in which the data were collected are considered middle-to-lower income areas. It would have been prudent to examine the prevalence rate and risk behaviour of Muslims living in very-low-income areas, but it was not possible to identify specific areas where Muslims are concentrated in this socio-economic grouping. South African Muslims are racially, geographically and economically diverse. As such, the prevalence of HIV in these varied segments of South African samples awaits further investigation.

The present study has 2 important implications. Firstly, a prevalence estimate of 2.56% obtained from the sample indicates that preventive efforts are necessary to ensure low rates of seroconversion in the future. Muslim religious leaders, mosques, and faith-based organisations may play an important role in spearheading such preventive efforts by designing and implementing effective education and awareness programmes specifically focused on the cultural and religious sensibilities of Muslims. Addressing the stigma associated with HIV infection may form an important component of education and awareness strategies. A decade ago the prevalence of HIV in South Africa was much lower than the 2002 estimate of 11.4% of HIV/AIDS in the country.<sup>3</sup> That none of the positive cases in this study had been tested for HIV and none reported a

previous STI is particularly alarming and signals the potential for rapid spread of HIV in these communities. If allowed to go unchecked, HIV prevalence among South African Muslims is likely to increase over the coming years.

Secondly, the data suggest that there may indeed be large numbers of Muslims infected with and affected by HIV. It is therefore imperative that antiretroviral treatment and hospice and burial services catering to the specific religious and spiritual needs of Muslims infected with HIV be made available within communities. Further, it is necessary that the stigma associated with HIV infection and death from AIDS be addressed.

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