

Feasibility of a Population Based Survey on HIV Prevalence in Barbados, and Population Preference for Sample Identification Method

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Abstract: *Objective:* To predict response rate and validity of a population-based HIV prevalence survey in Barbados using oral fluid, and the method of sample identification preferred by participants.

Methods: Persons age 18 to 35 randomly selected from the voters' register to participate in a study of the prevalence of chlamydia and gonorrhoea (STI) were invited to answer a questionnaire.

Results: Of 496 persons selected for the STI study, 88 did not participate, and a further 10 did not answer the questionnaire, leaving 398 respondents. 329 persons or 66% (60% men, 73% women, $p = 0.003$) of the original 496 persons said that they would be willing to take part in an HIV survey using oral fluid.

People indicating willingness to take part in an HIV survey did not differ significantly from non-respondents and those indicating unwillingness to participate by a number of demographic and STI risk factors including age, education level, partnership status, number of partners, condom use, drug use, and STI infection status.

For persons willing to participate in a HIV survey, confidential linked sample identification was acceptable to 99.0% (95% CI ± 1.0), and unlinked identification to 1.6% (95% CI ± 1.3).

Conclusion: The HIV prevalence estimated by a linked survey would have a reasonable response rate and be valid, as likelihood of participation is not related to infection risk.

Keywords: HIV, saliva, population surveillance, prevalence, sample identification.

INTRODUCTION

Between 1984 when the first HIV/AIDS case was diagnosed in Barbados, and December 2005, the cumulative number of cases was 3110 (1889 males and 1086 females), 70% of persons were between 20 to 49 years of age at diagnosis, and 1283 deaths were recorded [1]. It is estimated that 97% of women attending public antenatal clinics between January and March 2003 had voluntary testing [2]. In 2002 prevalence in antenatal women was 1.2%, and from this the estimated prevalence for Barbados was 1.75% [3].

In many countries HIV prevalence is estimated by extrapolation of data derived from sentinel groups, particularly antenatal women. However, population-based surveys done in India and in several African countries have shown that these estimates can significantly overestimate prevalence [4,5]. But in South Africa a national HIV survey gave an age adjusted prevalence similar to that derived from antenatal surveillance [6].

For the purposes of surveillance different methods can be used to label specimens [7]. These can be divided into two categories: a) unlinked anonymous tests with or without

informed consent, and b) linked testing, which can be confidential or anonymous. With unlinked anonymous tests personal identifiers are not collected, and it is not possible to trace persons with positive tests. Blood routinely collected for another purpose might be tested for HIV without informed consent, but in a population-based HIV prevalence survey, informed consent is needed from each respondent. With linked testing pre and post-test counselling would be necessary to conform to the usual standard in Barbados. With confidential linked testing a code or name can be used to identify the specimen, and the person can be informed of the result. With anonymous linked testing the specimen is labelled with a code not linked to any personal identifiers, and only the person can link this code to the result.

Oral fluid samples as collected by the OraSure device [8] would be more suitable for community-based studies than blood tests, as they are easier to collect, do not require the disposal of sharps, are less of a transmission hazard, and remain stable at room temperature for 3 weeks. Positive tests can also be reconfirmed by a second ELISA and by Western Blot. Studies conducted in the Caribbean [9, 10] gave a sensitivity and specificity comparable to those achieved with blood samples. Manufacturers of the Vironostika enzyme immunoassay report a sensitivity and specificity of 99% [11].

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A national HIV prevalence survey would be expensive, labour intensive, time consuming and require careful planning. It would therefore be useful to know in advance if the population would find participating in an HIV prevalence study acceptable, if the sample agreeing to testing would be unbiased, and what method of identification of specimens would be preferred by the population.

METHODS

Eighteen to 35 year olds were randomly selected from the voters' register of the St. Michael South East electoral district, Barbados to determine the prevalence of *Chlamydia trachomatis* and *Neisseria gonorrhoea* [12]. Respondents completed a questionnaire and provided a first void urine sample to a field worker for CT/NG testing using PCR. Respondents were then invited to participate in this survey on HIV testing. Separate written consent was obtained.

The study area has an estimated population 8450 persons (1731 males and 1719 females between the ages of 18 and 35 years), or 3% of the Barbados population. It is approximately one mile east of the capital Bridgetown, and contains all socio-economic strata [13].

Respondents were asked whether they would participate in an HIV survey using an oral fluid sample and to choose between a) confidential linked testing using the name, b) confidential linked testing using a code, and c) unlinked anonymous testing where no one including the researchers would be able to match the result to the individual. Respondents were informed that the first two options would allow them to receive the test result, but the use of a code would increase confidentiality, as only one person in the research team would be able to match it to the name.

Data Analysis

SPSS 10.0, and the Creative Systems Research sample size calculator [14] were used to analyse data. The Chi-square test was used to determine the statistical significance of associations between the categorical variables. Fishers Exact test was used when numbers were small. Non-normally distributed continuous variables were tested for significance using the Mann-Whitney U test. $P < 0.05$ by two-tailed test was considered statistically significant.

Ethical approval was obtained from the Ministry of Health, Barbados.

RESULTS

Of 496 persons (248 males and 248 females) who were randomly selected to participate in the study to determine the prevalence of *Chlamydia trachomatis* and *Neisseria gonorrhoea*, 88 (52 males and 36 females) declined to take part. Of the remaining 408 persons, 10 (6 males and 4 females) did not participate in the survey on HIV testing. This gave a total of 98 non-responders with a median age 26 years (interquartile range [IQR] 10), and 398 respondents, median age 25 years (IQR 10), ($p = 0.753$).

Of the 398 respondents, 69 (17%) answered that they would not participate in an HIV survey as described to them, leaving 329 who would participate. Assuming that none of

the persons who refused to take part in the Chlamydia/Gonorrhoea study would have agreed to take part in the HIV survey, 329 persons or 66.3% (95% CI ± 3.9) of the original 496 persons said that they were willing to take part in an HIV survey using oral fluid. Women were more likely than men ($p = 0.03$) to indicate willingness to participate in a study (Table 1). There was not a significant difference in response by other characteristics.

Of the 322 persons indicating a preference of sample identification, 309 (96.0%, 95%CI ± 2.0 %) were willing to have a code used to identify the sample. Of these 297 (92.2%, 95%CI ± 2.8) selected the use of a code exclusively. Twenty persons (6.2%, 95%CI ± 2.5) (10 males and 10 females) were willing to have their names used to identify the samples. Of these 10 (3.1+1.8%) indicated they would be also be willing to use a code. Five persons (1.6%, 95%CI ± 1.3) (3 males and 2 female) were willing to use an unlinked anonymous sample. Of these, 2 would also be willing to use a code. In total, 319 (99.1%, 95% CI ± 1.0) would be willing to use some form of linked testing (code or name).

DISCUSSION

Sixty-six percent of adults between 18 to 35 years of age were willing to provide an oral fluid sample for HIV testing. This is similar to the 65% response for a household survey using oral fluid in South Africa [15], but less than the 82% response with finger stick blood in India [4]. All persons who would participate, had provided urine in a preceding Chlamydia/Gonorrhoea prevalence survey, which shows that population surveys for sexually transmitted infection are feasible in Barbados [12]. However, 18% of those who provided urine were not willing to provide oral fluid, suggesting some additional stigma and fear, or perceived lack of benefit from HIV testing.

HIV infection is not evenly distributed in any population. The prevalence depends on the risk behaviours of groups within that population. Men were significantly less likely than women to indicate willingness to participate (Table 1). This is the case in many surveys. However potential risk factors such as age, educational level, income, lifetime number of partners, condom use at last intercourse, current infection with Chlamydia and/or Gonorrhoea, and a history of drug use were not associated with willingness to have a HIV test. A survey therefore could produce a valid estimate of HIV prevalence, as there is no indication that refusal to participate is associated with risk for HIV infection.

Linked confidential testing using a code to identify the specimen was the preferred choice of almost everyone. This labelling method is used for routine HIV testing in Barbados, while the patient's name is used on every other type of laboratory specimen. Rejection of the unlinked anonymous option suggests that most persons are interested in knowing their HIV status. This has implications for planning a future study, as pre and post-test counselling would be needed.

Only one district was surveyed, with the assumption that non-responders in the preceding Chlamydia/Gonorrhoea

Table 1. Willingness to Participate in a Survey Using Oral Fluid to Estimate HIV Prevalence by Category

| Category | Number (%) of Respondents in Each Category ^{&} (n = 408 Eligible Unless Otherwise Indicated) | Would Do HIV Test Number (% ± 95% CI) | p by Chi Square (Unless Otherwise Indicated) |
|---|---|---|--|
| <i>Gender</i> Male Female | (n = 496) 248(50) 248 (50) | 149 (60 ± 6) 180 (73 ± 5) | 0.003 |
| <i>Age (years)</i> 18 to 20 21 to 35 | (n = 496) 111 (22) 385 (78) | 73 (66 ± 8) 256 (67 ± 4) | 0.791* |
| <i>Education</i> Secondary or less Polytechnic Tertiary | 247 (63) 59 (15) 90 (23) | 201 (81 ± 5) 43 (73 ± 11) 74 (82 ± 8) | 0.295 |
| <i>Partnership Status</i> Married Common law Single/separated | 34 (9) 45 (11) 318 (80) | 25 (74 ± 14) 37 (82 ± 11) 257 (81 ± 4) | 0.564 |
| <i>Monthly Income</i> <\$500 500-999 1000-1499 1500 or more | 117 (33) 75 (21) 59 (16) 108 (30) | 92 (79 ± 7) 62 (83 ± 8) 49 (80 ± 10) 86 (80 ± 7) | 0.854 |
| <i>Health Care Source</i> Private GP [@] Polyclinic | (n = 352) 174 (51) 170 (49) | 141 (81 ± 6) 138 (81 ± 6) | 0.973 |
| <i>Last Medical Consultation</i> <6 months ≥6months/can't recall | 185 (46) 218 (54) | 149 (81 ± 5) 176 (81 ± 5) | 0.961 |
| <i>Age of Sexual Debut</i> <15 years 15 to 17 years >17 years | (n = 383) 68 (19) 196 (54) 98 (27) | 55 (81 ± 9) 156 (80 ± 5) 85 (87 ± 6) | 0.255* |
| <i>Lifetime No. of Sex Partners</i> 0 1-2 3 or more | 25 (6.7) 81 (21.7) 267 (71.6) | 20 (80 ± 15) 61 (84 ± 8) 216 (81 ± 4) | 0.792* |
| <i>Number of Partners in Last 12 Months</i> 0 1 2 or more | 55 (14) 292 (73) 56 (14) | 44 (80 ± 10) 240 (82 ± 4) 42 (75 ± 11) | 0.448 |
| <i>Chlamydia and/or Gonorrhoea Infected</i> Yes No | (n = 397) 50 (13) 347 (87) | 43 (86 ± 9) 277 (80 ± 4) | 0.302 |
| <i>Condom Use Last Intercourse[#]</i> Yes No | (n = 319) 151 (53) 136 (47) | 124 (82 ± 6) 115 (85 ± 6) | 0.580 |
| <i>Condom Use Last Intercourse: Commercial Partner</i> Yes No | (n = 22) 14 (67) 7 (33) | 11 (79 ± 20) 5 (72 ± 31) | 1.00** |
| <i>Smokes Cigarettes</i> Yes No | 51 (13) 352 (87) | 41 (80 ± 10) 283 (80 ± 4) | 1.000 |
| <i>Used Marijuana</i> Yes No | 112 (28) 289 (72) | 91 (81 ± 7) 232 (80 ± 4) | 0.825 |
| <i>Used Cocaine</i> Yes No | 4 (1) 396 (99) | 4 (100 ± 9) 319 (81 ± 4) | 1.000** |

[&]For gender and age all 98 non-responders were assumed to be unwilling to do an HIV test and were included in the analysis (n = 496 eligible). For all other categories 10 non-responders to this survey were included where data was available from a preceding survey.

*p using the Mann-Whitney U test on the continuous variable.

[@]General practitioner.

[#]Condom use with a partner not being lived with.

**Fisher's exact test.

study [12] would also be non-responders for a HIV study. These limitations need to be taken into account when interpreting this study. Barbados is however a small island, and much more homogenous than India or South Africa where surveys have been successfully completed. An actual survey would need to be extended beyond the 18 to 35 years age group. In a survey where the test is actually being offered, the response rate may differ from the situation in this survey where the test was hypothetical.

CONCLUSIONS

These findings should reduce concerns that linked surveys result in biased findings because those at most risk of disease will refuse to take part. A population based prevalence study has the potential of providing unbiased population based information to health planners, and valuable information to the individuals who participate.

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