showed similar associations with testing positive in CSI (OR 2.4 [95% CI 2.1 to 2.7]) and the STI centres (OR 1.2 [95% CI 1.0 to 1.3]), but the model basing ethnicity on country of birth of a person and his parents had a better fit (higher likelihood). Self-defined ethnicity may allow for more personal input, this however also makes it a dynamic variable: in the second round of CSI, 15% of the immigrants identified themselves by a different ethnicity than in the first round see Abstract P1-S4.02 Figure 1.

**Conclusions** Both self-defined ethnicity and ethnicity based on the country of birth of a person and his parents, can be used to detect young persons at a higher risk of Chlamydia infection. However the definition of ethnicity based on the country of birth explains variation in the Chlamydia data better and is objective and constant, whereas self-defined ethnicity would disregard a large part of the young population at higher risk for Chlamydia infection.

---

P1-S4.03 **USING ORGANISM LOAD OF *CHLAMYDIA TRACHOMATIS* AND *NEISSERIA GONORRHOEAE* IN CLINICAL SPECIMENS AS AN EPIDEMIOLOGIC TOOL**

doi:10.1136/sextrans-2011-050108.147

[1]B Van Der Pol, [2]A Pantone, [3]J Williams. *[1]School of Public Health, Indiana University, Bloomington, USA; [2]School of Medicine, Indiana University, Indianapolis, USA; [3]School of Medicine, Indiana University, Indianapolis, USA*

**Background** The Abbott Realtime m2000 system (m2000) is a qualitative real-time PCR assay for the detection of CT and NG that has the capability to provide a relative measure of target DNA. Results from the m2000 were used to determine CT and NG organism load by comparing the delta cycle (DC) value of each specimen to a set of lab developed standards containing known concentrations of each organism.
**Methods** Vaginal swabs and male urine specimens were evaluated. Six standards of each organism were prepared by inoculating collection tubes with lab strains in concentrations ranging from 0 to $4 \times 10^5$ organisms. The log10 organism load for each positive specimen was determined by comparing the DC value to the calibration curve. Self-reported symptoms were available for each patient.
**Results** A total of 99 vaginal and 284 urine specimens were available for analysis. There was no statistical difference in DC value of mean organism load by gender. Neither was there a difference based on the presence or absence of symptoms in people infected with CT. For NG, there was a significant difference in mean DC value and organism load by gender (p<0.001 for both DC and organism load) with men having higher loads. In NG positive men the mean DC was 15.2 [95% CI 14.7 to 15.8] and 11.4 [95% CI 9.0 to 13.7] for men with and without symptoms (p=0.003). This translated in mean log10 organism loads of 6.5 [95% CI 6.3 to 6.6] and 5.4 [95% CI 4.7 to 6.1] for men with and without symptoms (p=0.005). In NG positive women there was no difference in organism load based on presence or absence of symptoms (p=0.220).
**Conclusions** Advantages to using this methodology include being able to quantify organism load from specimens obtained for routine diagnostic testing, using standardised test reagents that can be purchased commercially, and using an automated platform. Even in those settings that do not have the capacity for calibration, the DC values may provide useful relative loads. This exploratory study demonstrated the feasibility of using this method to obtain relative quantitation measures. Application of this tool to epidemiologic questions using larger data sets may prove useful.

---

P1-S4.04 **BIASES IN THE DESIGN OF STUDIES ASSESSING THE ROLE OF SEXUALLY TRANSMITTED INFECTIONS AS HIV RISK FACTORS**

doi:10.1136/sextrans-2011-050108.148

J O'Hagan, M Lipsitch. *[1]Harvard School of Public Health, Boston, USA*

**Background** For over 20 yearss sexually transmitted infections (STIs) have been studied as risk factors for HIV infection. We show how the design of studies in this field has inherent biases due to inappropriate confounder definition, coinfection, and heterogeneity in exposure to HIV. We use herpes simplex virus 2 (HSV2) to illustrate these biases and show that use of a serodiscordant couple design can remove them. Such findings are timely given the interest in using HPV vaccination for HIV prevention based on similar data.
**Methods** We developed an individual based model (IBM) using published data from an existing STI IBM (STDSIM). This model permits simulation of multiple cohort studies to show the direction and magnitude of these biases. The model is written in Matlab. Analyses were performed using Cox regression in SAS.
**Results** We identified four causes of bias. (1) While confounding by sexual behaviour is widely appreciated it is less well understood that perfect measurement of sexual behaviour will not permit adequate control of confounding as data on the frequency of HIV exposure is

---

Abstract P1-S4.04 Table 1  Comparison of standard study design and serodiscordant couples study design for estimating the per-sex act risk of HIV infection among HSV2 infected individuals compared to HSV2 uninfected individuals

| | Null Median HR (Lowest HR, Highest HR) | Different transmissibility Median HR (Lowest HR, Highest HR) | Coinfection increases hiv infectiousness Median HR (Lowest HR, Highest HR) | Susceptibility Median HR (Lowest HR, Highest HR) |
|---|---|---|---|---|
| Expected | 1 | 1 | 1 | 10 |
| Standard Design | 1.32 (0.84, 2.26) | 1.58 (0.64, 1.44) | 1.26 (1.01, 1.56) | 4.38 (3.28, 5.65) |
| Serodiscordant Couples | 1.03 (0.84, 1.44) | 1.07 (0.70, 2.11) | 1.03 (0.72, 1.25) | 10.33 (9.65, 12.77) |

20 simulations were performed for each bias scenario. Simulations were started in 1930. Cohort studies were conducted from 1992-95, which is the period during which the data used to parameterise the model were collected in rural Tanzania. The data from each run was analysed using Cox proportional hazards regression in two ways, both of which enrolled sexually active index subjects who were HIV negative and who could be HSV2 positive or negative:
1) Standard design — data on exposure to infection was not incorporated into the analysis.
2) Serodiscordant couples design — only those individuals who had an HIV infected partner were included and only for the length of time they were in the partnership.
All analyses adjusted for age in 5-year intervals, gender, and the baseline number of lifetime partners. Results presented are the median, lowest, and highest point estimates for the HR calculated from these runs. HIV and HSV2 per-sex act transmission probabilities were both equal to 0.02 unless otherwise stated.
Null: No interaction between HSV2 and HIV.
Different Transmissibility: No interaction between HSV2 and HIV. HSV2 per-sex act transmission probability = 0.03.
Coinfection Increases HIV Infectiousness: Coinfected individuals have twice the HIV per-sex act transmission probability than individuals infected with HIV alone (ie, 0.04 vs 0.02 respectively).
Susceptibility: The HIV per-sex act transmission probability to an HSV2 infected individual is 10 times higher than to an HSV2 uninfected individual (ie, 0.2 vs 0.02 respectively).
**Note**: Susceptibility is not affected in the first three scenarios. Also, parameter values have been changed from disease specific values to permit each bias to be presented separately. Concurrent partnerships are not permitted. Full sensitivity analysis results which relax these restrictions are not shown.

missing. We show that this bias can result in upward confounding. 2) As HSV2 is more infectious than HIV we expect HSV2 to be acquired from coinfected partners first followed by HIV. 3) As coinfection increases HIV viral load HSV2 infection may act as a proxy for a partner's elevated infectiousness with HIV. Both of these mechanisms result in upward bias, the magnitude of which depends on the prevalence of coinfection. 4) Between subject heterogeneity in the risk of disease has been shown to attenuate estimates for any risk factor. We show that this bias can result in significant attenuation of the HR and that it depends on the prevalence of HIV among subjects' partners and their sexual behaviour. We show that if HIV serodiscordant couples are enrolled all four biases can be removed see Abstract P1-S4.04 Table 1.

**Conclusions** The standard design is affected by at least four biases that preclude causal interpretations of all such HSV2-HIV studies performed to date. Use of a serodiscordant couple study design can remove these biases. It is impossible to correct previous results as the biases are not all in the same direction and their magnitudes depend on the unknown prevalence and transmissibility of both HSV2 and HIV among partners. These findings are expected to generalise to other STI-HIV risk factor studies and can help inform the decision to test HPV vaccination as an HIV prevention measure.

---

| P1-S4.05 | QUANTIFYING SOCIAL DESIRABILITY BIASES IN REPORTED CONDOM USE AMONG FEMALE SEX WORKERS IN SOUTHERN INDIA |

[1]M Pickles, [2]B M Ramesh, [3]R Adhikary, [2]S Rajaram, [2]S Isac, [4]R Washington, [1]M C Boily, [5]J Bradley, [6]S Moses, [7]M Alary. [1]Imperial College, London, UK; [2]Karnataka Health Promotion Trust, Bangalore, India; [3]Family Health International, India; [4]St John's Research Institute, Bangalore, India; [5]CHARME-India Project, Bangalore, India; [6]University of Manitoba, Winnipeg, Canada; [7]Centre hospitalier affilié universitaire de Québec, Quebec, Canada

**Background** As part of the Avahan HIV initiative in Southern India, surveys were carried out in female sex workers (FSWs) and their clients to quantify condom use. We examine reported condom use measured using different survey methodologies, and consistency of response between FSWs and clients to quantify the effect of social desirability bias.

**Methods** We use data from 15 districts with IBBA face-to-face interviews (FTFIs) for FSWs and clients. Three of these districts also had special behavioural survey (SBS) FTFIs, informal confidential voting interviews (ICVIs), and polling booth surveys (PBSs) for FSWs. ICVI/ PBS survey methodologies increase anonymity, reducing reporting bias of sensitive questions eg, condom use, and are analysed in more detail. The IBBA and SBS FTFIs differed as blood samples were taken in the IBBA to measure HIV prevalence. We use questions about condom use in last act with regular and occasional FSWs/clients. For the 15 IBBA districts the FSW: client ratio of reported condom use at last act was calculated.

**Results** In IBBAs, condom use in last act with occasional FSWs reported by clients in the 15 districts is 26% (range 13–40%) lower than FSW condom use with last occasional client, and 28% (3–46%) lower for last act with regular FSW/client. In the three districts with extra surveys, from Abstarct P1-S4.05 table 1, FSW reported condom use with occasional clients is broadly comparable, and the maximum difference with the more anonymous ICVI is 5% with regular clients in Belgaum. On average the IBBA FTFI was only 2% lower that other methods. Reported condom use with occasional clients was15–26% lower than that reported in the IBBA, but the difference between IBBA and PBS was smaller for use with regular clients.

**Abstarct P1-S4.05 Table 1** Reported condom use in last act by type of act for FSW surveys in the three districts where all surveys were carried out

| | Condom use at last act with occasional clients/FSWs | | | Condom use at last act with regular clients/FSWs | | |
|---|---|---|---|---|---|---|
| | Belgaum (%) | Bangalore Urban (%) | Bellary (%) | Belgaum (%) | Bangalore Urban (%) | Bellary (%) |
| FSW IBBA R1 FTFI | 96.43 | 93.31 | 82.82 | 86.91 | 75.12 | 77.57 |
| FSW IBBA R2 FTFI | 97.45 | 94.08 | 96.45 | 88.22 | 84.02 | 92.68 |
| FSW SBS FTFI | 91.40 | 85.98 | 90.70 | 82.43 | 91.18 | 94.41 |
| FSW SBS ICVI | 98.18 | 91.53 | 97.67 | 82.39 | 77.43 | 95.78 |
| FSW PBS R3 (May 2007) | 82.75 | 73.33 | 66.78 | 94.94 | 75.68 | 80.21 |
| FSW PBS R4 (Oct 2008) | 88.80 | 79.50 | 80.40 | 88.52 | 87.01 | 80.30 |

**Discussion** There is a substantial difference in reported condom use in last act with occasional and regular partner for FSWs and clients. However, the samples of FSW and clients may not be comparable because low-risk clients may be undersampled in hot spots. FSWs report lower condom use with occasional clients in the more anonymous PBS, suggesting this method may reduce social desirability bias more than FTFIs and ICVIs. Based on FSW data only and using a conservative estimate from the largest difference, the FSW IBBA may over-estimate condom use with occasional clients by up to 26% (mean 17%) and with regular clients by 13% (mean 2%).

---

| P1-S4.06 | WHAT IMPACT DOES MISSING QUEBEC DATA HAVE ON NATIONAL HIV SURVEILLANCE DATA? |

[1]K L Tomas, [2]R Bitera, [2]M Alary, [2]M Fauvel, [2]R Parent, [2]D Sylvain, [2]M Hastie, [2]C Claessens, [1]J Halverson, [1]C Archibald. [1]Public Health Agency of Canada, Ottawa, Canada; [2]Institut national de sante publique du Quebec, Canada

**Objective** To quantify the difference in the exposure category breakdowns of national HIV surveillance figures if exposure data from the Institut nationale de Santé Publique du Québec (INSPQ) were included in national datasets.

**Background** National HIV/AIDS surveillance is coordinated by the Public Health Agency of Canada's (PHAC) Surveillance and Risk Assessment Division's (SRAD). HIV is reportable in all provinces and territories, although the degree of epidemiologic information collected and submitted varies. Quebec's case reports to PHAC come from their laboratory-based surveillance system, which contains positive test reports, by age and sex. All Quebec cases are classified in SRAD's dataset as Not Reported, which contributes to the large proportion of cases at the national level with no known exposure category.

**Methods** Quebec's provincial HIV surveillance system "Programme de surveillance de l'infection par le VIH au Québec" collects further epidemiological information, including exposure category and risk factor information, although recorded separately from the HIV laboratory test results file. This provincial system's exposure category data was added to existing national surveillance data, and the exposure category breakdowns recalculated, in order to assess change in the proportion of unknown/not reported cases and to quantify the resulting difference in exposure category breakdowns at the national level.

**Results** With inclusion of Quebec data for 2009, there is a 50% decrease (from 45.5% to 23.1%) in the proportion of national HIV cases with unknown exposure category. There are also differences in the overall national exposure category breakdowns. For 2009, proportional increases were observed in the men who have sex with men (MSM) and heterosexual-endemic categories (5.4% and 2.8% respectively), while proportional decreases were observed in the exposure categories of injection drug use (−4.1%), heterosexual-risk (−2.0%), and no-identified-risk heterosexual (−2.2%).