

person-years of observation (pyo) for at least two of the three HIV-groups, i.e. a HIV-1 mono and/or a HIV-2 mono and/or a HIV-D infected group. Meta-analyses were performed using random effects models, estimating combined mortality rate ratios (MRRs).

**Results** Of the 631 identified titles, 7 articles met the inclusion criteria. Of these, 6 articles were included in the meta-analysis of HIV-D versus HIV mono-infected and 7 were included in the analysis of HIV-1 versus HIV-2 mono-infected people. The overall MRR of HIV-D versus HIV-1 was 1.11 (95% CI 0.95–1.30). The overall MRR of HIV-D versus HIV-2 was 1.81 (95% CI 1.43–2.30) and the MRR of HIV-1 versus HIV-2 was 1.86 (95% CI 1.44–2.39).

**Conclusion** The mortality rate of HIV-D infected individuals did not significantly differ from the mortality rate of HIV-1 mono-infected individuals. The mortality rates of both HIV-1 mono-infected and HIV-D infected individuals were significantly higher than the rate among HIV-2 mono-infected individuals. Therefore, we conclude that HIV-2 mono-infected have a lower mortality rate than HIV-1 infected individuals, but there is no evidence that HIV-D infected individuals survive longer than HIV-1 mono-infected individuals.

### P3.204 HIV RISK BEHAVIOUR AMONG MEN WHO HAVE SEX WITH MEN IN YANGZHOU AND GUANGZHOU CHINA: A COHORT STUDY

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**Q Wang**, Y Yin, X Chen, G Liang, B Wang, R Zhang, N Jiang. *Institute of Dermatology, Chinese Academy of Medical Sciences, Nanjing, China*

**Background** This study provides the HIV prevalence, HIV incidence, HIV risk-factors, and demographics of Yangzhou MSM and a comparison of HIV risk behaviour among Yangzhou and Guangzhou MSM in China.

**Methods** A cross-sectional study and a prospective cohort study were conducted among MSM in Yangzhou and Guangzhou from July 2009 to September 2010. A total of 617 MSM (317 Guangzhou, 305 Yangzhou) were screened for eligibility.

**Results** Compared with Guangzhou sample, Yangzhou sample was significantly older and lower educated and less likely to identify themselves as homosexual ( $p < 0.001$ ), but more likely to be married ( $p < 0.001$ ), and more likely to sex intercourse with female ( $p < 0.001$ ). No significant differences were found in receiving more than 5 sexual health services in two samples ( $p > 0.05$ ) and the proportions never or not always using condoms during sex with female and always use condoms in such a case ( $p > 0.05$ ). A higher prevalence of HIV and syphilis was found among Yangzhou sample than Guangzhou sample ( $p < 0.001$ ). Aged (older than 40 years), married, and syphilis-positive were associated with HIV infection in both samples. In Multivariate logistic regression analysis.

**Conclusions** There were significant differences in demographic characteristics and risk sexual behaviours and the prevalence and incidence of HIV and syphilis between Yangzhou sample and Guangzhou sample. Our results showed that Yangzhou sample was at higher risk of infection of HIV than Guangzhou sample and reinforced the strong need for more and further investigation targeting MSM in economic-medium cities to prevent HIV in China.

### P3.205 DECLINING HIV PREVALENCE IN ZAMBIA: SENTINEL SURVEILLANCE PROGRAMMATIC INSIGHT AND THE NEED FOR HIV INCIDENCE DATA

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**S Kamocha**, <sup>2</sup>C Mulenga, <sup>2</sup>D Mwakazanga, <sup>3</sup>M Monze, <sup>1</sup>I Nyoni, <sup>1</sup>F Soud, <sup>1</sup>M Shields, <sup>1</sup>M Marx. <sup>1</sup>Centers for Disease Control and Prevention, Lusaka, Zambia; <sup>2</sup>Tropical diseases research centre, Ndola, Zambia; <sup>3</sup>University teaching hospital, Lusaka, Zambia

**Background** Antenatal clinic (ANC) HIV sentinel surveillance has provided key data to inform health policy, especially between population-based surveys. HIV prevalence among teenage attendees has been used as a proxy for incidence in Zambia, where incidence data are lacking. We present trends in HIV prevalence among ANC attendees in Zambia since 1994.

**Methods** We assessed HIV prevalence in 15–39 year-old women accessing ANC in convenience sample-based cross-sectional surveys in 21 sites in 1994, 1998, 2002, 2004, 2006, 2008 and 2011. Anonymous blood was tested from consecutively-enrolled women on their first ANC visit; age, residence, parity and gravidity were also noted. We evaluated trends in HIV prevalence.

**Results** Among 8,222 women surveyed in 2011, HIV prevalence remained essentially unchanged from 2008 (16.2% vs. 16.4%,  $p = 0.74$ ), but declined from a peak of 19.6% in 1994 ( $p < 0.001$ ). Similarly, HIV prevalence stagnated among 1,661 15–19 year-olds between 2011 and 2008 (7.9% vs. 8.3%  $p = 0.66$ ) but declined from its peak of 13.9% in 1994 ( $p < 0.001$ ). Declines in HIV prevalence among rural residents have been modest (11.8% peak in 2004 vs. 10.4% in 2011 [ $n = 2904$ ],  $p = 0.09$ ). HIV prevalence among 5,318 urban women declined from 22.8% in 2008 to 19.6% in 2011 ( $p < 0.001$ ), the lowest level since a peak of 27.6% in 1994 ( $p < 0.001$ ). Among 904 15–19 year-old urban women HIV prevalence declined in 2011 (10.1%) from a peak of 16.4% in 2002 ( $p < 0.001$ ), but was essentially unchanged compared to 2008 (11.1%,  $p = 0.42$ ).

**Conclusions** HIV prevalence declined in urban ANC attendees from 2008–2011 and in all surveyed ANC attendees compared to 1994. Results suggest success in prevention activities over the past 17 years, especially among urban women. Declines in prevalence have slowed recently, likely reflecting increased treatment-related survival possibly combined with decreases in incidence. Incidence and survival data are needed to fully understand these data.

### P3.206 CHARACTERIZING HIV SERO-DISCORDANCY AMONG STABLE COUPLES IN CAMBODIA, THE DOMINICAN REPUBLIC, HAITI, AND INDIA

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**H Chemaitelly**, <sup>1,2,3</sup>L J Abu-Raddad. <sup>1</sup>Infectious Disease Epidemiology Group, Weill Cornell Medical College-Qatar, Doha, Qatar; <sup>2</sup>Department of Public Health, Weill Cornell Medical College, Cornell University, New York, NY, United States; <sup>3</sup>Vaccine and Infectious Disease Institute, Fred Hutchinson Cancer Research Center, Seattle, WA, United States

**Background** Characterizing the epidemiology of HIV sero-discordancy among stable couples (SCs) is essential to inform HIV policy and programming, especially considering the recent availability of efficacious interventions among stable HIV sero-discordant couples (SDCs). This work complements a quantitative assessment of HIV sero-discordancy among SCs in sub-Saharan Africa (SSA), by analysing sero-discordancy in all countries outside SSA for which HIV biomarker demographic and health surveys (DHS) are available.

**Methods** We derived measures of HIV sero-discordancy using nationally-representative DHS data for Cambodia, the Dominican Republic (DR) including a sub-population at higher risk of HIV (Bateyes-DR), Haiti, and India. Vietnam was excluded from our analysis because of the low number of couples affected by HIV (3 couples).

**Results** HIV was more prevalent in Bateyes-DR (3.3%) and Haiti (2.2%) than in other settings ( $< 1\%$ ). About two-third of the population in reproductive age in these countries were engaged in SCs. The proportions of SCs affected by HIV and of SDCs were, respectively, 5.7% and 4.2% (Bateyes-DR), 4.7% and 3.2% (Haiti), 1.2% and 0.9% (DR), 1.0% and 0.5% (Cambodia), and 0.5% and 0.4% (India). Among SCs affected by HIV, 74.3% were sero-discordant in Bateyes-DR compared to 68.3% in Haiti, 70.1% in DR, 51.6% in Cambodia, and 78.5% in India. About a third of HIV sero-positive persons had

uninfected partners: 38.3% (Bateyes-DR), 35.4% (Haiti), 33.3% (DR), 32.1% (Cambodia), and 39.6% (India). Limited sero-discordancy was observed at the population-level with at most two out of every 100 adults in reproductive age being engaged in a SDC.

**Conclusions** Our findings are consistent with HIV sero-discordancy patterns in low prevalence settings in SSA. While the large sero-discordancy among SCs affected by HIV offers an opportunity for HIV prevention, the small number of SCs affected by HIV at the population-level suggests logistical difficulties for implementing SDC-targeted prevention interventions in these countries.

### P3.207 THE INFLUENCE OF COLLEGE STUDENTS IN A SEXUAL NETWORK OF YOUNG AFRICAN-AMERICAN MEN

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<sup>1</sup>D K Pasquale, <sup>2</sup>A Doherty, <sup>3</sup>M E Emch, <sup>1,2</sup>W C Miller, <sup>4</sup>E M Foust, <sup>2,4</sup>P A Leone. <sup>1</sup>University of North Carolina at Chapel Hill Gillings School of Global Public Health, Chapel Hill, NC, United States; <sup>2</sup>University of North Carolina at Chapel Hill School of Medicine, Chapel Hill, NC, United States; <sup>3</sup>University of North Carolina at Chapel Hill Department of Geography, Chapel Hill, NC, United States; <sup>4</sup>North Carolina Division of Public Health, Communicable Disease Branch, Raleigh, NC, United States

**Background** Young Black men who have sex with men (MSM) are disproportionately affected by HIV and STIs in North Carolina (NC). Behavior and STI prevalence in the sexual network affect transmission risk; network position may be a marker for risk.

**Methods** We constructed the local sexual network from reportable HIV and syphilis cases diagnosed among Black men age 15–30 in north central NC from 2006–2009 (N = 1100); infected and uninfected contacts were included in the network. Bonacich power is an unbounded measure of network centrality derived from the number of contacts and number of contacts' contacts. Higher Bonacich scores represent increased centrality in the network, while accounting for the centrality of an individual's contacts. It is iterative, giving more weight to closer contacts. To assess the centrality of college status in the network, Bonacich scores and 95% confidence intervals (95% CI) were calculated for all college-age Black men (17–24 years) (n = 385). We computed t-tests and chi-square tests to measure score differences by college status for factors associated with HIV infection risk.

**Results** Bonacich scores were normally distributed (range –57.5–62.2). Mean score was higher for college than non-college men (5.86 (95% CI: 4.69–7.04) v. 3.13 (95% CI: 2.51–3.76),  $P < 0.0001$ ). College men were more likely to use dating sites and less likely to use marijuana than non-college men. Sexual orientation also differed significantly by college status: while the proportion of MSM was ~70%, college men were more likely to be bisexual (24% v. 11%) and less likely to be heterosexual (7% v. 22%) compared to non-college men. College status was not associated with diagnosis, STI history, alcohol use, or having anonymous partners.

**Conclusion** Young African-American college men are more central in this sexual network than young African-American men who are not in college, putting them at risk for HIV acquisition and transmission.

### P3.208 SPATIAL VARIABILITY IN THE DECLINE OF HIV PREVALENCE IN THREE COUNTRIES IN SUB-SAHARAN AFRICA

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D F Cuadros, S F Awad, L J Abu-Raddad. Weill Cornell Medical College in Qatar, Doha, Qatar

**Background** HIV prevalence is decreasing in large parts of sub-Saharan Africa (SSA), but the impact of this decline on the geographical heterogeneity of HIV infectious burden is not well understood. We explored and described aspects of the spatial and temporal heterogeneity of the epidemic in three countries in SSA.

**Methods** Data were obtained from Demographic and Health Surveys conducted at different times in Malawi, Tanzania, and Kenya. We identified and compared spatial clusters with high numbers of HIV infections at two different times from each country using Kullback-Leibler spatial scan test. The test locates areas with higher numbers of HIV infections than expected under spatial randomness. For each identified cluster, a likelihood ratio test was computed. A  $P$ -value was then determined through Monte Carlo simulations to evaluate the statistical significance of each cluster.

**Results** The table summarises the main results. We found no evidence of decline in HIV prevalence within clusters with high HIV prevalence despite the statistically significant decline in the national HIV prevalence in Malawi and Tanzania. National HIV prevalence decreased by 19% in Malawi, and 17% in Tanzania; meanwhile, HIV prevalence in areas outside of the clusters declined by 33% and 30%, respectively. There was no statistically significant decline in the national HIV prevalence in Kenya, but HIV prevalence within clusters increased by 27%.

**Conclusions** We found marked spatial variability in the decline of HIV prevalence in the three studied SSA countries. Even in the presence of declining national HIV prevalence, HIV prevalence in the high HIV prevalence clusters either did not decline or even increased. Most of the gains in reducing HIV disease burden did not occur in the areas of most intense HIV transmission, but in areas outside of the clusters. Our findings provide insights for resource allocation and HIV prevention interventions in these countries.

#### Abstract P3.208 Table 1

| Country  |                  | Survey 1<br>(2003–2004)<br>HIV prevalence (%) | Survey 2<br>(2009–2010)<br>HIV prevalence (%) | P value |
|----------|------------------|---|---|---------|
| Malawi   | National         | 12.52   | 10.13   | < 0.001 |
|          | Within clusters  | 15.32   | 14.83   | 0.59    |
|          | Outside clusters | 10.35   | 6.97  | < 0.001 |
| Tanzania | National         | 6.50  | 5.38  | < 0.001 |
|          | Within clusters  | 9.85  | 9.34  | 0.49    |
|          | Outside clusters | 5.13  | 3.61  | < 0.001 |
| Kenya    | National         | 6.59  | 6.30  | 0.62    |
|          | Within clusters  | 10.77   | 13.72   | 0.01    |
|          | Outside clusters | 5.37  | 4.66  | 0.11    |

### P3.209 LOW RATES OF STI CO INFECTION OBSERVED IN HIV POSITIVE WOMEN PARTICIPATING IN AN HPV VACCINE STUDY IN CANADA

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<sup>1</sup>E Moses, <sup>2</sup>S Blitz, <sup>1</sup>J Raboud, <sup>3</sup>J Singer, <sup>4</sup>M Loutfy, <sup>5</sup>F Smail, <sup>2</sup>S Walmsley, <sup>3</sup>D Money. <sup>1</sup>University of Toronto, Toronto, ON, Canada; <sup>2</sup>University Health Network, Toronto, ON, Canada; <sup>3</sup>University of British Columbia, Vancouver, BC, Canada; <sup>4</sup>Women's College Research Institute, Toronto, ON, Canada; <sup>5</sup>McMaster University, Hamilton, ON, Canada

**Background** HIV positive women with sexually transmitted infections (STIs) face increased reproductive health risks and negative health outcomes. This sub-analysis was performed to determine the co-factors associated with a history of STI's in this high-risk population.

**Methods** Data was collected as part of an ongoing multi-centred study of the immunogenicity and safety of a quadrivalent HPV vaccine in HIV+ women in Canada. Clinical data, along with genital HPV-DNA sampling and liquid based cervical cytology data, was collected 3 months prior to initial vaccination.

**Results** Of the 255 sexually active women in this sub-analysis, characteristics were: mean age of 37, ethnicity: black 42%, white 36%, aboriginal 11% and other 10%. Mean number of lifetime sexual partners 5 (3–15), 70% of women were sexually active within