

much reinfection within partnerships contributes to the persistent spread of chlamydia in heterosexual populations.

Methods We derive an expression for the basic reproduction number of an SIS infection in a population with long term monogamous partnerships. The basic reproduction number contains an explicit term quantifying the contribution of re-infection within partnerships to the overall reproduction number. The derivation is then extended to include partner notification and treatment. Finally, the model is extended to include two types of partnerships with differing average duration.

Results For small recovery rates and low transmission probabilities reinfection plays a minor role in sustaining chlamydia transmission. However, there is an optimal combination of duration of infection and transmission probability for which reinfection contributes substantially to keeping chlamydia endemic in a population. We discuss the functional dependency of the basic reproduction number on these parameters. Using a more complex model numerical scenarios were simulated showing that partner notification prevents a large proportion of re-infections.

Conclusions The effect of screening depends, in part, on whether or not it succeeds in moving the basic reproduction number away from the transmission optimum via reinfection. This can be achieved either by choice of the screening interval or by rescreening those individuals who tested positive in a first screening test. There is an optimal time interval for retesting that minimises the basic reproduction number. The precise numerical value depends on partnership durations and transmission probabilities.

P1-S5.42 PREVALENCE OF TRANSITIONAL AND EMBEDDED CONCURRENCY WITHIN A PROSPECTIVE COHORT OF URBAN ADOLESCENT FEMALES

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Background Studies have found that concurrent sexual partnerships, as opposed to cumulative number of sex partners or serially monogamous partnerships play a pivotal role in rates of STI transmission. Different patterns of concurrency have different consequences to STI transmission as these patterns result in diverse network structures from within which to disseminate disease. Our objective was to determine the prevalence and types of concurrent partnerships within a prospective cohort of urban adolescent females.

Methods A cohort of adolescent females (N=63), aged 16–19 at baseline, were recruited from health clinics and community venues in Baltimore, MD and completed daily diaries about each current sex partner on a Palm Smartphone continuously for up to 18 months. As data collection is ongoing, relationships that were at least 8 weeks long were selected for this analysis. Partner names were confirmed by participants at regular intervals to ensure the same partner was followed over time. Sex partners were considered concurrent if they were named by the participant in the same week. Concurrent partners were categorised as either embedded or transitional relative to each relationship. A side partner was categorised as embedded if the week(s) that partner was named were completely contained within the weeks of the relationship. A side partner was categorised as transitional if weeks that the partner was named either preceded or persisted beyond the relationship or if the partner was only named in a single week within the first or last 4 weeks of the relationship.

Results Fifty-five participants had a relationship of at least 8 weeks duration, of these 55 relationships 28 (51%) had a concurrent

partner within the relationship, with a mean (SD) of 2.7 (2.6) concurrent partners. Of the 28 relationships that contained concurrency, transitional concurrency was most prevalent (43%), followed by both transitional and embedded (39%), and embedded only (18%). Among relationships with concurrency, 25% had a gap of >4 weeks within the relationship, as a result partners initially classified as transitional subsequently became embedded. There was no difference in relationship duration for those with and without concurrency.

Conclusions Transitional concurrency may reflect adolescents' intentions of serial monogamy. Future data collection is needed to gain an improved understanding of adolescents' motivations for concurrent sexual partnerships.

Epidemiology poster session 5: Transmission dynamic: Income/race disparities

P1-S5.43 DISPARITIES IN SEXUALLY TRANSMITTED DISEASES ACROSS RACE-INCOME "COUNTIES IN THE USA: A RACE-SPECIFIC MORBIDITY ANALYSIS"

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Background We examined the association between race-specific incidence rates for three major bacterial STDs and race-specific household income at the county level for all counties in the 48 contiguous states in the USA.

Methods Race-specific county-level median household incomes were obtained from the 2000 decennial census. We used the overall US median household income (ie, \$41 994, in 2000 dollars) as the cut-point to categorise counties into six race-income county groups. "Race-income" county groups were defined by black household income and white household income at the county level (see Abstract P1-S5.43 table 1). County-level race-specific morbidity for chlamydia, gonorrhoea and primary and secondary (P&S) syphilis were obtained from the National Electronic Telecommunications System for Surveillance (NETSS) for 1999–2001. For each of the six county groups, we calculated race-specific STD rates (new cases per 100 000 residents) using the total number of cases and population size for all three years. In a supplemental analysis, we used a spatial regression technique to examine the association in more detail, controlling for county-level socio-demographic factors.

Abstract P1-S5.43 Table 1 Average race-specific STD rates (number per 100 000 residents), 1999–2001 for six "race-income" county groups

County group	Description of race-specific household income in county group	Chlamydia		Gonorrhoea		P & S syphilis	
		Black	White	Black	White	Black	White
1	Black and white incomes below national median	695.2	88.8	597.0	22.9	10.7	0.5
2	Black income below national median, white income above national median	691.1	67.5	625.3	23.5	14.0	0.7
3	Black income above national median, white income below national median	279.3	61.3	125.4	5.6	6.2	0.1
4	Black and white incomes above national median	220.6	29.2	176.1	6.3	4.2	0.3
5	No black households in county; white income below national median	—	55.3	—	3.0	—	0.2
6	No black households in county; white income above national median	—	55.1	—	3.8	—	0.0

Results STD rates for Blacks in each category were at least 4 times higher than for whites. For chlamydia, county group 1 had the

highest rate followed by county group 2. However, for gonorrhoea and P&S syphilis, county group 2 had the highest rate for both Blacks and Whites, followed by county group 1 (see Abstract P1-S5.43 table 1). In the regression analysis, gonorrhoea rates were significantly higher (+12%, $p < 0.05$) in counties in which black household income is below the national average and white household income is above the national average than in counties in which black and white household incomes are both below the national average.

Conclusions Although other studies have demonstrated the association between income, race and STD rates, our race-income categorisation provides several new insights. Most importantly, the grouping of counties that we developed allows us to examine not only the association between STD incidence and income, but also the association between STD incidence and disparities in income. Racial disparities in income were associated with racial disparities in STDs. Specifically, when there is disparity in median household incomes for Blacks and Whites, rates of gonorrhoea and P&S syphilis for each race are higher than when there is more equity in the median household income.

P1-S5.44 STD RATES IN THE EIGHT AMERICAS: "DISPARITIES IN THE BURDEN OF SYPHILIS, GONORRHOEA, AND CHLAMYDIA ACROSS RACE AND COUNTY"

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Background The purpose of this study was to examine rates of three STDs (primary and secondary syphilis, gonorrhoea, and chlamydia) in eight subpopulations (known as the eight Americas) defined by a small number of sociodemographic and geographical characteristics.

Methods A list of the race-county combinations comprising each of the eight Americas was obtained from the corresponding author of the original eight Americas project, which examined disparities in mortality rates across the eight Americas. Using county-level STD surveillance data, we calculated syphilis, gonorrhoea, and chlamydia rates (new cases per 100 000) for each of the eight Americas.

Results STD rates varied substantially across the eight Americas. STD rates were generally lowest in America 1 (Asian and Pacific Islanders in selected counties) and America 2 (Northland low-income rural white) and highest in America 6 (Black Middle America), America 7 (Southern low-income rural black), and America 8 (High-risk urban black) see Abstract P1-S5.44 Table 1.

Conclusions The disparities in STD rates we observed across the eight Americas were akin to the disparities in mortality rates and life expectancy reported by the authors of the original eight Americas study. Although disparities in STDs across the eight Americas are generally similar to the well-established disparities in STDs

Abstract P1-S5.44 Table 1 STD rates (new cases per 100 000) in the Eight Americas, 2008

America	Primary and secondary syphilis	Gonorrhoea	Chlamydia
1. Asian	1.4	14.5	100.6
2. Northland low-income rural white	0.3	9.2	125.5
3. Middle America	2.7	30.0	172.4
4. Low-income whites in Appalachia and the Mississippi Valley	1.1	23.8	139.4
5. Western Native American	2.9	80.9	820.7
6. Black Middle America	14.5	475.3	1,063.6
7. Southern low-income rural black	15.3	482.2	1,109.4
8. High-risk urban black	25.3	507.2	1,155.9

across race/ethnicity, the grouping of US race-counties into the eight Americas does offer additional insight into disparities in STDs in the USA. The high STD rates we found for Black Middle America relative to Middle America are consistent with the assertion that sexual networks and social factors are more important drivers of racial disparities in STDs than differences in sexual behaviours.

P1-S5.45 ABSTRACT WITHDRAWN

Epidemiology poster session 5: Transmission dynamic: Income disparities

P1-S5.46 ASSESSING THE RELATIONSHIP BETWEEN SEXUALLY TRANSMITTED INFECTION RATES, ETHNIC GROUP AND SOCIO-ECONOMIC DEPRIVATION IN ENGLAND

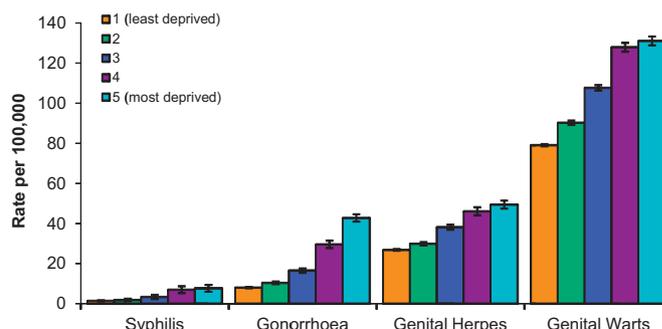
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Background Disparities in the distribution of sexually transmitted infections (STIs), especially gonorrhoea, across ethnic groups in England are well recognised. Socio-economic deprivation (SED) is also a known determinant of poor health outcomes and is often more common in ethnic minorities, but it has not previously been possible to assess the relationship between ethnic group, SED and STI rates at the national level. We used data from a new national patient-level STI surveillance system to investigate the interplay between SED and ethnicity on population-level rates of STIs in England.

Methods Data on patients diagnosed with syphilis, gonorrhoea, genital herpes and genital warts from all genitourinary medicine (GUM) clinics in England in 2009 were obtained through the GUM Clinic Activity Dataset (GUMCAD). Rates of STI diagnoses by ethnic group and deprivation quintile were calculated. Deprivation was measured using the Index of Multiple Deprivation for England for each lower-level super output area of residence.

Results In England in 2009 the rate of syphilis and gonorrhoea was over five times higher (7.7/100 000 vs 1.4/100 000 and 42.8/100 000 vs 8.0/100 000 respectively) in the most deprived areas than in the least deprived areas but there was less difference for genital herpes (49.4/100 000 vs 26.8/100 000) and warts (131.1/100 000 vs 79.0/100 000) (see Abstract P1-S5.46 figure 1). The highest crude rates of acute STI diagnoses were among black ethnic communities although the magnitude varied by STI. The rate of gonorrhoea in black communities was over eight times higher than in white ethnic groups (171/100 000 vs 20/100 000), however, for genital warts rates in black ethnic communities were only 1.5 times higher than those in white ethnic groups (194.5/100 000 vs 130/100 000). Asians had the lowest rates for all four infections.



Abstract P1-S5.46 Figure 1 Rates of diagnoses of STIs by deprivation quintile using the Index of Multiple Deprivation, England, 2009.