Characteristics of short-term mobility and sexual behavior in Accra, Ghana

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Migration, or the movement of persons from one country or locality to another, has long been understood as an underlying factor for transmission of sexually transmitted infections (STI), including HIV. Migrants not only exhibit higher risk for acquisition of HIV and other sexually transmitted infections than non-migrants, but disproportionately transmit those infections to others (Brockerhoff and Biddlecom 1999; Gras et al. 1999; Hirsch et al. 2002; Hunt 1989; Lurie et al. 2003; Potterat et al. 1985; Quinn 1994; Zuma et al. 2003). Population migration was a significant determinant of the spread of HIV in countries with large generalized epidemics, including Kenya (Brockerhoff and Biddlecom 1999), South Africa (Lurie et al. 2003), Uganda (Nunn et al. 1995), Zimbabwe (Coffee et al. 2005a) and Ghana {Decosas, 1995 #132}. Circular migration in particular can catalyze HIV transmission rates in the home region, as migrants are more likely than non-migrants to engage in risky sexual behaviors, become infected with HIV while away, and return home to infect their at-home partners (Lurie 2000). This is a form of concurrency, a network phenomenon of having two or more overlapping partnerships (Morris and Kretzschmar 1997), shown to impact generalized HIV epidemics (Goodreau et al. 2012; Morris and Epstein 2012). These associations may depend on the sex of the migrant as well, given potential differences in behavior and travel characteristics. Nonetheless, the role of frequent short-term mobility in generalized epidemics is less clear, and the link between short-term mobility and sexual behavior could be confounded by reasons for travel (Coffee et al. 2005b), origins of migrants (Greif and Dodoo 2011), or the stage of HIV epidemic (Deane, Parkhurst and Johnston 2010; Mundandi et al. 2006; Voeten et al. 2010). Additionally, short-term mobility can be defined in many different ways; more work is needed to understand the nuanced relationship between sexual risk behavior and the duration, frequency, destination, and reason of travel.

Migration and HIV studies are subject to many methodological and measurement challenges in part because there are many forms of migration, from short-term circular labor migration to lifetime rural to urban migratory patterns (Deane et al. 2010; Vissers et al. 2008). Consequently, our understanding of the etiologic impact of migration on HIV risk is mixed, has evolved with the changing epidemic stage, and depends on social context and measurement methods across studies (Deane et al. 2010; Mundandi et al. 2006; Voeten et al. 2010). Often ross-sectional studies of migration and HIV or sexual risk behavior have to rely on summary measures such as past year travel and 12 month concurrency prevalence. This type of study design can address whether migrants have a higher propensity to engage in risky sexual behavior, but can not specifically align exposure (migration episode) with outcome (e.g., having a concurrent partner). Prospective survey designs or retrospective event history calendars are better able to align mobility episodes with sexual risk behavior.

The objective of this research is to test whether short-term mobility is associated with frequency of protected and unprotected sex as well as with concurrent partnerships. We test this association with retrospective longitudinal data on travel and sexual behaviors each month for a year using data from our recent study of sexually active adults in Agbogbloshie, a dynamic urban slum area that is a migratory hub of Accra, Ghana. Next, we aim to differentiate types of mobility and associations with sexual risk behavior. First we test the association accounting for *duration* (# of nights away in a month). Next, we

examine whether *destination* of travel is associated with different patterns of sexual risk behavior. Lastly, we examine whether *reason* for travel explains these differences. We are unable to test associations between HIV and mobility due to small sample size: 5 males and 13 female respondents tested positive for HIV.

DATA & METHODS

Sampling Design. Our Migration & HIV in Ghana (MHG) study was a cross-sectional study of sexually active adults within Agbogbloshie, Ghana during 2012. The methods have previously been described in detail {Cassels, Under Review }. Briefly, MHG used a three-stage cluster randomized sampling scheme to obtain a probability sample of the target population. Given a census of the area, we first selected households at random with probability proportional to household size, and then randomly selected one adult household member to participate. Given differences in household size, we used a weighting scheme to address differential inclusion probabilities. The third sampling stage involved referring cohabiting partners, but those linked data are not included in this analysis. Eligibility criteria were current residence in the selected household, age 18 to 49 years, and lifetime history of consensual sexual intercourse. The Institutional Review Boards of the University of Washington and University of Ghana approved these study procedures.

Measures. The study involved a standardized survey administered by trained field staff and a diagnostic HIV-1/2 test, although for this analysis we only consider survey data. The survey was organized into parts for structured questions for demographics, summary travel, and sexual behavior, and also an event-history calendar for detailed travel and sexual history for each month over the year prior to the survey.

Summary sexual partnership data were collected for overall activity, but detailed partnership data were truncated at the last three partners in the past year. Partners were defined as persons with whom the subject has engaged in consensual vaginal or anal intercourse. Partner data included the duration of the partnership, and month-by-month information on the type of the partnership, number of total and unprotected sexual acts that occurred, and geographic location of the intercourse. Mobility was defined as any overnight travel. Travel data include month-by-month information on destination (city and region), duration, and reason for travel.

Statistical Analysis. In the primary analysis, we assess evidence for association between short-term mobility and sexual partner concurrency and frequency of protected and unprotected sex acts using a series of random-effects logistic and continuous regression models. The outcome in each model is prevalence of concurrency in each month or the number of acts (total and unprotected only) summed across all partners in each month. The main predictor is whether or not the individual traveled overnight in each month. We further stratify travel by destination (currently measured as within the Greater Accra region or outside the region). Next steps will include accounting for duration and reason of travel in the models. The models are stratified by sex to show male-female differentials in effect. All models account for confounding variables including marital status, ever having a child, education, and religion. The random effects modeling framework allows monthly predictor and outcome data to be nested within individuals.

PRELIMINARY RESULTS

We recruited 484 index subjects, and 106 linked cohabiting partners. The response rate for HIV testing (survey participants could decline testing) was 91.0%. These results will present data only on the index subjects. In the weighted analysis, 42% of the population was male and over half were age 29 or younger (54%). The majority of the population was never married or currently cohabiting (61%) and 5.5% of the population tested positive for HIV.

The majority of respondents reported only one sexual partner over the past year, but 37% of men and 9% of women reported two or more sexual partners. Most respondents that had multiple partners also had concurrent partnerships in the last year: 35% of men and 6.5% of women. The mean number of total monthly sex acts was 11.0 and the mean number of unprotected sex acts was 8.2. Mobility was quite common in our study population. Seventy five percent of men and 78% of women reported at least one overnight trip away from home in the preceding 12 months, and 13% and 18% of men and women traveled away from home for more than a month in the last year.

The 202 men contributed 2,424 person-months and 282 women contributed 3,384 person-months to the present analysis. Twenty six percent of the person-months (p/m) involved at least one overnight trip, although destination of travel varied significantly by region and sex. Most short-term mobility took place within the Greater Accra region compared to any other single region, with 12% of p/m involving overnight travel. Women were more likely to travel within the Greater Accra region (14% of p/m) compared to men (9% of p/m), and men were more likely to travel to more distant regions such as the Uppers East and Upper West regions. However, travel to other regions was common as well: 15% of p/m involved travel outside the Greater Accra region (respondents could report travel to >1 region within a month).

Our main findings are summarized in Table 1. We find that short-term mobility is generally associated with more concurrent partnerships as well as frequency of sex, but the relationships vary by sex of the respondent and destination of travel. After controlling for standard sociodemographic measures, any overnight travel in a month is not associated with increased risk of concurrency for men. However, short-term mobility within the Greater Accra region does significantly predict higher risk of concurrency (OR = 2.69, 95% CI: 1.00-7.25). On the other hand, destination does not seem to change the relationship for women. Any short-term mobility is associated with significantly higher odds of concurrency for women.

The associations between short-term mobility and frequency of protected and unprotected sex also vary by sex of the respondent and destination. As seen in Table 1, short-term mobility as measured as any overnight travel in a month is significantly associated with a higher frequency of sex (both protected and unprotected) for men, but not for women. However, travel outside of Greater Accra is positively associated with frequency of sex for men, while only overnight within the Greater Accra region is positively associated with frequency of sex for women.

DISCUSSION

The relationship between short-term mobility and sexual risk behavior differs significantly by sex of the migrant as well as destination. Both men and women traveling short-distances are more likely to have a concurrent partner within that month, but long-distance mobility only predicts higher levels of concurrency for women. The full conference paper will include analyses that account for duration of travel as well as reason for travel. For instance, the reason for increased frequency of sex for men with long-distance mobility may be due to temporary migrant men who live in Agbogbloshie and return home to visit family.

Table 1a: Factors Associated with Sexual Partner Concurrency among sexually active adults in Agbogbloshie Men (n=2,424 person-months) and women (n = 3,384 person-months) Aged 18 - 49

	MEN		**WOMEN**	
	Model 1	*Model 2*	*Model 1*	*Model 2*
	OR	OR	OR	OR
Any overnight travel in month	1.12		4.48 **	
Greater Accra (GA) travel		2.69 **		4.05 **
Travel outside of GA		0.87		4.05 **

Table 1b: Factors Associated with Frequency of sex acts among sexually active adults in Agbogbloshie Men (n=2,424 person-months) and women (n - 3,384 person-months) Aged 18 - 49

	Model 1	*Model 2*	*Model 1*	*Model 2*
	coef	coef	coef	coef
Any overnight travel in month	0.67 **		0.16	
Greater Accra (GA) travel		-0.16		0.43 **
Travel outside of GA		0.84 ***		0.06

Table 1c: Factors Associated with Frequency of condom unprotected sex acts among sexually active adults in Agbogbloshie Men (n=2,424 person-months) and women (n = 3,384 person-months) Aged 18 - 49

	Model 1	*Model 2*	*Model 1*	*Model 2*
	coef	coef	coef	coef
Any overnight travel in month	0.33 *		0.15	
Greater Accra (GA) travel		0.07		0.44 **
Travel outside of GA		0.33 *		0.05

Note: All multivariate models control for marital status, ever having a child, education, and religion, and concurrent partnerships are included in the freequency of sex models

***p<0.001, **p<0.01, *p<0.1

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