Full Length Research Paper

Concurrent sexual partnerships among Chinese men: Evidence from a national population-based survey

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We sought to determine the pattern of the concurrent sexual partnerships among Chinese men and its correlates with individual, partnership and community factors. Using data from the Chinese Health and Family Life Survey, we examined the prevalence and distribution of sexual concurrency of 1689 men. A two-level logistic regression was employed to assess variables associated with sexual concurrency. Nine percent of men had concurrent sexual partnerships in preceding year. Sexual concurrency was associated with higher income (OR, 1.21; 95% CI, 1.02 to 1.48), longer traveling time (OR, 2.03; 95% CI, 1.44 to 2.87), and more frequent socializing activities (OR, 1.15; 95% CI, 1.01 to 1.30). Men who perpetrated domestic violence (OR, 1.92; 95% CI, 1.20 to 3.08) and perceived partners having other concurrent partners (OR, 4.19; 95% CI, 1.95 to 9.02) were more likely to have concurrent sexual partnerships. Tolerant community attitude towards sexual behavior and community education level showed effects on men's concurrency involvement. The results contribute to a better understanding of the potential role of concurrent sexual partnerships in the spread of HIV and other STIs in China.

Key words: Concurrent sexual partnerships, risk factors, human immunodeficiency virus prevention, Chinese men.

INTRODUCTION

The HIV/AIDS epidemic in China appears to spread from high risk groups such as injection drug users, blood donors and sex workers to the general population through heterosexual transmission. Heterosexual infection has now become the dominant mode of transmission (Wang et al., 2009) with the acquisition of sexually transmitted HIV tripling from 2005 to 2007(Lu et al., 2008). Therefore, a better understanding about sexual risk behaviors of the Chinese population should be warranted to guide the HIV prevention efforts. Compared with other risk sexual behaviors (Ma et al., 2002; Liu et al., 2005; Zhang et al., 2007), concurrent sexual partnership in China has been rarely studied,

although its association with the increased risk of HIV infection and other sexually transmitted infections (STIs) has been demonstrated by mathematical modeling (Watts and May, 1992; Doherty et al., 2006) and empiri-cal studies (Mishra and Assche 2009; Mah and Halperin, 2010). The existing studies largely remain limited to African and American population. For example, using the 2002 United States National Survey of Family Growth data, one study showed that 11% of adult men had concurrent partnerships in the preceding year and marital status and race were strongly related to the sexual con-currency (Adimora et al., 2007). Other studies in Africa also demonstrated that a large proportion of women and women reported sexual concurrency (Carter et al., 2007; Mattson et al., 2007).

In this study, we utilized the data from the Chinese Health and Family Life Survey to determine the pattern of concurrent sexual partnership among Chinese men as

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well as its risk factors from a multilevel perspective: individual, partnership and community level. We focused on men rather than women because the reported prevalence of concurrent sexual partnerships among the latter is relatively low.

METHODS

Data

The Chinese Health and Family Life Survey conducted in 1999 to 2000 was the first and only nationally probability survey thus far which focuses on sexual life and behaviors of Chinese adults. It covered the adult population aged 20 to 64 years from China mainland except Tibet and Hong Kong. Using a multi-stage sampling approach, the survey sampled 5000 respondents, of whom 3766 completed the interview yielding a response rate of 75.3%. The survey instrument primarily focused on sexual behavior and sexual partnerships of respondents. The survey used computer technology to interview respondents in a private place, away from the respondent's home. Interviews were initiated and led by interviewers who obtained oral and computer-entered consent from respondents. Then, respondents obtained control of the interview and continued the survey in the computerized format. However, about 13% (often older women in the countryside) needed continued assistance throughout the interview. More information about the survey can be found in previous studies (Parish et al., 2003, 2007).

Definition of concurrent sexual partnership

There is no consensus on the definition of concurrent sexual partnership. It has been measured in variety of ways in different studies. Some studies have identified concurrent sexual partnerships through collecting information on the date of first and last sex encounters with different partners (Morris and Kretzschmar, 1997; Lagarde et al., 2001). This method can be burdensome and is also prone to misclassification, as well as underreporting (Manhart et al., 2002). Defining concurrent sexual behavior as having an extra sexual partner beyond a primary partner like a spouse (Jennings et al., 2004) could also result in misclassification of some who do not have sex at all with their primary partner, therefore rendering the sexual relationship with their extra partner as non-concurrent. Directly asking respondents whether they have more than one sex partners during a certain period (Daker-White and Barlow, 1997; Colvin et al., 1998) is easily implemented, however this method may have recall limitations. In this study, we defined one having concurrent sexual partnerships if he had other sexual partners while keeping sexual activity with the primary sexual partner in the last 12 months. The primary sexual partner was a current spouse for married respondents and for those respondents who were not married, the most intimate partner with more than 6 months of sexual relationship. Clearly this measurement of concurrent sexual partnerships is conditional on one having a primary partner. Hence, only men (90% of total sample) who reported having a primary partner were included in this analysis.

The identification of sexual concurrency in this study was computed based on the respondents' self-report to several questions. For example, respondents were asked about the sexual activities with their current primary partner:

"In the past 12 months, how often did you and your current primary partner have sex?" Options are provided as:

1) Once a day or more
2) 3 to 6 times a week
3) 1 to 2 times a week
4) 2 to 3 times a month
5) Once a month or less

If a respondent selected options from option 1 to 4, this indicates that this person was sexually active on a regular basis or every month with his primary partner during the last 12 months. Respondents were also asked the time of last sexual encounter with partners other than the primary partner, which included the most recent long-term sexual partner (having at least one month of sexual relationship) and the most recent short-term sexual partner (having less than one month of sexual relationship). If his last sex with long-term extra partner or short-term partner occurred during the last year, he was considered to have concurrent sexual behavior. Moreover, among those who did not report regular monthly sexual activity with their primary partner, one would be considered to have concurrent sexual partnerships if he responded that his last sex with both a primary partner and an extra partner (either long-term or short-term) happened during the last month.

Independent variables

This study attempted to identify risk factors of concurrent sexual behavior at multiple levels including individual, primary partnership and community levels. This was based on the ecological framework that directs the attention to multilevel determinants of health behavior (McLeroy et al., 1988; Stokols, 1992). Individual demographic and social behavioral variables such as time away from home due to travel and frequency of socializing activities were included. The respondent's primary partnership characteristics included marital status, partnership duration and partnership discordance in social characteristics such as age, income and education. Psychological aspects such as perception of partner's infidelity and domestic violence were also included. At the community level, the survey sampling subunit-village or urban neighborhood was defined as the "community" through which the social context is hypothesized to operate to influence individual's behavior. The contextual factors of particular interest in this study were community socio-economic level and prevailing social attitudes towards premarital and extramarital sex. Community variables were generated from individual level data. Table 1 presents the operational definitions of all variables included in the model.

Analytical models

Both descriptive analyses and multivariate modeling were used with the effect of a complex survey design adjusted in both analyses. In the multivariate analysis, we used the two-level logistic modeling: individual level and community level. Primary partnership characteristics were treated as individual level variables. Compared with regular individual level regression analyses that assume all individuals are independent, the multilevel modeling approach considers the clustering effect among people who live in the same community and may share similarities. It also allows the simultaneous investigation of the effects of group-level and individual-level variables on individual level outcomes (Stephenson and Tsui, 2003). Preliminary analysis showed the intra-class correlation coefficient (ICC) of having concurrent sexual partnerships is 0.07, which indicates a clustering effect at community level and thus justifies the use of multilevel modeling. We allowed for the random intercepts across communities and assumed constant effects

Table 1. Definitions of independent variables included in the model.

Variable	Operational definition
Individual	
Age	Actual age in single year, range 20 to 64.
Education	Three categories: no schooling/primary, high school and college or higher.
Income	Log transferred individual monthly income in RMB.
Occupation	Four categories from farmers to self-employed/ business managers.
Migration status	Four categories from permanent resident to migrate here for less than 1 year.
Time away from home due to travel	In the last 12 months, away from home due to travel on own regardless of reason (only overnight stays count, nigh shifts or staying overnight at relatives' place don't count).
Frequency of socializing activity	In the past 12 months, how often the respondent participants in social activities after work (excluding activities with families or relatives).
Primary partnership predictors	
Marital status	Currently married vs. single/divorce/widow.
Partnership duration	Number of full years since the first sex with the primary partner, range: 0 to 48.
Age gap	Age difference between respondent and primary partner.
Income gap	Difference between log current monthly income between respondent and primary partner.
Education gap	Difference between respondent's education level and primary partner's education level.
Perceived partner unfaithful	Respondent perceived that primary partner had ever have sex with other people at any time throughout the sexual relationship even if it happened just once.
Domestic violence	It is defined as have beaten primary partner in the last 12 months for whatever reason (not including in a joking or playful way).
Community context*	
Community education level	The median of individual education level within the community.
Community income level	The median of individual's log current monthly income within the community.
Community attitudes towards premarital sexual behavior[†]	Mean score of agreement on premarital sexual behavior, higher score indicates more tolerant attitudes.
Community attitudes towards extramarital sexual behavior[†]	Mean score of agreement on extramarital sexual behavior, higher score indicates more tolerant attitudes.
Residence	Present locale of residence: urban or rural.
Region	Coastal or non-coastal area: the coastal area includes counties close to east and south coast where the economic is more developed than the national average.

*Both women and men's data were used to generate community variables. [†]Community attitude towards premarital sex is constructed based on the individual response to the question "Do you agree 'As long as two people eventually get married, it doesn't matter whether they have sex before they marry'?" Answer of yes is scored 1, no is score zero. The average score of the community is used to measure the community attitude towards premarital sex. The variable of community attitude towards extramarital sex is generated in the similar way based on the response to the question "Do you agree 'it is okay to have sex with someone other than your spouse after marriage'?"

assumed constant effects of variables across communities. The model equation was expressed as shown as follows:

$$LOG \left(\frac{P_{IJ}}{1 - P_{IJ}} \right) = \beta_0 + \beta_1 X_{IJ} + \beta_2 PR_{IJ} + \beta_3 C_J + \alpha_{0J}$$

$$\alpha_{0J} \sim (0, \tau_{00})$$

P_{IJ} represented the probability of engaging in concurrent sexual behavior for i^{th} individual in j^{th} community. X_{IJ} and PR_{IJ} represented a vector of individual variables and primary partnership

variables corresponding to the *ith* respondents in the *jth* community; C_J represented a vector of covariates at the community level. Respectively, *β's* represented the fixed coefficients of all predictors.

$\propto_{0 J}$ was the random effect part that indicated the variation across the communities, assumed to be normally distributed with mean zero and variance T_{00}. The significance of community random

effect indicates that the community environment is playing a role after adjusting for the individual and partnership level predictors. Two nested analytical models were built, with model I including individual and primary partnership variables, and model II having community variables added in. This approach allowed us to assess the relative contribution from each set of covariates. This study was reviewed and approved by the Committee on Human Research at the Bloomberg School of Public Health, Johns Hopkins University.

RESULTS

Socio-demographic characteristics of respondents

Of the men who completed the interview, 1689 who reported having primary partners were included in the analysis. The distribution of sample in demographic characteristics and social behaviors are presented in Table 2. The average age of men in the study was 41 and almost all were married. About two-thirds of men obtained an education of high school, college or higher. These men had diverse occupations, with 22% self-em-ployed or managing businesses. About 5% of men were migrants, of whom half lived in their currently locality for more than 5 years. One in five men reported that they left home for more than 1 week due to travel during the last 12 months and about one third of respondents reported a frequency of socializing once or more than once per week.

Prevalence of concurrent sexual partnership and variations by socio-demographic and behavioral factors

Table 3 shows the prevalence of concurrent sexual behavior by socio-demographic and behavioral characteristics. Overall, 9 men (95% CI: 6.5 to 11.6%) in every 100 population reported having been involved in concurrent sexual partnerships in the last 12 months. The prevalence varied by age group and urban/rural residence. Men aged 30 to 39 appeared to be at the most risk of having concurrent sexual partnerships, followed by men aged 20 to 29. About 15% of men in urban sites reported concurrent sexual behavior, compared with about 7% in rural sites. Bivariate analysis also showed that a higher prevalence of concurrent sexual partnership was found among men who had higher education, higher income, were not currently married, were self-employed/business managers, were non-permanent local

residents, resided in coastal areas, socialized more frequently and had been away from home for longer time.

Adjusted effects of predictors on involvement of concurrent sexual partnerships

The analytic models were built with individual level and community level variables added sequentially. Table 4 displays the results of both models. The first model shows that younger age, earning higher income, being away from home due to travel for more than one week and engaging more frequent socializing activities were risk factors for having concurrent sexual partnerships within the last 12 months. Individual education level, occupation and migration status, however, were not associated with having concurrent sexual partnerships. Men who perceived their partner to have other concurrent partners and who perpetrated domestic violence to his partner were more likely to engage in the concurrent sexual partnerships. Partnership types, partnership duration, as well as the discordance in age, education and income between partners did not show any significant association with sexual concurrency. The community level random effect was statistically significant (p = 0.003), which indicated that other factors that influence clustering of the outcome at community level were omitted in this model.

Model II added the community level variables. All of the significant individual and primary partnership predictors in the model I remained significant. Men who earned a higher income (OR, 1.21; 95% CI, 1.02 to 1.48), had been away from home due to travel for more than one week (OR, 2.03; 95% CI, 1.44 to 2.87), and had more frequent socializing activities (OR, 1.15; 95% CI, 1.01 to 1.30) were more likely to have concurrent sexual partnerships in the last 12 months.

Perceiving the primary partner to have other concurrent partners (OR, 4.19; 95% CI, 1.95 to 9.02) and having perpetrated domestic violence to his partner (OR, 1.92; 95% CI, 1.20 to 3.08) were associated with having concurrent sexual partnerships. A more permissive community attitude towards extramarital sexual behavior was shown to be associated with men's higher likelihood of engaging in concurrent sexual partnerships (OR, 1.12; 95% CI, 1.05 to 1.20). While individual educational attainment was not associated with involvement in sexual concurrency, the education at community level was (OR, 0.57; 95%, 0.40 to 0.81). People who live in a better-educated community were protected from engaging in the concurrent sexual behavior. Living in coastal or urban area was associated with having concurrent sexual partnerships. The community economic level does not show a significant effect, though the individual income level matters. The clustering effect in the final model dropped and was no longer significant, which means by

Table 2. Socio-demographic characteristics of respondents.

Socio-economic demographic variable	No. of men	Weighted percent
Age		
20 to 29	256	19.0
30 to 39	578	28.6
40 to 49	505	26.5
50+	350	25.9
Education		
No school or primary school	283	34.4
High school	1134	60.6
College or higher	272	5.2
Individual monthly income[1]		
Low	716	68.7
High	973	31.3
Occupation[2]		
Farmers	183	41.0
Manual/serv/tech/prof	835	26.8
Clerica/admin/others	340	10.7
Self-employed/business managers	331	21.5
Migration status		
Permanent resident	1387	94.7
Migrate here for more than 5 years	117	2.5
Migrate here for 1 to 5 years	114	1.8
Migrate here for less than 1 year	71	1.0
Time away from home due to travel		
One week or less	1300	80.5
More than one week	389	19.5
Frequency of socializing activity		
Less than once per week	1016	67.3
Equal or more than once per week	673	32.7
Marital status		
Married	1595	96.8
Single/divorce/widows	94	3.2
Region		
Non-coastal area	969	88.7
Coastal area	720	11.3
Residence		
Urban	1341	29.7
Rural	348	70.3
Total	1689	100.0

[1]The low income means the half below median, high income means the half above median (income was log transferred). [2]Manual/serv/tech/prof refer to manual worker, sales, service, entertainment industry worker, technical worker, teacher, professional technical worker; Clerica/admin/others refer to clerical worker, low-rank bureaucrat, office worker and others.

Table 3. Prevalence of concurrent sexual partnerships among Chinese men by socio-demographic and behavioral characteristics.

Socio-demographic variable	Prevalence (%)	95% CI
Age		
20 to 29	12.0	3.2 to 20.8
30 to 39	17.5	10.2 to 24.7
40 to 49	4.5	1.9 to 7.1
50+	2.3	0.8 to 3.7
Residence		
Urban	14.8	11.7 to 17.9
Rural	6.6	3.3 to 10.0
Education		
No school or primary school	5.4	1.0 to 9.9
High school	11.0	7.7 to 14.4
College or higher	10.5	4.2 to 16.8
Monthly income		
Low	6.9	3.7 to 10.0
High	13.9	9.6 to 18.2
Occupation		
Farmers	4.4	0.4 to 8.5
Manual/serv/tech/prof	8.9	6.0 to 11.9
Clerica/admin/others	14.8	5.2 to 24.4
Self-employed/business managers	15.3	8.7 to 21.8
Migration status		
Permanent resident	9.1	7.0 to 11.1
Migrate here for more than 5 years	17.4	2.3 to 32.5
Migrate here for 1 to 5 years	21.1	10.3 to 31.8
Migrate here for less than 1 year	11.3	5.4 to 17.3
Time away from home due to travel		
One week or less	6.2	4.0 to 8.4
More than one week	20.8	12.0 to 29.7
Frequency of socializing activity		
Less than once per week	6.1	3.2 to 8.9
Equal or more than once per week	15.2	10.1 to 20.3
Marital status		
Married	8.6	6.0 to 11.2
Single/divorce/widows	23.4	8.0 to 38.9
Region		
Non-coastal area	7.4	4.7 to 10.2
Coastal area	21.9	15.9 to 27.8
Total	9.1	6.5 to 11.6
N	1689	

Table 4. Results of multilevel modeling of concurrent sexual partnership in the last 12 months among Chinese men.

	Model I	Model II
	Odds ratio (95% CI)	Odds ratio (95% CI)
Individual variable		
Respondent's age	0.94(0.89 to 0.98)**	0.94(0.89 to 0.98)**
Education attainment		
No school or Primary school	1.00	1.00
High school	1.39(0.76 to 2.53)	1.51(0.83 to 2.75)
College or higher	1.39(0.63 to 3.08)	1.57(0.71 to 3.50)
Income	1.22(1.01 to 1.48)**	1.21(1.02 to 1.48)**
Occupation		
Not working/farmer	1.00	1.00
Manual/serv/prof	1.42(0.59 to 3.43)	1.22(0.51 to 2.97)
Clerica/admin/others	1.42(0.59 to 3.43)	1.23(0.48 to 3.18)
Self-employed/ managers	2.04(0.88 to 4.71)	1.72(0.71 to 4.19)
Migration status		
Permanent resident	1.00	1.00
Migrate here for more than 5 years	1.42(0.79 to 2.55)	1.43(0.79 to 2.57)
Migrate here for 1 to 5 years	1.28(0.71 to 2.31)	1.30(0.72 to 2.37)
Migrate here for less than 1 year	0.91(0.41 to 2.02)	0.96(0.43 to 2.17)
Time away from home due to travel		
Less than one week	1.00	1.00
Equal or more than one week	1.93(1.36 to 2.74)***	2.03(1.44 to 2.87)***
Frequency of socializing activity		
Less one once per week	1.00	1.00
Equal or more than one per week	1.18(1.04 to 1.33)**	1.15(1.01 to 1.30)**
Primary partnership variables		
Marital status		
Currently married	1.00	1.00
Single/divorce/widowed	0.62(0.31 to 1.24)	0.66(0.33 to 1.30)
Partnership duration	1.03(0.97 to 1.08)	1.02(0.97 to 1.08)
Partnership discordance		
Age gap	1.02(0.95 to 1.10)	1.02(0.95 to 1.09)
Income gap	0.96(0.88 to 1.04)	0.96(0.88 to 1.04)
Education gap	0.84(0.69 to 1.03)	0.83(0.68 to 1.01)
Perceived partner ever had concurrent sexual partners		
No	1.00	1.00
Yes	4.04(1.85 to 8.83)***	4.19(1.95 to 9.02)***
Domestic violence		
No	1.00	1.00
Yes	1.86(1.16 to 3.00)***	1.92(1.20 to 3.08)***
Community variable		
Community education level		0.57(0.40 to 0.81)***

Table 4. Contd.

Community income level		0.47(0.22 to 1.03)
Community attitudes towards premarital sex		1.00(0.98 to 1.02)
Community attitudes towards extramarital sex		1.12(1.05 to 1.20)***
Region		
Non-coastal		1.00
Coastal		1.91(1.24 to 2.94)***
Residence		
Rural		1.00
Urban		1.95(1.04 to 3.65)**
Sigma U	0.504	0.003
Rho	0.07	0.00
p value	0.003	0.496

OR = Odds ratio, 95% CI = 95% confidence interval. Significant level ** p<0.05; *** p<0.01.

considering all included predictors above, the variations α_{0J} among communities were largely explained.

DISCUSSION

This study shows that concurrent sexual partnership among Chinese men was not uncommon. The prevalence of sexual concurrency in the preceding year, particularly among men in their 20s and 30s, was high and comparable to the prevalence found in American society (Manhart et al., 2002). Using the same data, Parish et al. (2007) also found that a high percentage of these two cohorts reported to have concurrent partners during the relationship with their spouse (Parish et al., 2007). Results of multilevel modeling highlight that the risk factors of sexual concurrency were operating at individual, primary partnership and community levels. The study found that the individual income is positively associated with men's involvement in sexual concurrency. The involvement in concurrent sexual behavior usually requires extra economic expenses so that the higher income secures the better economic affordability. However, this study failed to find the protective effect of individual educational attainment against sexual concurrency. In contrast, education attainment at community level exhibits some positive effects. A better-educated community may protect men through, for example, more positive communication, a more reliable mass media environment and a healthier life style.

In the early 1990s, the Chinese government advocated to "let some people become rich first". This principle along with supportive economic policies has produced a wealthy class in the variety of communities where there is still considerable proportion of poor. These rich community members are often at high risk for many behaviors including risky sexual behaviors, while the protective effect from the community, mentioned above, is not yet in place. Our findings related to education and incomes are consistent with this phenomenon. Occupation has been found to be associated with risky sexual behaviors in China (Wang and Gao, 2000; Rich and Kim, 2002). Long distance drivers, border traders and businessmen who travel more frequently are more likely to exhibit risky sexual behaviors compared with their peers. This study failed to find an association between occupation and the involvement in concurrent sexual behavior after controlling for income, travel and socializing activity. However, our analysis does show that men who were self-employed or managers, had higher income, longer time away from home due to travel, and more frequent socializing activities. All these factors were found to be associated with increased likelihood of concurrent sexual behavior. The association between primary partnership characteristics and sexual concurrency has often been omitted in previous studies. This analysis found that men's concurrent sexual behavior is strongly associated with the perception that their partner has other concurrent partners. This finding has also been noted by other studies (Adimora et al., 2004, 2007), which suggest an intense sexual network within such a population that might allow for the acceleration of the spread of HIV and other STIs.

Domestic violence is the other important primary partnership characteristic associated with concurrent sexual behavior. Given that mounting evidence has shown the correlation between domestic violence and the increased prevalence of HIV among women (Martin and Curtis, 2004; Silverman et al., 2008), this finding may suggest that sexual concurrency is an intermediate factor in the relationship between the domestic violence and

HIV infection. The current study illustrates the importance of contextual influences on men's involvement in concurrent sexual behavior. Besides the effect of community education discussed earlier, the study showed that permissive social attitudes towards sexual behavior in the community are leading men to become involved in sexual concurrency. Therefore, HIV/AIDS prevention efforts may need to involve changing community social norms towards sexual risk behaviors, which in turn may influence the behaviors of individuals. The strength of this study is in using data from a national probability survey hence, the results are more generalizable. It is also one of the very few studies to examine sexual concurrency among Chinese adults.

The study analyses consider multiple perspectives in examining the concurrent sexual partnerships by encompassing individual, primary partnership and community variables. This approach considers sexual behavior as an interactive process grounded in social context, which leads a more thorough understanding of such behavior. While there are a number of study strengths, several limitations need to be considered. The first limitation is that the data used is old. Some results might be subject to changes. However, the Chinese Health and Family Life Survey is the only national probability survey to date focusing on sexual life and behaviors of Chinese adults. We therefore believe that the findings in this article still shed light on the prevalence and risk factors of concurrent sexual partnership and thus contribute to guiding the HIV and other STI prevention efforts in China. The lack of recent data highlights the need for a similar type of data collection in the near future. The second study limitation is the way in which the concurrent sexual behavior is measured, which may lead to underestimating its prevalence. In this study, measuring concurrent sexual partnerships is conditional upon respondents having a primary partner. Therefore, individuals who do not have a primary partner but may keep sexual relationships with several partners (for example short-term partners) during a certain period would be excluded from the study. A previous study has shown that individual who do not have a primary partner have a higher risk to be involved in the concurrent partnerships (Adimora et al., 2002). However, since about 90% of sample reported having a primary partner, we expect that exclusion of study respondents who are involved in sexual concurrency due to this reason was not substantial.

ACKNOWLEDGEMENTS

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