Exploring Concurrent Sexual Partnerships:

New Definitions and Estimates from a Study of Youth in Urban Kenya

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Abstract

Concurrent sexual partnerships have been associated with the spread of HIV/AIDS. Previous research suffers from poor measurement and a lack of details on concurrency, including characteristics of concurrent partnerships and unsafe sexual behavior within them. We use unique life history calendar data, which include monthly information on the sexual histories of young people in urban Kenya, to develop a new measure of concurrency, defined as having sex with 2 or more partners in the same month or series of months. Preliminary results show that 17% of respondents had at least one episode of concurrency in the last 10 years. Of those involved in these partnerships, 25% had more than one episode and 15% had sex with 3 or more partners simultaneously. Approximately 45% never used condoms within a concurrent relationship. Further analyses will examine additional characteristics of concurrency that are crucial to the transmission of HIV/AIDS among young people.

Introduction

Concurrent sexual partnerships, defined as having two or more sexual relationships at the same time, are not uncommon in sexually active populations. A national household survey of American women aged 15-44 years found that approximately 12 percent of respondents ever had concurrent sexual partnerships in the past five years (Adimora et al. 2002). In another nationally representative sample, about 14 percent of sexually active American adolescents reported ever having concurrent sexual partnerships in the past 18 months (Kelley et al. 2003). In a Latino community in San Francisco, approximately 20 percent of sexually active adolescents in the sample had concurrent partnerships in the last 6 months (Doherty et al. 2007). Concurrent sexual partnerships are also notable in developing countries. In Botswana, for example, 23 percent of sexually active respondents in a population-based survey reported ever having a concurrency in the past year (Carter et al. 2007). In a study of five cities in sub-Saharan Africa, the fractions of sexual partnerships that were concurrent at the time of interview were estimated to be 0.98 in Yaoundé (Cameroon), 0.44 in Kisumu (Kenya), 0.33 in Cotonou (Benin), and 0.26 in Ndola (Zambia) (Lagarde et al. 2001).

The prevalence of concurrent sexual partnerships has been associated with the spread of HIV and other sexual transmitted infections (STIs). In contrast to sequential monogamy, concurrent partnerships are able to transmit infection across multiple partnerships simultaneously, where earlier partners can be exposed when the subject becomes infected by a later partner (Morris and Kretzschmar 1997). Greater numbers of concurrent sexual partnerships have been related to a 60 percent higher risk of STI diagnosis among adolescents who sought care at public STI clinics in San Francisco (Rosenberg et al. 1999). Among sexually active American adolescents, STI risk is almost 4 times higher for those engaging in concurrent sexual partnerships than for those in monogamous relationship (Kelley et al. 2003). In a fully stochastic simulation study, Morris and Kretzschmar (1997) found that concurrent sexual partnerships can exponentially increase the number of HIV infected individuals. In a later simulation study using 1994 Ugandan sexual network data as the baseline, Morris and Kretzschmar (2000) found that concurrent partnerships may raise the number of HIV infections by over 25 percent after a 5-year period compared to sequential monogamy. One exception is Lagarde and colleagues (2001), who failed to find an association between levels of concurrent sexual partnerships and HIV or STI infections; they suggested that this may be related to higher condom use among the ones engaging in concurrency. A better understanding of the prevalence of concurrent sexual partnerships and the characteristics and behavior of individuals who engage in them may contribute to our knowledge about HIV prevention as well as reductions in the spread of other STIs.

Previous research (e.g., Adimora et al. 2002 and 2004; Carter et al. 2007; Doherty et al. 2007; Lagarde et al. 2001) on concurrency is limited in several respects. First, many survey questions on concurrency are vague and do not provide accurate measures of the prevalence and number and length of episodes of concurrency. Second, many previous surveys fail to collect information on individuals' full sexual histories, and thus important characteristics of concurrency that can be crucial to HIV and STI transmissions remain unknown. For example, we know little about the duration of episodes of concurrency, the number of partners involved, and condom use during these relationships. Finally, numerous studies use samples restricted to certain risk groups, which limits our ability to generalize findings to the wider population. For example, both Rosenberg and colleagues (1999) and Nelson and colleagues (2007) recruited adolescents and young people who sought care at public STI clinics in the U.S., and these

individuals are likely to differ from the entire youth population. This study aims to address these gaps by examining the prevalence and characteristics of concurrent sexual partnerships among youth in urban Kenya using unique relationship history calendar data, which include detailed information on respondents' sexual relationships over a 10-year period.

Data and Sample

The data used in this paper are drawn from a survey in Kenya using the Relationship History Calendar (RHC) developed by Luke, Clark, and Zulu (2008). A random sample of young men and women aged 18-24 in 2007 was drawn in urban Kisumu. Kisumu is the third largest city in Kenya and has an HIV prevalence rate estimated at 25 percent for women and 18 percent for men in 2003 (Bailey et al. 2007), with young people among the most severely affected (Glynn et al. 2001). Monthly data were collected on all of respondents' romantic and sexual relationships for a 10-year retrospective period (from January 1998 to July 2007) using a life history calendar instrument. Questions were asked about the frequency of sex, condom use, type of relationship, and partner's residence in each month for each romantic/sexual partnership. These data allow us to describe and examine the characteristics of concurrent sexual partnerships in detail.

After excluding 82 respondents who never had sex, the final sample of ever sexually active youth includes 498 young men and women. Table 1 presents demographic and socioeconomic characteristics of the sample. The sample consists of 53.82 percent young men and 46.18 percent young women. Approximately three quarters of the respondents were never married. A little over 20 percent of youth were still in school, and two thirds had a highest degree of Form 1 (some high school) or above. Luo was the largest ethnic group, accounting for three quarters of the sample. Roman Catholic and Mainstream Protestant together accounted for nearly half of the sample. The income distribution was positively skewed in that about 45 percent of the respondents reported no income in the last year, and approximately two thirds earned less than 2000 Kenyan shillings on average per month (approximately US$30).

Table 2 presents the characteristics of respondents' sexual histories. The average age at first sex was about 16 years old. Sexually active respondents had an average number of 3.22 and 3.56 sexual partners in their life time and in the last 10 years, respectively. They also had an average of 1.37 HIV tests in the last 10 years.

Definition of Concurrency

In most previous studies, a concurrent sexual partnership is defined as having 2 or more sexual partnerships that occur at the same time (Adimora et al. 2002 & 2003; Laumann 1994; Potterat et al 1999; Serwadda et al 1992). That is, "first sexual intercourse with one partner occurred before the month of last sexual intercourse with another partner" (Adimora et al. 2002: 321). An even cruder measurement is to ask respondents to report concurrency without clearly defining the starting and ending points, such as the following question used by Manhart (2002:135): "Once you began sexual activity with (X), with how many other people did you engage in sexual activity?" Using these definitions, we do not know the occurrence or frequency of sex during the time of concurrency, and this information could provide an indication of the level of risk of disease transmission between partnerships.

The detailed data in this study on the frequency of sex each month within each partnership for the last 10 years provide the opportunity to define concurrency in a variety of ways. As in

previous studies, we first compare the month of first sex and that of last sex across relationships and define *overlapped sex* as 2 or more sexual partnerships that are overlapped in time. In an effort to examine the patterns of sexual intercourse within overlapped partnerships in more detail, we use a narrower definition of *concurrency* as having sexual intercourse with 2 or more partners in the same month or series of consecutive months. It is important to note that an individual may have more than one episode of concurrent sex within the same overlapping partnerships.[1]

Preliminary Results

We first describe the prevalence of concurrency and overlapped sex in the sample, and then look into the characteristics of the relationships among those who ever had these partnerships. Table 3 presents the basic information about the prevalence of these sexual partnerships. Almost 17 percent of respondents ever had an episode of concurrent sex in the past 10 years. Of those who had these partnerships, approximately three-quarters had only one episode, 14.29 percent had two, and 11.22 percent had more than two. The prevalence of overlapped sex is 18.45 percent, slightly higher than that of concurrent sex. Approximately 81 percent of respondents ever had one occurrence of overlapped sex, 12.15 percent had two, and 6.54 percent had more than two occurrences. Further analyses will investigate partnerships in the last year in order to draw prevalence comparisons with other studies of concurrency in various populations. The proportion of respondents who had more than one episode of concurrency (about 0.25 = (11+14)/98) is higher than the proportion who had more than one occurrence of overlapped sex (about 0.19 = (13+7)/107), which is not surprising given that multiple episodes of concurrency may take place in one occurrence of overlapped sex. It is, however, interesting to note that the proportions are so similar, indicating that episodes of having sex with 2 or more partners at the same time occur generally only once within an overlapped occurrence.

Table 4 presents figures that describe the nature of concurrent and overlapped sexual partnerships among the respondents who ever had these relationships. Nearly 85 percent of those who had an episode of concurrent sex had sex in the same month or series of months with 2 sexual partners, and about 15 percent had 3 partners. No one had sex with more than 3 partners in the same month. Similar proportions hold for those who had an overlapped sex; 83.18 percent had 2 partners simultaneously, and approximately 17 percent had more than 3 partners at the same time. There is one respondent who had 4 partners simultaneously. In short, among the respondents who ever had concurrent or overlapped sex, the majority of them only maintained 2 partners simultaneously.

For nearly half of the respondents who ever had an episode of concurrent sex, the longest duration of all their episodes was one only month. For approximately 15 percent, the longest episode was 2-3 months and for another 15 percent, the longest episode was 4-6 months. Approximately 9 percent of respondents' longest episodes were 7-12 months in duration. For 10 percent, their longest episode lasted over one year. Not unexpectedly, overlapped sexual partnerships display longer durations than episodes of concurrent sex. Among those who ever

[1] For example, if an individual maintains a sexual relationship with 2 partners at one time, this is recorded as an occurrence of overlapped sex; if the individual had sex with both partners in the same month at the beginning of the relationships, stopped having sex with one or both during the period, and then had sex in the same month with both at the end of the relationships, this is coded as 2 episodes of concurrent sex.

had overlapped sex, about 40 percent had their longest occurrence for only one month, and approximately 17 percent had their occurrences lasting over one year.

With high levels of condom use, concurrent or overlapped sexual partnerships may not increase the spread of HIV and STI infections. In our sample, the proportion of respondents who never used a condom within their concurrent or overlapping partnerships is 43.88 and 41.12 percent, respectively. This result provides some support for Lagarde and colleagues' (2001) explanation about the lack of association between levels of concurrency and HIV infection. Further analyses will shed light on the consistency of condoms use within concurrent and overlapped partnerships.

Approximately 20 percent of respondents ever had an episode of concurrency where their spouses or fiancés were involved in one of the relationships. About half of the respondents had episodes that involved serious, dating, or casual partners, and 23.47 percent had episodes that involved other types of partnerships, including commercial sex or one-night stands. In short, the respondents are most likely to have concurrent sex with someone whom they are familiar with (serious, dating, and casual partners) but not as close as marital partners (i.e., spouses or fiancés). A similar pattern holds for those who had overlapped sex.

Finally, 30.61 percent of the respondents who ever had an episode of concurrent sex had at least one of their concurrent sexual partners living in a different village or city. Thus, these respondents had sex with two partners in different locations within the same month or series of months. The percentage of those with overlapping partnerships is 37.38 percent. Taken together, these results underscore the high mobility of the young population and how sexual behaviors are intertwined with migration patterns.

Conclusion and Next Steps

Using sexual history data from a survey of young people in urban Kisumu, Kenya, we overcome some of the limitations in the previous research on concurrency and provide a more detailed and complete description of the prevalence and characteristics of concurrent and overlapping sexual partnerships in a high HIV/AIDS prevalence context. We define concurrency in two ways: an *episode of concurrency* is having sexual intercourse with multiple partners in the same month or series of months, and an *occurrence of overlapping sex* is having multiple sexual partners for whom the time of the first and last sex are overlapped. Overall, the prevalence of these partnerships is between 15 and 20 percent of respondents. Among those who had concurrent sexual partnerships, most of the respondents had only one such episode in the last 10 years and this usually involved only 2 partners simultaneously. The large majority of episodes of concurrency lasted for 6 months or less. Serious, dating, and casual partners are the most common in concurrent sexual partnerships. There is also a notable proportion of respondents having one of their concurrent sexual partners living in a different village or city.

In addition to the new analyses noted above, future work will also examine the factors associated with the risk of having concurrent or overlapping sexual partnerships, including gender, education and employment, migration, and the characteristics of respondents' sexual partners. Furthermore, most previous research views all concurrent partnerships as equally risky; in contrast, we wish to explore how unsafe sexual behavior varies across concurrent and overlapping partnerships. For example, the number, types, and location of partners involved may significantly impact condom use and its consistency. The same factors associated with decreased

condom use, such as having migrants as sexual partners, may also expand respondents' sexual networks more broadly, thus increasing the spread of HIV and STIs.

Table 1. Demographic and Socioeconomic Characteristics of Sexually Active Youth

	Frequency	Percent
Gender		
Male	268	53.82
Age		
18-19	143	28.71
20-21	171	34.34
22-24	184	36.95
Marital status		
Never married	377	75.7
Currently in school	114	22.89
Highest education degree		
No schooling, or Standard 1-8	161	32.33
Form 1-4	233	46.79
Form 5 and above	104	20.88
Ethnic group		
Luo	383	76.91
Religion		
Roman Catholic	122	24.5
Mainstream Protestant	126	25.3
SDA	76	15.26
Pentecostal	89	17.87
Other	85	17.07
Average monthly income in the last year		
0	227	45.58
1-2000	108	21.69
2001-4000	61	12.25
4001-6000	54	10.84
>6000	48	9.64

Table 2. Characteristics of Sexual Histories of Sexually Active Youth

	Mean	S.D.	Min	Max
Age at first sex (years)	16.10	2.42	8.42	23.17
Number of life-time sexual partners	3.22	3.83	1	40
Number of sexual partners in the last 10 years	3.56	3.76	0	32
Number of HIV tests in the last 10 years	1.37	2.73	0	17

Notes: S.D.= standard deviation; Min= minimum; Max= maximum.

Table 3. Prevalence of Concurrent/Overlapped Sexual Partnerships

	Concurrent sex		Overlapped sex	
	Freq.	Percent	Freq.	Percent
Ever had episode of concurrency or overlapped sex	98	16.90	107	18.45
Total number of episodes (of those who had episodes)				
1	73	74.49	87	81.31
2	14	14.29	13	12.15
>2	11	11.22	7	6.54
N	580		580	

Table 4. Characteristics of Concurrent/Overlapped Sexual Partnerships

	Concurrent sex		Overlapped sex	
	Freq.	Percent	Freq.	Percent
Max. number of sexual partners in the partnership				
2	83	84.69	89	83.18
3	15	15.31	17	15.89
4	0	0	1	0.93
Max. duration of partnership (months)				
1 month	48	48.98	44	41.12
2-3 months	15	15.31	19	17.76
4-6 months	16	16.33	15	14.02
7-12 months	9	9.18	11	10.28
>12 months	10	10.20	18	16.82
Ever had episode of concurrency or overlapped sex with no condom throughout	43	43.88	44	41.12
Ever had partnership that involved				
Spouse or fiancé	20	20.41	24	22.43
Serious partner	54	55.10	57	53.27
Dating partner	49	50.00	55	51.40
Casual partner	54	55.10	57	53.27
Other types of partners[a]	23	23.47	25	23.36
Ever had episode of concurrency or overlapped sex that involved 1 partner living in other village/city	30	30.61	40	37.38
N	98		107	

Notes: Freq.= frequency.
[a] Includes commercial sex, one-night stand, relative, stranger, inherited widow.

References

Adimora, Adaora A., Victor J. Schoenbach, D. Bonas, Francis Martinson, Kathryn Donaldson, and Tonya Stancil. 2002. "Concurrent sexual partnerships among women in the United States." *Epidemiology* 13: 320-327.

Adimora, Adaora A., Victor J. Schoenbach, Francis Martinson, Kathryn Donaldson, Tonya Stancil, and Robert E. Fullilove. 2004. "Concurrent sexual partnerships among African Americans in the Rural South." *Ann Epidemiol* 14: 155-160.

Bailey, Robert C., Stephan Moses, Corette B. Parker, Kawango Agot, Ian Maclean, John N. Krieger, Carolyn F.M. Williams, Richard T. Campbell, Jeckoniah O. Ndinya-Achola. 2007. Male circumcision for HIV prevention in young men in Kisumu, Kenya: A randomized controlled trial. *The Lancet* 369:643-656.

Buvé, Anne, M. Caraël, R.J. Hayes, B. Auvert, B. Ferry, N.J. Robinson, S. Anagonou, L. Kanhonou, M. Laourou, S. Abega, E. Akam, L. Zekeng, J. CHege, M. Kahindo, N. Rutenberg, F. Kaona, R. Musonda, T. Sukwa, L. Morison, H.A. Weiss, and M. Laga, for the Study Group on Heterogeneity of HIV Epidemics in African Cities. 2001. "Multicentre study on factors determining differences in rate of spread of HIV in sub-Saharan Africa: Methods and prevalence of HIV infection." *AIDS* 15(suppl 4): s5-s14.

Carter, Marion W., Joan M. Kraft, Todd Koppenhaver, Christine Galavotti, Thierry H. Roels, Peter H. Kilmarx, and Boga Fidzani. 2007. "A bull cannot be contained in a single kraal: Concurrent sexual partnerships in Botswana." *AIDS Behav* 11: 822-830.

Doherty, Irene A., Alexandra Minnis, Colette L. Auerswald, Adaora A. Adimora, and Nancy S. Padian. 2007. "Concurrrent partnerships among adolescents in a Latino community: The Mission District of San Francisco, California." *Sexually Transmitted Diseases* 34(7): 437-443.

Glynn, J.R., M. Caraël, B. Auvert, M. Kahindo, J. Chege, R. Musonda, F. Kaona, A. Buve, and the Study Group on the Heterogeneity of HIV Epidemics in African Cities. 2001. "Why do young women have a much higher prevalence of HIV than young men? A study in Kisumu, Kenya and Ndola, Zambia." *AIDS* 15(suppl. 4):S51-S60.

Kelley, Stephanie S., Elaine A. Borawski, Susan A. Flocke, and Kevin J. Keen. 2003. "The role of sequential and concurrent sexual relationships in the risk of sexually transmitted disease among adolescents." *Journal of Adolescent Health* 32: 296-305.

Lagarde, Emmanuel, Bertran Auvert, Michel Caraël, Martin Laourou, Benoît Ferry, Evina Akam, Tom Sukwa, Linda Morison, Bertrand Maury, Jane Chege, Ibrahima N'Doye, Anne Buvé and the Study Group on Heterogeneity of HIV Epidemics in African Cities. 2001. "Concurrent sexual partnerships and HIV prevalence in five urban communities of sub-Saharan Africa." *AIDS* 15: 877-884.

Laumann, E. O., J. H. Gagon, R. T. Michael, and S. Michaels. 1994. *The Social Organization of Sexuality: Sexual Practices in the United States*. Chicago: The University of Chicago Press.

Luke, Nancy, Shelley Clark, and Eliya Zulu. 2008. "Using the New Relationship History Calendar Method to Improve Sexual Behavior Data." Paper presented at the Annual Meetings of the Population Association of America, April 17-19, New Orleans.

Manhart, Lisa E., Sevgi O. Aral, King K. Holmes, and Betsy Foxman. 2002. "Sex partner concurrency: measurement, prevalence, and correlates among urban 18-39-year-olds." *Sexually Transmitted Diseases* 29(3): 133-143.

Morris, Martina, and Mirjam Kretzschmar. 1997. "Concurrent partnerships and the spread of HIV." *AIDS* 11: 641-648.

—— 2000. "A microsimulation study of the effect of concurrent partnerships on the spread of

HIV in Uganda." *Mathematical Population Studies* 8(2): 109-133.
Nelson, Sara J., Lisa E. Manhart, Pamina M. Gorbach, David H. Martin, Bradley P. Stoner, Sevgi O. Aral, and King K. Holmes. 2007. "Measuring sex partner concurrency: It's what's missing that counts." *Sexually Transmitted Diseases* 34(10): 801-807.
Potterat, John J., Helen Zimmerman-Rogers, Stephen Q. Muth, Richard Rothenberg, David Green, Jerry Taylor, Mandy Bonney, and Helen White. 1999. "Chlamydia Transmission: Concurrency, Reproduction Number, and the Epidemic Trajectory." *American Journal of Epidemiology* 150(12):1331-1339.
Rosenberg, Melanie D., Jill E. Gurvey, Nancy Adler, Miranda B.V. Miranda, and Jonathan M. Ellen. 1999. "Concurrent sex partners and risk for sexually transmitted diseases among adolescents." *Sexually Transmitted Diseases* 26(4): 208-212.
Serwadda, D, M. J. Wawer, S. D. Musgrave, N. K. Sewankambo, J. E. Kaplan, and R. H. Gray. 1992. "HIV risk factors in three geographic strata of rural Rakai District, Uganda." *AIDS* 6: 983-989.

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