CENTRE FOR
SOCIAL SCIENCE RESEARCH

Aids and Society Research Unit

Concurrent sexual partnerships among individuals on HAART in South Africa: An opportunity for HIV prevention

Brendan Maughan-Brown
Atheendar S. Venkataramani
Timothy L. Mah

CSSR Working Paper No. 265

December 2009

Brendan Maughan-Brown, Ph.D., AIDS and Society Research Unit, University of Cape Town.

Atheendar S. Venkataramani, Ph.D., Washington University School of Medicine, St Louis.

Timothy L. Mah, D.Sc., Division of Technical Leadership and Research, Office of HIV/AIDS, USAID.

Acknowledgements:

The authors wish to thank Drs. Nicoli Nattrass, Daniel Halperin and Jim Shelton for their comments. We would like to acknowledge funding from the AIDS and Society Research Unit at the University of Cape Town and the Health Economics and HIV/AIDS Research Division at the University of KwaZulu-Natal. The views expressed here are not necessarily those of the United States Agency for International Development (USAID), nor the United States Government.

Concurrent sexual partnerships among individuals on HAART in South Africa: An opportunity for HIV prevention

Abstract

Concurrent sexual partnerships, a common form of sexual partnering in much of southern Africa, play an important role in HIV transmission dynamics. This study examines the prevalence of concurrency and condom use among the general population and a sample of HAART patients in Cape Town, South Africa. The prevalence of reported concurrency was relatively high among a sample of HAART patients and in the general population (24% and 18% respectively) and reported consistent condom use was significantly higher among HAART patients compared to the general population (58% versus 20%); perceived concurrency among the study populations' sexual partners was higher among HAART patients (35% versus 20%). Individuals on HAART report higher and more consistent use of condoms than the general population but the prevalence of concurrent relationships remains worryingly high. Greater programmatic attention should be given to promoting risk awareness of and behaviour change around concurrency both in the general population and amongst people living with HIV.

Key Words: *concurrency, concurrent partners, HIV prevention, HAART*

Introduction

Concurrent sexual partnerships (CP), defined as overlapping sexual partnerships where sexual intercourse with one partner occurs between two acts of intercourse with another partner, are considered to be an important factor contributing to the HIV epidemics of southern Africa (UNAIDS Reference Group on Estimates Modelling and Projections, 2009, SADC, 2006, Halperin and Epstein, 2007). Qualitative and quantitative data suggest that concurrency is a common form of sexual partnering in the region (Mah and Halperin, 2008, Parker et al., 2007, Soul City Institute Regional Programme, 2008, Mah, 2009). Additionally, modelling exercises demonstrate that concurrency can increase HIV transmission through sexual networks (Morris and Kretzschmar, 1997, Morris et al., 2009). Such findings have resulted in suggestions that partner and concurrency reduction should form a larger component of a broad spectrum of evidence-based HIV prevention strategies in the region (Epstein, 2008, Potts et al., 2008, Shelton, 2009)

Given the large numbers of people living with HIV (PLHIV), particularly in southern Africa, secondary prevention (or 'prevention with positives') has increasingly become a component of a comprehensive approach to the HIV epidemic (Bunnell et al., 2006). Specific targeting of efforts to promote partner and concurrency reduction among PLHIV should form an important part of these broader efforts. For example, Kalichman et al. (2007) found that 20% of PLHIV in Botswana reported multiple partnerships (measured as two or more sexual partners in the past three months), leading to their conclusion that multiple strategies targeting PLHIV are urgently needed in sub-Saharan Africa.

While evidence of the prevalence and epidemiological importance of concurrency among the general population and, to a lesser extent, PLHIV is growing, there has been no research on this subject among those on highly active antiretroviral therapy (HAART). A high prevalence of concurrency among those on HAART could have important implications for both HIV prevention and treatment. First, while antiretrovirals decrease viral loads to undetectable levels in the short-medium run, even the durability of first-line treatments is, on average, less than five-years (Willig et al., 2008). Consequently, as first-line regimes weaken, viral loads fluctuate and the infectivity of individuals on HAART increases. In addition, although levels of adherence to HAART in the region are generally good, viral loads will fluctuate among those with non-perfect adherence. Second, recent studies have found HIV-1 RNA in the semen of HIV-infected men on effective HAART suggesting that onward transmission is still possible (Anderson et al., 2009, Pasquier et al.,

2009). Third, in cases of positive sero-concordance between partners, engaging in concurrency may increase the risk of HIV-re-infection, leading to the development of drug-resistant strains of HIV and accelerated disease progression (Campbell et al., 2009, Pernas et al., 2006).

The aim of this paper is to address this gap in the literature by using data from an African township in Cape Town, South Africa, to measure the prevalence of concurrent sexual partnerships and condom use among individuals on HAART. Comparisons are made between individuals on HAART and the general population from the same geographic area.

Data and Methods

Khayelitsha is Cape Town's largest African township and, in 2001, was the site of the first public sector provision of HAART in Africa (Medecins sans Frontieres South Africa et al., 2003). It is an area with a high HIV prevalence, with about a third of women attending antenatal clinics HIV positive (Shaikh et al., 2006). The data used in this analysis come from two surveys collected in Khayelitsha by the AIDS and Society Research Unit at the University of Cape Town: the Khayelitsha HAART Panel Study (hereafter, the HAART Study), which focused on HAART patients, and the Khayelitsha Panel Study (KPS), which examined the general population.

The HAART Study sample was recruited in 2004 (n = 242) through social networks and contacts with clinics and support groups and participants were re-interviewed in 2006 (n=224). This was not a random sample. However, over two-thirds of those participating in the 2001 HAART program and over a third of those known to have been on HAART for over a year, were recruited into the study.

The KPS sample evolved out of the 2000/01 Khayelitsha Mitchell's Plain (KMP) Survey (n = 2,644). The KMP was representative of the population (18 years of age and older) residing in Khayelitsha and Mitchell's Plain (Crankshaw et al., 2001). The KPS sought to follow a representative sub-sample of individuals in the KMP who lived just in Khayelitsha. This analysis utilizes data collected from 651 participants during the second wave of the KPS in 2005. An attrition analysis found little evidence of non-random attrition between the various waves of the KMP/KPS (Magruder and Nattrass, 2006).

Data on concurrency were collected in the second waves of both the HAART Study and KPS using identical questions. In both surveys, a set of questions was asked about each sexual partner (or the most recent four if more than four were reported) the respondent had in the past year. Concurrent sexual partnerships among respondents were measured with the following question: "*Did **you** have any other sexual partners during the time that you and* [***partner***] *were having a sexual relationship?*" [*definitely yes, not sure, definitely no*].

To measure aspects of the broader sexual network we utilized answers to the question: "*As far as you know, did [**partner**] have any other sexual partners during the time that you and he/she were having a sexual relationship?"* [*definitely yes, not sure, definitely no*]. Finally, in order to examine other potentially risky sexual behaviours in the context of concurrency, we utilized information on condom use, which came from the question "*How often did you use condoms when you had sex during the past year?"* [*none of the time, some of the time, most of the time, all of the time*].

Descriptive statistics and cross-tabulations for concurrency and condom use were computed for each study population by gender. Statistical significance of the difference between the HAART and KPS samples was assessed using Chi-square tests. Given that the two samples may differ in demographic and socioeconomic characteristics, we tested the sensitivity of the results in a sample where HAART and KPS respondents were paired based on the nearest neighbour propensity score, where the propensity of appearing in one sample was determined by age, gender and level of education. The results were highly similar regardless of method and, as such the results shown came from the full (general population) KPS sample. All analyses were carried out using Stata SE (version 10.0, College Station, TX). Ethical approvals were granted by the University of Cape Town and written informed consent was provided by all participants.

Results

Sample characteristics are presented in Table 1. A majority of respondents, in both the HAART (79%) and KPS (62%) samples, were women. The lower percentage of men in the HAART sample probably reflects the higher prevalence of HIV among women and that men are less likely than women to participate in HAART programs and seek medical treatment, more generally (Nattrass, 2008). The mean age of HAART participants was 33 years, and most individuals had completed an average of 9.5 years of schooling. The HAART

sample was slightly younger and slightly more educated, on average, than the general population. Although fewer individuals on HAART were employed as compared to the general population, per capita household income was slightly higher among the HAART sample. Self-reported health within each sample was similar. Finally, HAART study participants had been on HAART for an average of 3.5 years.

Table 1. Sample characteristics for 2006 HAART Study & 2005 KPS.

	HAART (n = 224)		KPS (n = 651)	
	%	Mean	%	Mean
Gender Men	21		38	
Women	79		62	
Age (years)		33		39
Education (years/level achieved)		9.6		8.8
None	2		2	
Primary	10		17	
Secondary	54		53	
Grade 12/Matric	34		27	
Per capita Household income (Rand/month)		509		468
Employed	42		58	
Self-Reported (1-5 Likert Scale, 5 – excellent health)		3.6		3.9
Years on HAART		3.5		n/a

Notes: n/a = not applicable

Table 2 displays percentages of respondents who reported being sexually active, engaged in concurrency, believed their partner engaged in concurrency, and condom use. Similar percentages of individuals on HAART (81%) and in the general population (80%) reported being sexually active (defined as having full penetrative sex) in the past year. More than three times as many women as men in both samples reported not being sexually active.

Conditional on reporting sexual activity in the past 12 months, nearly a quarter of the HAART population (24%) reported having engaged in concurrency and 18% of KPS respondents reported concurrency (the difference is not statistically significant). The proportion was similar across men and women (25% and 24%, respectively) in the HAART sample, while in the KPS sample, more men than women reported concurrency (21% and 16%, respectively).

Thirty-five percent of HAART respondents reported a belief that their sexual partner had other partners. This figure was driven predominantly by women, 41% of whom were “definitely sure” that their sexual partner was engaged in concurrent partnerships. These figures are likely an underestimate as a significant proportion of the HAART participants reported being unsure as to whether their partner had other sexual partners at the same time (30%).

Compared to the HAART sample, a lower percentage of respondents (21%) in the general population believed their partners were involved in concurrency (the difference between the samples is statistically significant at $p < 0.01$). However, this was still a relatively high proportion. Similar to the HAART sample, a greater number of women (22%) than men (16%) in the general population believed their sexual partners had other partners.

Table 2. Reported sexual behaviour for 2006 HAART Study and 2005 KPS participants.

		HAART			KPS		
		All	**Men**	**Women**	**All**	**Men**	**Women**
Sexually active							
Had sexual intercourse in past 12 months?	Yes	81% [181]	93% [40]	78% [141]	80% [512]	92% [226]	72% [286]
	No	19% [42]	7% [3]	22% [39]	20% [130]	8% [19]	28% [111]
Concurrency among sexually active respondents							
Did **you** have any other sexual partners during the time that you and [**partner]** were having a sexual relationship?	Definitely yes	24%	25%	24%	18%	21%	16%
	Not sure	1%	0%	1%	3%	4%	1%
	Definitely no	75%	75%	75%	79%	75%	83%
Concurrency reported for respondents' sexual partners							
As far as you know, did [**partner**] have any other sexual partners during the time that you and he/she were having a sexual relationship?	Definitely yes	35%	15%	41%	20%**	16%	22%**
	Not sure	30%	25%	31%	22%	29%	16%
	Definitely no	35%	60%	28%	59%	55%	62%
Condom use							
How often did you use condoms when you had sex during the past year?	Never	11%	13%	11%	67%	69%	64%
	Inconsistent	31%	21%	35%	13%	12%	14%
	Consistent	58%	68%	55%	20%**	18%**	22%**

Notes: Numbers in brackets indicate number of respondents.
Asterisks refer to results from Chi-Square tests, with ** - $p < 0.01$, * - $p < 0.05$. For the concurrency variables, the tests compare "definitely yes" to "not sure" or "definitely no" across the HAART and KPS samples by sub-sample (i.e., tests were computed separately for full samples, males and females). We used the same procedure for condom use, comparing "consistent" with "never" and "inconsistent".

The majority of HAART respondents (58%) reported using a condom consistently, while 11% indicated that they never used a condom. A greater

percentage of men (68%) than women (55%) reported always using a condom. In the KPS, 67% reporting never using a condom, while 20% reported consistent use. The differences across the samples were statistically significant ($p < 0.01$). In contrast to the HAART sample, condom use was more consistent among women compared to men in the general population sample.

Table 3 explores condom use among those individuals who reported either being engaged in concurrency, believing that their partner was engaged in concurrency, or both. Among HAART participants who reported CP *or* perceived their partner to be involved in CP, 47% were using condoms inconsistently or not at all (i.e. 19% of the sexually active sample). Among HAART participants who reported CP *and* perceived their partner to be involved in CP, 44% were using condoms inconsistently or not at all (i.e. 8% of the sexually active sample). Although a smaller percentage of respondents in the KPS reported involvement in concurrency, significantly fewer reported consistent condom-use (30%).

Table 3. Reported condom use among participants involved in concurrency in the 2006 HAART Study and 2005 KPS.

	HAART		**KPS**	
	Either respondent or partner had CP (n = 74, 41% of sexually active)	**Both respondent and partner** had CP (n = 32, 18% of sexually active)	**Either respondent or partner** had CP (n = 128, 25% of sexually active)	**Both respondent and partner** had CP (n = 62, 12% of sexually active)
None/inconsistent	47%	44%	70%	70%
Consistent	53%	56%	30%	30%

Discussion

Based on the findings of this analysis, it is evident that many individuals in both study populations engage in concurrent sexual partnerships. Despite being on treatment, which lowers viral loads and thus infectivity, there are concerns that the practice of concurrency among individuals on HAART may have adverse public health effects. Concurrent partnerships have negative implications for HIV prevention, treatment and care efforts through the transmission of HIV to sero-negative partners or through HIV-re-infection between sero-positive partners.

These possibilities underscore the importance of further investigating concurrency among individuals on HAART and in the general population to gain a better understanding of the social and individual factors which shape CP prevalence. To the best of our knowledge, this paper is the first to examine the prevalence of concurrency among individuals on HAART in sub-Saharan Africa. We found that 24% of sexually active men and women on HAART reported having had at least one concurrent sexual partner in the past year. Forty-one percent reported that either they *or* their partner had other sexual partners during the relationship. In addition, almost one in five sexually active individuals on HAART reported that he/she had at least one concurrent sexual partnership *and* at the same time his/her sexual partner had at least one concurrent sexual partnership. This suggests a potentially worrisome degree of connectivity between these individuals on HAART, their partners and a wider sexual network.

The public health significance of these reported concurrent partnerships was underscored by the fact that almost one in five of those on HAART who engaged in concurrency also reported inconsistent condom use. Although risk assessment is limited by the lack of information on sexual behaviours and HIV status of respondents' partners, this suggests that many of these partnerships may represent a risk for HIV transmission. In the most recent wave of the HAART Study (2007), participants were asked whether they knew the HIV status of their most recent sexual partner: approximately 55% reported that their last sexual partner was HIV negative. This indicates that the concurrent partnerships among these individuals involve sexual networks of both PLHIV and sero-negative individuals, representing risk for new infections and re-infection.

Comparisons across the HAART and KPS populations provide interesting insights into public health efforts to reduce risky sexual behaviours. Our finding that condom use was much more frequently and consistently reported in the HAART sample was expected as other studies have found PLHIV to use condoms more consistently once they started HAART (Stinson, 2009, Bateganya et al., 2005). Retrospective data on condom use among the HAART sample prior to treatment reflects the potential efficacy of condom use messages: 12%, 57% and 70% reported always using condoms when they had sexual intercourse before counselling and testing (CT), after CT but before receiving ARV treatment, and since beginning ARV treatment, respectively.

Lacking panel data on concurrency, we do not know how concurrency has changed over time. It is possible that rates of concurrency or multiple partnering in the HAART sample were significantly greater before HIV-diagnosis – a

potential co-factor for many sero-conversions – and were decreased to their reported levels through counselling and HAART services. It is also possible that rates of concurrency have remained stable over time (in both populations) since concurrency reduction was not targeted by prevention campaigns. However, that both study populations reported relatively high levels of concurrency is troubling.

This paper has several limitations that should be considered. First, as with all self-reported data, there is potential for recall and social desirability biases. In South Africa, concurrency has been found to be common but yet not generally acceptable in non-peer social dialogue (Mah and Maughan-Brown, 2009), suggesting that social desirability bias would result in an underestimation of the prevalence of concurrency. Further, given the extensive education on condom use, social desirability bias would probably result in an over-reporting of condom use, thus masking some of the risk presented by concurrent partnerships. These biases may also be differential between the samples. Second, our results may not be generalisable to all individuals on HAART as it is possible that selection bias existed. Finally, as mentioned previously, the cross-sectional survey used from the HAART Study provides a snap shot of concurrency at a given time. It was therefore not possible to assess the dynamics of concurrency over time or in relation to starting HAART.

Despite these limitations, our findings indicate that concurrent partnerships are common – both among the general population and among individuals on HAART. We therefore recommend that partner and concurrency reduction interventions be included in prevention packages targeting the general population, including PLHIV and those on HAART. Reducing concurrent partnerships may be challenging, given the extent of concurrency in the general population and hence the evident social-rootedness of such practices. However, condom-use has increased over time among the HAART sample and is significantly greater compared to the general population. This indicates that many individuals on HAART are receptive to safer sex counselling. There is thus potential for counselling and HAART services to be used to promote concurrency reduction as a component of HIV prevention. While increasing the risk perception of concurrency is important in the short term, research needs to evaluate structural factors, such as economic and gender inequalities, which play a role in engaging in concurrent sexual partnerships. Further research is also necessary to better understand the role of concurrency and sexual networks in onward transmission of HIV or re-infection among PLHIV, including those on HAART.

References

Anderson, D., Politch, J., O'brien, W., Xu, C., Bowman, F. & Mayer, K. (2009) Persistent HIV-1 RNA shedding in semen of men on HAART is associated with high risk sexual behavior. *5th IAS Conference of HIV Pathogenesis, Treatment and Prevention.* Cape Town, South Africa.

Bateganya, M., Colfax, G., Shafer, L. A., Kityo, C., Mugyenyi, P., Serwadda, D., Mayanja, H. & Bangsberg, D. R. (2005) Antiretroviral therapy and sexual behavior: A comparative study between antiretroviral-naive and -experienced patients at an urban HIV/AIDS care and research center in Kampala, Uganda. *AIDS Patient Care & STDs,* 19**,** 760-768.

Bunnell, R., Mermin, J. & DE Cock, K. M. (2006) HIV prevention for a threatened continent: Implementing positive prevention in Africa. *Journal of the American Medical Association,* 296**,** 855-858.

Campbell, M. S., Gottlieb, G. S., Hawes, S. E., Nickle, D. C., Wong, K. G., Deng, W., Lampinen, T. M., Kiviat, N. B. & Mullins, J. I. (2009) HIV-1 superinfection in the antiretroviral therapy era: Are seroconcordant sexual partners at risk? *PLoS ONE,* 4.

Crankshaw, O., Welch, M. & Butcher, S. (2001) GIS Technology and Survey Sampling Methods: The Khayelitsha/Mitchell's Plain 2000 Survey. *Social Dynamics,* 27**,** 156-174.

Epstein, H. (2008) AIDS and the irrational. *British Medical Journal,* 337**,** 1265-67.

Halperin, D. T. & Epstein, H. (2007) Why is HIV prevalence so severe in southern Africa? The role of multiple concurrent partnerships and lack of male circumcision: Implications for AIDS prevention. *Southern African Journal of HIV Medicine,* 8**,** 19-25.

Kalichman, S. C., Ntseane, D., Nthomang, K., Segwabe, M., Phorano, O. & Simbayi, L. C. (2007) Recent multiple sexual partners and HIV transmission risks among people living with HIV/AIDS in Botswana. *Sexually Transmitted Infections,* 83**,** 371-375.

Magruder, J. & Nattrass, N. (2006) Exploring attrition bias: The case of the Khayelitsha panel study (2000-2004). *South African Journal of Economics,* 74**,** 769-781.

Mah, T. L. (2009) Prevalence and correlates of concurrent sexual partnerships among young people in South Africa. *Sex Transm Dis,* 36.

Mah, T. L. & Halperin, D. T. (2008) Concurrent sexual partnerships and the HIV epidemics in Africa: Evidence to move forward. *AIDS and Behavior,* EPub.

Mah, T. L. & Maughan-Brown, B. (2009) Social and cultural contexts of concurrency in Khayelitsha. *Working Paper Series # 09/251*. Cape Town, South Africa, Centre for Social Science Research, University of Cape Town.

Medecins Sans Frontieres South Africa, University of Cape Town Department of Public Health & Provincial Administration of the Western Cape (2003) Antiretroviral therapy in primary health care: Experience of the Khayelitsha programme in South Africa: Case study. *Perspectives and Practice in Antiretroviral Treatment.* Geneva, World Health Organization.

Morris, M. & Kretzschmar, M. (1997) Concurrent partnerships and the spread of HIV. *AIDS,* 11**,** 641-8.

Morris, M., Kurth, A. E., Hamilton, D. T., Moody, J. & Wakefield, S. (2009) Concurrent Partnerships and HIV Prevalence Disparities by Race: Linking Science and Public Health Practice. *Am J Public Health,* 99**,** 1023-1031.

Nattrass, N. (2008) Gender and Access to Antiretroviral Treatment in South Africa. *Feminist Economics,* 14**,** 19 - 36.

Parker, W., Makhubele, B., Ntlabati, P. & Connolly, C. (2007) Concurrent Sexual Partnerships Amongst Young Adults in South Africa. Johannesburg, South Africa, CADRE.

Pasquier, C., Saune, K., Raymond, S., Moinard, N., Daudin, M., Bujan, L. & Izopet, J. (2009) Determining seminal plasma HIV-1 load in the context of efficient HAART. *Journal of Clinical Microbiology,* EPub ahead of print**,** JCM.02131-08.

Pernas, M., Casado, C., Fuentes, R., Perez-Elias, M. J. & Lopez-Galindez, C. (2006) A dual superinfection and recombination within HIV-1 subtype B 12 years after primoinfection. *Journal of Acquired Immune Deficiency Syndromes,* 42**,** 12-18.

Potts, M., Halperin, D. T., Kirby, D., Swidler, A., Marseille, E., Klausner, J. D., Hearst, N., Wamai, R. G., Kahn, J. G. & Walsh, J. (2008) Reassessing HIV prevention. *Science,* 320**,** 749-750.

SADC (2006) Expert think tank meeting on HIV prevention in high-prevalence countries in southern Africa: Report. Gaborone, Botswana, Southern African Development Community Secretariat - HIV and AIDS Unit.

Shaikh, N., Abdullah, F., Lombard, C. J., Smit, L., Bradshaw, D. & Makubalo, L. (2006) Masking through averages--intraprovincial heterogeneity in HIV prevalence within the Western Cape. *South African Medical Journal,* 96**,** 538-43.

Shelton, J. D. (2009) Why multiple sex partners? *Lancet*, 374**,** 367-3690.

Soul City Institute Regional Programme (2008) Multiple and concurrent sexual partnerships in Southern Africa: A ten country research report. Johannesburg, South Africa.

Stinson, K. (2009) Determinants of sexual risk behaviour among HIV-infected individuals across different health service settings in Cape Town *Faculty of Health Sciences.* Cape Town, University of Cape Town

UNAIDS Reference Group On Estimates Modelling And Projections (2009) Consultation on concurrent sexual partnerships: Recommendations from a meeting held in Nairobi, Kenya. London.

Willig, J. H., Abroms, S., Westfall, A. O., Routman, J., Adusumilli, S., Varshney, M., Allison, J., Chatham, A., Raper, J. L., Kaslow, R. A., Saag, M. S. & Mugavero, M. J. (2008) Increased regimen durability in the era of once-daily fixed-dose combination antiretroviral therapy. *AIDS,* 22**,** 1951-1960.