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The Prevalence of Sexual Partner Concurrency Is Not Correlated with Markers of Poverty or Gender Inequality: An Ecological Analysis

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Abstract

High rates of overlapping sexual relationships (concurrency) are believed to be important in the generation of generalized HIV epidemics in sub-Saharan Africa. Different authors favor socioeconomic, gender-equity or cultural explanations for the high concurrency rates in this region. We performed linear regression to analyze the association between the point-prevalence of concurrency in 15 - 49 years old males and various indicators of socioeconomic status and gender-equity using data from 11 countries surveyed in 1989/1990. We found no meaningful association between concurrency and the various markers of socioeconomic status and gender-equity. This analysis supports the findings of other studies that high concurrency rates in sub-Saharan Africa could be reduced without having to address socioeconomic and gender-equity factors.

Keywords

Concurrency, HIV, Culture, Gender Inequality, Poverty, Prevalence

1. Introduction

Sexual partner concurrency is believed by many to play an important role in the genesis of the generalized HIV epidemics in sub-Saharan Africa [1]-[5]. The factors underpinning the high concurrency rates in this region have however been hotly debated [6]-[8]. While few would dispute that a combination of socioeconomic [9] [10], gender-equity-related [10] and cultural factors [11] play a role, the emphasis placed on each differs considerably. Establishing whether or not one of these plays a dominant role has significant programmatic consequences for

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HIV prevention. A first step in elucidating the factors responsible for high concurrency rates should be assessing the way concurrency and its putative determinants are patterned internationally. This should tell us if the prevalence of concurrency is higher in regions with greater economic or gender inequality for example.

We present an ecological analysis of the correlation between point-concurrency prevalence and various socioeconomic and gender-equity indicators that have been argued to be important in the generation of extensive concurrency.

2. Methodology

2.1. Dependent Variable

To overcome the problems of comparability with different datasets using different methodologies and definitions of concurrency, we used what is to the best of our knowledge, the only multinational surveys which assess concurrency using the same methodology. These are the WHO/Global Programme on AIDS (GPA) sexual behavioural surveys conducted in 1989/1990. Using data from 1990 is advantageous for the purposes of this study as this period predates the marked changes in sexual behavior as a response to the HIV epidemic that have occurred in certain countries [12]-[14]. The surveys were performed in 15 countries but only the 11 countries that asked questions about concurrency are evaluated here [15] [16]. These countries were: Brazil, Central African Republic, Côte d'Ivoire, Kenya, Lesotho, Philippines, Singapore, Sri Lanka, Tanzania, Thailand and Zambia. All these surveys followed WHO/GPA protocols. These included that national probability samples of the general populations aged 15 to 49 should be utilized. In two cases, Manila and Rio de Janeiro, the samples were representative of these large cities rather than being nationally representative. All samples were selected based on probability principle with various designs depending on national factors. A two stage sampling strategy was the norm, with census enumeration areas as the first stage and households as the second. The sample sizes were typically 1000 - 3000 men and women (**Table 1**). Response rates were high in all cases. The questionnaire started with innocuous questions about the respondents' backgrounds. This was to establish a rapport before exploring more sensitive issues. The variable for concurrency was derived from the question "Do you now have one or more than one spouse/regular partner?" The dependent variable we used in our analysis was the percentage of all men 15 - 49 years old who had more than one sexual partnership active at the time of the survey. The denominator for this variable was thus the total number of survey participants (**Table 1**). Only 7 of the countries surveyed asked the women if they had concurrent partners and so we limited our analysis to male concurrency. Concurrency prevalences were natural log transformed to create more normal distributions for regression analyses.

2.2. Independent Variables

Both absolute poverty and economic inequality are plausible drivers of concurrency [9] [17]. We used two indicators to measure the impact of absolute poverty on concurrency rates; national Gross Domestic Product (GDP) per capita from 1989 (expressed in Purchasing Power Parity 1987 US$) and the percentage of the population living below the poverty line. The Gini coefficient was used to assess the impact of economic inequality. Overall development status was measured via the United Nations Development Programme's (UNDP) Human Development Index (HDI) as well as its three constitutive indices—the GDP, life expectancy and education indices. All these data were obtained from the UNDP's 1990 Human Development Report [18]. In a few cases the 1990 report did not contain the information pertaining to a particular country and we were forced to obtain the data from the 1995 Human Development Report (see **Table 1** for details) [19].

Gender inequality in relationships has been associated with increased HIV transmission [20]. We compared concurrency rates with two composite indicators of gender equity obtained from the 1995 Human Development Report that focused on "Gender and Human Development". The gender-related development index (GDI) measures achievement in the same basic 3 capabilities (life expectancy, education outcomes, standard of living) as the Human Development Index does, but takes note of and penalizes inequality in achievement between women and men [19]. The gender empowerment measure (GEM) evaluates the extent to which women are able to actively participate in economic and political life and take part in decision-making. It includes three dimensions: the share of jobs classified as professional, administrative and managerial, the share of seats in parliament and women's income [19].

Table 1. The frequency distribution of various socioeconomic and gender indicators and their correlation with the natural log of point concurrency prevalences in 11 countries.[a]

	n	% Male Concurrency (point-prevalence)	GDP 1990 (PPP US$)	Gini coefficient	Percentage of population below poverty line	Gender empowerment measure	Gender Related Development Index (1995)	Women's share of income (%)	Women's life expectancy	Women's literacy rate (%)	HDI (1995)	HDI (1990)
Central African Republic	2431	20	591	0.61	91	0.205	0.338	37.4	51.9	45.6	0.361	0.258
Brazil	1341	7	4307	0.57	38	0.377	0.728	22.9	68.7	81.3	0.804	0.784
Côte d'Ivoire	3001	36	1123	0.55	26	0.157	0.341	27.8	52.4	81.3	0.369	0.393
Kenya	2967	13	794	0.48	55		0.458	34.8	57.3	65.2	0.481	0.481
Lesotho	1582	55	1585	0.48	55	0.450	0.446	35.7	63	58.8	0.473	0.580
Philippines	1617	3	1878	0.45	64	0.459	0.650	21.1	68.2	93.7	0.671	0.714
Singapore	2115	2	12790	0.42		0.423	0.853	28.9	77.4	84.3	0.878	0.899
Sri Lanka	3012	2	2053	0.45	15	0.307	0.694	25.1	74.2	85.8	0.704	0.789
Thailand	2601	3	2576	0.47	34	0.417	0.812	34.6	71.8	91.4	0.827	0.784
Zambia	1992	22	717	0.51		0.303	0.362	25.3	49.7	67.4	0.425	0.481
Tanzania	2005	18	405	0.38	60		0.352	45	53.6	52.4	0.364	0.413
Correlation with point prevalence of concurrency—r (*P*-value)												
All countries			−0.55 (0.08)	0.39 (0.24)	0.36 (0.35)	−0.43 (0.24)	−0.87 (<0.001)	0.42 (0.20)	−0.83 (0.002)	−0.72 (0.01)	−0.85 (<0.001)	−0.80 (0.003)
African countries only			0.92 (0.03)	0.15 (0.78)	−0.38 (0.53)	0.57 (0.53)	0.05 (0.91)	−0.25 (0.62)	0.45 (0.37)	0.26 (0.62)	0.09 (0.87)	0.39 (0.45)

HDI—Human Development Index. [a]All the data is from the Human Development Report 1990 except the following: 1. Gender Related Development Index, Gender Empowerment Measure and the Human Development Index 1995 are all from the 1995 Human Development Report [19]. 2. The Gini coefficients for Central African Republic (1993), Kenya (2005), Lesotho (2003), Tanzania (2007) and Zambia (2004) are all from the World Bank's World Development Reports (year of publication in parentheses). Empty cells reflect data was not obtainable from the above sources.

The natural log of point concurrency prevalence was related to the gender and socioeconomic variables through linear regression. The analyses were repeated limited to sub-Saharan African countries (henceforth termed African countries) to assess if there were any region specific effects. Variables that were associated with the natural-log-of-point-concurrency-prevalence in univariate analysis at a significance level of *P* value of 0.1 or lower were entered into a multivariate linear regression model. Because of a high degree of collinearity between HDI and GDI only GDI was entered into the multivariate analysis. All analyses were performed in STATA 13.

This study involved secondary data analysis of surveys that had each received ethical committee clearance for data analyses such as the one conducted here. No extra ethics committee approval was necessary for this study.

3. Results

The point prevalence of male concurrency and the various socioeconomic indicators is detailed in **Table 1**. The

prevalence of male concurrency varied between 2 and 55%. GDP in 1990 varied between US$405 and US$12 790. There was no evidence of a relationship between the point-prevalence of concurrency and Gini coefficient, percentage of the population living below the poverty line or the Gender Empowerment Measure (**Table 1**). In the all-country analysis, there was a negative relationship between concurrency prevalence and GDI ($r = -0.87$; $P < 0.001$), HDI (1995: $r = -0.85$; $P < 0.001$), women's life expectancy ($r = -0.83$; $P = 0.002$) and women's literacy rate ($r = 0.72$; $P = 0.01$).

Within African countries there was a positive association between GDP per capita and the prevalence of concurrency ($r = 0.85$; $P = 0.03$). There was no significant association between GDI, HDI, women's literacy or women's life expectancy and concurrency.

None of the four variables entered into the multivariable analysis were significantly associated with concurrency prevalence (**Table 2**).

4. Discussion

Although only based on a sample size of 11 populations, the results of this study do not support the thesis that levels of poverty or inequality (economic or gender-related) are dominant drivers of higher concurrency rates. Concurrency rates were higher in countries with lower GDIs and HDIs. However much of this association appears to be driven by the lower life expectancy in countries in Africa, which also had higher concurrency rates. Life expectancy constitutes one third of the weight of the HDI and GDI. The lower life expectancies in Africa could be due to the effects of HIV or the multiple other factors that have resulted in the lower life expectancy in this region [21]. The finding that concurrency rates were higher in countries with higher GDP per capitas in Africa is unexpected and requires further evaluation in larger datasets.

This analysis is weakened by a number of factors including the small sample-size of only 11 populations, the absence of a concurrency-as-normative-indicator (measuring the acceptability of concurrent partnering), the fact that concurrency prevalence was based on self-reported data from surveys and the ecological nature of the study. Nonetheless the major effect that concurrency has on enhancing HIV transmission is via increasing network connectivity—a population level attribute. Ecological studies are therefore necessary to investigate the drivers and effects of concurrency.

5. Conclusions

I draw two conclusions from this study about the patterning of concurrency at the level of countries. Firstly, there is little evidence for a relationship between concurrency and various markers of relative and absolute poverty or gender inequality. Individual-level [22] and ecological studies [23] in sub-Saharan Africa have likewise found little or no relationship between economic deprivation and concurrency. Secondly, all the countries with point-concurrency above 10% are in sub-Saharan Africa where numerous qualitative studies, particularly in Southern and Eastern Africa, have reported a widespread tolerance for main and side partners for men [11] [24]. Much more can and should be done to address the issues of economic deprivation and gender inequality. The available evidence, however, suggests that high concurrency prevalence rates in parts of Africa are not predominantly determined by socioeconomic or gender-equity related issues. More qualitative and quantitative research is needed to better delineate the socio-cultural factors underpinning the high concurrency rates in the area. In the interim it may be prudent for countries affected by generalized HIV epidemics to follow the example of Uganda where culturally appropriate campaigns to diminish the practice of having partners-on-the-side were instrumental in reducing the prevalence of concurrency and HIV [13].

Table 2. Multivariate linear regression analysis for variables associated with log transformed concurrency prevalence.

	Coefficient (95% CI)	*P*
GDP 1990 (PPP US$)	0.00002 (−0.0002 - 0.0003)	0.787
Gender Related Development Index (1995)	−5.4 (−17.8 - 7.2)	0.320
Women's life expectancy	0.01 (−0.21 - 0.22)	0.954
Women's literacy rate (%)	-0.01 (−0.08 - 0.05)	0.670

Conflict of Interest Statement

The author states that he does not have a commercial or other association that might pose a conflict of interest.

References

[1] Epstein, H. and Morris, M. (2011) Concurrent Partnerships and HIV: An Inconvenient Truth. *Journal of the International AIDS Society*, **14**, 13. http://dx.doi.org/10.1186/1758-2652-14-13

[2] Kenyon, C. and Colebunders, R. (2012) Strong Association between Point-Concurrency and National Peak HIV Prevalence. *International Journal of Infectious Diseases*, **16**, e826-e827. http://dx.doi.org/10.1016/j.ijid.2012.05.008

[3] Mah, T.L. and Shelton, J.D. (2011) Concurrency Revisited: Increasing and Compelling Epidemiological Evidence. *Journal of the International AIDS Society*, **14**, 33. http://dx.doi.org/10.1186/1758-2652-14-33

[4] Morris, M., Epstein, H. and Wawer, M. (2010) Timing Is Everything: International Variations in Historical Sexual Partnership Concurrency and HIV Prevalence. *PLoS One*, **5**, e14092. http://dx.doi.org/10.1371/journal.pone.0014092

[5] Kenyon, C., Buyze, J. and Colebunders, R. (2013) HIV Prevalence by Race Co-Varies Closely with Concurrency and Number of Sex Partners in South Africa. *PLoS One*, **8**, e64080. http://dx.doi.org/10.1371/journal.pone.0064080

[6] Lurie, M.N. and Rosenthal, S. (2010) Concurrent Partnerships as a Driver of the HIV Epidemic in Sub-Saharan Africa? The Evidence Is Limited. *AIDS and Behavior*, **14**, 17-24; Discussion 25-18. http://dx.doi.org/10.1007/s10461-009-9583-5

[7] Sawers, L. (2013) Measuring and Modelling Concurrency. *Journal of the International AIDS Society*, **16**, 17431. http://dx.doi.org/10.7448/IAS.16.1.17431

[8] Sawers, L. and Stillwaggon, E. (2010) Concurrent Sexual Partnerships Do Not Explain the HIV Epidemics in Africa: A Systematic Review of the Evidence. *Journal of the International AIDS Society*, **13**, 34. http://dx.doi.org/10.1186/1758-2652-13-34

[9] Hunter, M. (2007) The Changing Political Economy of Sex in South Africa: The Significance of Unemployment and Inequalities to the Scale of the AIDS Pandemic. *Social Science & Medicine*, **64**, 689-700. http://dx.doi.org/10.1016/j.socscimed.2006.09.015

[10] Jewkes, M.R (2010) Gender and Sexuality: Emerging Perspectives from the Heterosexual Epidemic in South Africa and Implications for HIV Risk and Prevention. *Journal of the International AIDS Society*, **13**, 6.

[11] Leclerc-Madlala, S. (2009) Cultural Scripts for Multiple and Concurrent Partnerships in Southern Africa: Why HIV Prevention Needs Anthropology. *Sexual Health*, **6**, 103-110. http://dx.doi.org/10.1071/SH08032

[12] Halperin, D., Mugurungi, O., Hallett, T., Muchini, B., Campbell, B., *et al.* (2011) A Surprising Prevention Success: Why Did the HIV Epidemic Decline in Zimbabwe? *PLoS Medicine*, **8**, e1000414. http://dx.doi.org/10.1371/journal.pmed.1000414

[13] Kirby, D. (2008) Changes in Sexual Behaviour Leading to the Decline in the Prevalence of HIV in Uganda: Confirmation from Multiple Sources of Evidence. *Sexually Transmitted Diseases*, **84**, ii35-ii41. http://dx.doi.org/10.1136/sti.2008.029892

[14] Shisana, O. (2009) South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, 2008: A Turning Tide among Teenagers? HSRC Press, Cape Town.

[15] Carael, M. (1995) Sexual Behaviour. In: Cleland, J.G. and Ferry, B., Eds., *Sexual Behaviour and AIDS in the Developing World*, Taylor & Francis, London, 89-103.

[16] Ferry, B., Deheneffe, J., Mamdani, M. and Ingham, R. (1995) Characteristics of Surveys and Data Quality. In: Cleland, J.G. and Ferry, B., Eds., *Sexual Behaviour and AIDS in the Developing World*, Taylor & Francis, London, 148-167.

[17] Leclerc-Madlala, S. (2003) Transactional Sex and the Pursuit of Modernity. *Social Dynamics*: *A Journal of the Centre for African Studies University of Cape Town*, **29**, 213-233. http://dx.doi.org/10.1080/02533950308628681

[18] UNDP (1990) Human Development Report 1990. Concept and Measurement of Human Development, United Nations Development Program, New York.

[19] UNDP (1995) Human Development Report 1995. United Nations Development Program, New York.

[20] Jewkes, R., Dunkle, K., Nduna, M. and Shai, N. (2010) Intimate Partner Violence, Relationship Power Inequity, and Incidence of HIV Infection in Young Women in South Africa: A Cohort Study. *The Lancet*, **376**, 41-48. http://dx.doi.org/10.1016/S0140-6736(10)60548-X

[21] Shetty, N. and Shetty, P. (2003) Epidemiology of Disease in the Tropics. In: Cook, G.C. and Zumla, A., Eds., *Manson's Tropical Diseases*, 21st Edition, Saunders, London, 19-31.

[22] Kenyon, C., Boulle, A., Badri, M. and Asselman, V. (2010) I Don't Use a Condom (with My Regular Partner) Because

I Know That I'm Faithful, but with Everyone Else I Do: The Cultural and Socioeconomic Determinants of Sexual Partner Concurrency in Young South Africans. *Journal of Social Aspects of HIV/AIDS*, **7**, 35-43. http://dx.doi.org/10.1080/17290376.2010.9724967

[23] Mishra, V. and Bignami-Van Assche, S. (2009) Concurrent Sexual Partnerships and HIV Infection: Evidence from National Population-Based Surveys. DHS Working Papers.

[24] Kenyon, C.R., Osbak, K., Buyze, J., Johnson, S. and van Lankveld, J. (2015) Variations of Sexual Scripts Relating to Concurrency by Race, Class, and Gender in South Africa. *Journal of Sex Research*, **52**, 878-886. http://dx.doi.org/10.1080/00224499.2014.963832