



Published in final edited form as:

AIDS Care. 2015 April ; 27(4): 466–472. doi:10.1080/09540121.2014.969675.

The role of relationship types on condom use among urban men with concurrent partners in Ghana and Tanzania

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Abstract

Multiple concurrent partnerships are hypothesized to be important drivers of HIV transmission. Despite the demonstrated importance of relationship type (i.e. wife, girlfriend, casual partner, sex worker) on condom use, research on concurrency has not examined how different combinations of relationship types might affect condom use. We address this gap, using survey data from a sample of men from Ghana (n=807) and Tanzania (n=800) who have at least three sexual partners in the past three months. We found that approximately two-thirds of men's reported relationships were classified as a girlfriend. Men were more likely to use a condom with a girlfriend if their other partner was a wife compared to if their other partner was a sex worker (Ghana OR 3.10, 95% CI, 1.40, 6.86; Tanzania OR 2.34 95% CI 1.35, 4.06). These findings underscore the importance of considering relationship type when designing HIV prevention strategies in these settings.

Keywords

Ghana; Tanzania; HIV; concurrency; condom use; men

Introduction

Concurrent, or overlapping, sexual relationships have been hypothesized to facilitate the rapid spread of HIV through sexual networks during acute infectious stage (Halperin & Epstein, 2004; Morris & Kretzschmar, 1997; Wawer et al., 2005). The major studies of concurrency have ignored differences in partner types within concurrent relationship (Lurie & Rosenthal, 2010; Sawers & Stillwaggon, 2010) despite the fact that relationship type is an important determinant of condom use (de Visser & Smith, 2001; Norman, 2003; Van Rossem, Meekers, & Akinymi, 2001). Existing research on concurrency has never (a) described the prevalence of relationship types and condom use, (b) determined the most prevalent relationship type combinations and their correlates, or (c) examined how condom

use with one partner may be influenced by the relationship types of the man's *other* co-occurring relationships. We aim to fill this gap by analyzing data collected from men with at least three concurrent sexual partnerships in Tema, Ghana and Mbeya, Tanzania.

Methods

Data were collected from men in both sites aged 18-49 who had at least three different sex partners in the past three months. Data collection occurred from June to November 2008 in Tema, Ghana (HIV prevalence: 6.4%; national prevalence: 3.1%) and September 2008 to February 2009 in Mbeya, Tanzania (HIV prevalence: 9.2%; national prevalence: 5.8%) (Ghana AIDS Commission, 2004; National Bureau of Statistics, 2009). At the population level, having multiple partners is relatively uncommon in each study site: 15.1% of men in Tema's region and 17.6% of men in Mbeya's region had two or more partners in the last 12 months (Ghana Statistical Service, 2009; National Bureau of Statistics, 2011).

Sampling and Data Collection

We used time-space sampling in high-risk areas to enroll a random probability sample of high-risk sexually active men. A final set of 18 venues in Tema and 13 venues in Mbeya were selected for sampling.

Men who met the eligibility requirements of having at least three sexual partners within the past three months were interviewed by a male interviewer in a nearby private location after giving informed consent. Face-to-face interviews were conducted with 800 men in Ghana and 807 men in Tanzania. This study was reviewed and approved by FHI360's Protection of Human Subjects Committee, the Ghana Health Service Ethical Review Committee, the Muhimbili University of Health and Allied Sciences Senate Research and Publications Committee, the Tanzania National Institute for Medical Research, and the Mbeya Medical Research and Ethics Committee.

Measures

Condom use at last sex—Each man self-reported condom use at last vaginal sex for each of the last three women that he had sex with.

Relationship type and combination—Each man was also asked to categorize the relationship type for these three women: wife, live-in girlfriend, girlfriend (GF), casual acquaintance, or sex worker. This typology was based on formative research with the study population. Relationship type combination was a categorical variable we created to describe the relationship types of all three women.

Men's characteristics—We examined men's demographic characteristics (age, salary in the past month, and education), attitudes towards gender equality, and self-reported sexually transmitted infections (STI). Attitudes towards gender equality were measured using the Gender Equitable Men (GEM) Scale. For this analysis, we used men's factor scores from the modified GEM Scale (for more details, see Shattuck et al., 2013 and Pulerwitz & Barker, 2008). Self-reported STI was assessed using the Demographic and Health Survey method;

men were asked “During the last 12 months, have you had a disease which you got through sexual contact?” (Ghana Statistical Service, 2009; National Bureau of Statistics, 2011).

Analysis

We conducted bivariate analyses to compare men's characteristics with relationship type combinations. Because there were over thirty unique combinations, we conducted chi-squared tests for difference for each characteristic comparing (1st) all combinations, (2nd) the top 10 most prevalent combinations, and then (3rd) the five combinations that had at least 2 girlfriends. We then conducted logistic regression to assess differences between relationship combinations and condom use at last sex with a selected sub-sample of relationships. Due to the sampling strategy, we accounted for clustering at the venue and individual levels by obtaining Huber-White corrected standard errors to account for the interdependence of men from the same venues and the multiple relationships reported by each man.

Results

Demographic and relationship type data are summarized in Table 1. There were 2367 relationships reported with complete data in Ghana and 2392 in Tanzania. Over half of relationships in both locales were categorized as a non-live in girlfriend, referred to as a ‘girlfriend’ or ‘GF’ in the rest of the paper. The percentage of relationships where the man reported condom use at last sex varied by how casual the relationship was (Table 2); condom use was lowest with wives (GH:13.8%, TZ:8.8%) and highest with sex workers (GH:82.0%, TZ:76.8%).

Relationship type combination and men's characteristics

In total, there were 34 and 32 relationship type combinations in Ghana and Tanzania, respectively. The top 10 combinations for each location account for 711 men (88.9%) in Ghana and 694 men (86.0%) in Tanzania. The most prevalent combination was 3 girlfriends (GH:37.5% of men; TZ:34.8%). In both settings, we found a significant association ($p < .0001$) between men's relationship type combination and men's characteristics (age, education level, GEM factor score, and self-reported STI) when conducting the analysis with the top ten combinations (Table 3 and 4).

Relationship type combinations and condom use

To assess the extent to which condom use with one partner is associated with the relationship type of men's *other* relationships, we focused on condom use with girlfriends since it was the only relationship type with sufficient sample size. Further, since we wanted to isolate the effect of men's *other* relationship types on their condom use with a girlfriend, we limited our sub-sample to those men with at least two girlfriends. This sub-sample of men with at least two girlfriends included 573 Ghanaian (71.6%) and 578 Tanzanian (71.6%) men. As shown in Table 5, for condom use at last sex *with girlfriends*, percentages were lowest (GH:55.4%; TZ:51.1%) when men's relationship type combination included 2 girlfriends and 1 sex worker and highest with the relationship type combination of 2 girlfriends and 1 wife (GH:77.5%; TZ:73.7%). Among men at least two girlfriends, we

found that condom use *with girlfriends* is significantly associated with relationship type combination (i.e. relationship type of the other partner) (GH:wald $\chi^2= 29.87$, $p<.0001$; TZ:wald $\chi^2= 9.42$, $p=0.05$). In both settings, the overall trend was that condom use with girlfriends decreased when the other relationship was more casual. These associations held when controlling for age, education and salary.

Discussion

We found that different relationships types and combinations are associated with condom use. Two-thirds of all relationships in both sites were described by the men as a girlfriend. Further, one-third of all men reported that all three of their most recent sexual partners were girlfriends. Condom use with girlfriends was 63% in Ghana and 69% in Tanzania, though this proportion ranged between 51% and 78% depending on the type of the man's other concurrent relationships. HIV interventionists have struggled to promote condom use between spouses and steady partners but have had greater success promoting condom use between sex workers and their clients (Foss et al., 2007). Our findings suggest that even small increases in condom use with girlfriends could potentially reduce HIV transmission in populations of high-risk men due to the large numbers of these relationships.

Sex workers are widely seen as the 'riskiest' sexual partner because of their relatively high rates of HIV prevalence worldwide (Baral et al., 2012). Our data suggest that men's increased STI risk could stem in part from less frequent condom use with their girlfriends when they also have a sex worker partner. Men may conduct a 'risk comparison' and perceive girlfriends as less likely to have STIs or HIV compared to their sex worker partners, but more likely to have STIs or HIV compared to their wives.

Limitations

We do not have detailed data on when each relationship started and ended, as recommended by UNAIDS to measure 'concurrency' (UNAIDS, 2010). We did ask men "how many women are you currently having sex with" and 88% reported three or more women. Due to this data, the fact that over 90% of men had at least one steady partner, and the short window (3 months) in which their sexual encounters co-occurred, we feel comfortable describing these relationships as concurrent (but acknowledge the limitations of our approach). A further limitation is our reliance on self-reported condom use, which may be subject to social desirability bias, and self-reported STI symptoms, which are not as accurate as biological markers.

Conclusion

Studies of concurrency have largely ignored potential differences in risk based on different types of concurrency combinations. Our data suggest that condom use is associated with men's concurrent relationship type combinations. Future HIV research in sub-Saharan Africa on individuals with multiple concurrent partners should focus on different relationship type combinations and their influence on HIV risk behaviors.

Acknowledgements

This research was made possible by Grant Number 1R01HD052429-01A2 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD). Mr. Fleming was supported by FHI 360 as part of the FHI 360-University of North Carolina-Chapel Hill Public Health Fellowship. We are also grateful to the Carolina Population Center for training support (T32 HD007168) and for general support (R24 HD050924).

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Table 1

Demographic characteristics of the men and relationship types

| Sample size | | Tema, Ghana | Mbeya, Tanzania |
|---|-----------|-----------------------|-----------------------|
| | | 800 | 807 |
| Age | Mean (SD) | 28.3 (5.96) | 29.5 (6.25) |
| <i>Age in years (%)</i> | | | |
| | | 27.1 | 20.7 |
| | | 40.5 | 34.3 |
| | | 16.5 | 23.4 |
| | | 9.8 | 11.9 |
| | | 6.1 | 9.7 |
| Monthly Salary [USD] * | Mean (SD) | 169.9 USD (266.0 USD) | 195.2 USD (142.9 USD) |
| Self-reported STI(%) | | 16.5 | 20.8 |
| <i>Marital Status (%)</i> | | | |
| | | 16.1 | 24.0 |
| | | 6.9 | 13.0 |
| | | -- | 3.0 |
| | | 77.0 | 60.0 |
| Has co-wives (%) | | 1.1 | 3.0 |
| Number of children | Mean (SD) | 0.72 (1.04) | 0.92 (1.39) |
| <i>Highest level of schooling (%)</i> | | | |
| | | 5.9 | 26.6 |
| | | 26.6 | 38.5 |
| | | 44.5 | 17.1 |
| | | 23.0 | 17.7 |
| Total # of relationships | | 2367 | 2392 |
| <i>Frequency of Relationship types (% of all relationships)</i> | | | |
| | | 94 (4.0) | 194 (8.1) |
| | | 103 (4.4) | 101 (4.2) |
| | | 1607 (67.9) | 1562 (65.3) |
| | | 374 (15.8) | 341 (14.3) |
| | | 189 (8.0) | 194 (8.1) |

USD= United States Dollars; GF=girlfriend;

* USD rate for Ghanaian Cedi calculated for September 1, 2008. 1 GHC = 0.849 USD. The following converting website was used: <http://www.oanda.com/currency/converter/>

Table 2

Relationship type and condom use for all reported relationships

| Relationship type | Freq of Relationship (%) | Condom use at last sex (%) | Odds Ratio for condom use at last sex ^a | Adjusted Odds Ratio ^{a,b} |
|--|--------------------------|----------------------------|--|------------------------------------|
| GHANA (n=2367 relationships) | | | | |
| Wife | 94 (4.0) | 13.8 | REF | REF |
| Live-In GF | 103 (4.4) | 31.1 | 2.81 (1.35, 5.86) | 3.09 (1.46, 6.52) |
| Non-live in GF | 1607 (67.9) | 63.3 | 10.74 (5.93, 19.46) | 11.15 (6.02, 20.65) |
| Casual Acq. | 374 (15.8) | 78.3 | 22.54 (11.77, 43.15) | 23.86 (12.18, 46.74) |
| Sex Worker | 189 (8.0) | 82.0 | 28.40 (13.58, 59.41) | 32.46 (15.16, 69.53) |
| TANZANIA (n=2392 relationships) | | | | |
| Wife | 194 (8.1) | 8.8 | REF | REF |
| Live-In GF | 101 (4.2) | 27.7 | 3.99 (1.98, 8.06) | 4.95 (2.35, 10.44) |
| Non-live in GF | 1562 (65.3) | 69.3 | 23.54 (13.51, 41.03) | 30.90 (16.93, 56.39) |
| Casual Acq. | 341 (14.3) | 75.1 | 31.36 (17.30, 56.84) | 36.99 (19.63, 69.70) |
| Sex Worker | 194 (8.1) | 76.8 | 34.47 (17.57, 67.64) | 46.88 (22.60, 97.23) |

GF=girlfriend; Casual Acq=casual acquaintance

Bolded means the odds ratio is significantly different than 1 (p<.05)^a Accounting for clustering at the man level and venue level^b Adjusted for education, salary, and age

Table 3

Characteristics of men in Tema, Ghana by their relationship combination

| | 3 GFs | 2 GFs & 1 Casual | 1GF & 2Casual | 2 GFs & 1 Wife | 2 GFs & 1 Live-in GF | 2 GFs & 1 CSW | 1 GF, 1 Casual & 1 CSW | 1GF & 2CSW | 1 Live-in GF, 1 GF, & 1 Casual | 3 CSW |
|---|---------------|------------------|---------------|----------------|----------------------|---------------|------------------------|-------------|--------------------------------|-------------|
| # of men | 300 | 121 | 66 | 60 | 55 | 37 | 28 | 17 | 15 | 12 |
| % of men | 37.5 | 15.13 | 8.25 | 7.5 | 6.88 | 4.63 | 3.5 | 2.13 | 1.88 | 1.5 |
| <i>Age^{a,b,c}</i> | | | | | | | | | | |
| Mean Age (SD) | 27.2 (5.8) | 26.6 (4.5) | 26.1 (4.0) | 34.4 (6.2) | 28.7 (5.4) | 28.4 (5.2) | 28.5 (4.6) | 29.8 (7.6) | 27.5 (4.0) | 32.5 (5.9) |
| <i>STI in last months^{a,b}</i> | | | | | | | | | | |
| Yes (%) | 14.7 | 17.4 | 13.6 | 11.7 | 16.4 | 21.6 | 21.4 | 41.2 | 13.3 | 16.7 |
| <i>Salary in USD^{*a}</i> | | | | | | | | | | |
| Mean (SD) | 162.2 (339.6) | 132.4 (139.2) | 154.5 (292.9) | 211.4 (147.7) | 149.4 (131.6) | 279.3 (264.9) | 140.9 (181.7) | 84.9 (94.2) | 185.9 (251.3) | 99.3 (83.2) |
| <i>Education^{a,b,c}</i> | | | | | | | | | | |
| None (%) | 0.3 | 0.0 | 0.0 | 3.3 | 5.5 | 0.0 | 3.6 | 0.0 | 0.0 | 8.3 |
| Primary (%) | 3.0 | 2.5 | 1.5 | 8.3 | 5.5 | 2.7 | 3.6 | 11.8 | 6.7 | 16.7 |
| MidSch (%) | 30.0 | 18.2 | 26.2 | 20.0 | 36.4 | 37.8 | 28.6 | 11.8 | 33.3 | 16.7 |
| Secondary (%) | 44.3 | 52.9 | 50.8 | 56.7 | 36.4 | 29.7 | 35.7 | 47.1 | 40.0 | 50.0 |
| Post-sec (%) | 22.3 | 26.5 | 21.6 | 11.7 | 16.3 | 29.7 | 28.6 | 29.4 | 20.0 | 8.3 |
| <i>GEM Score Tertiles (%)^{a,b,c}</i> | | | | | | | | | | |
| Equitable | 30.3 | 44.6 | 43.9 | 25.0 | 32.7 | 27.0 | 28.6 | 11.8 | 33.3 | 33.3 |
| Average | 34.7 | 26.4 | 33.3 | 41.7 | 36.4 | 27.0 | 25.0 | 47.1 | 40.0 | 16.7 |
| Inequitable | 35.0 | 28.9 | 22.7 | 33.3 | 30.9 | 45.9 | 46.4 | 41.2 | 26.7 | 50.0 |

GF=girlfriend; CSW=commercial sex worker; USD=United States Dollars; MidSch=Middle School; Post-Sec=post-secondary

* USD rate for Ghanaian Cedi calculated for September 1, 2008. 1 GHC = 0.849 USD. The following converting website was used: <http://www.oanda.com/currency/converter/>^a Chi-squared test for difference between all 34 combination is significant, p<.0001^b Chi-squared test for difference between top 10 combination (those presented in this table) is significant, p<.0001

^cChi-squared test for difference between the 5 combinations with at least 2 'girlfriends' is significant, $p < .0001$

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Table 4

Characteristics of men in Mbeya, Tanzania by their relationship combination

| | 3 GFs | 2 GFs & 1 Wife | 2 GFs & 1 Casual | 2 GFs & 1 CSW | 2 GFs & 1 Live-in GF | 3 Casual | 2 Casual & 1 GF | 1 GF, 1 Wife, & 1 Casual | 1GF & 2CSW | 1 GF, 1 Wife, & 1 CSW |
|---|---------------|----------------|------------------|---------------|----------------------|--------------|-----------------|--------------------------|---------------|-----------------------|
| # of men | 281 | 93 | 75 | 69 | 60 | 36 | 31 | 20 | 15 | 14 |
| % of all men | 34.8 | 11.5 | 9.3 | 8.6 | 7.4 | 4.5 | 3.8 | 2.5 | 1.9 | 1.7 |
| <i>Age^{a,b,c}</i> | | | | | | | | | | |
| Mean Age SD | 27.9 (6.1) | 34.7 (6.2) | 28.0 (5.3) | 28.4 (4.5) | 29.5 (4.7) | 26.4 (3.5) | 27.4 (6.7) | 36.0 (5.2) | 27.1 (5.0) | 33.9 (5.8) |
| <i>STI in last month^{a,b,c}</i> | | | | | | | | | | |
| Yes (%) | 18.9 | 21.7 | 13.3 | 29.0 | 33.9 | 5.6 | 13.3 | 20.0 | 46.7 | 46.2 |
| <i>Salary^{a,b,c}</i> | | | | | | | | | | |
| Mean SD | 164.4 (128.6) | 269.6 (165.0) | 203.8 (162.7) | 191.6 (129.7) | 173.6 (118.0) | 150.7 (96.4) | 128.7 (90.8) | 314.8 (141.8) | 174.3 (127.1) | 255.7 (124.7) |
| <i>Education^{a,b,c}</i> | | | | | | | | | | |
| None (%) | 1.1 | 2.2 | 0.0 | 1.5 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Primary (%) | 30.6 | 18.3 | 14.7 | 32.4 | 30.0 | 22.2 | 22.6 | 5.0 | 46.7 | 35.7 |
| MidSch (%) | 42.0 | 32.3 | 36.0 | 48.5 | 36.7 | 19.4 | 32.3 | 40.0 | 40.0 | 7.1 |
| Secondary (%) | 13.9 | 22.6 | 26.7 | 8.8 | 16.7 | 19.4 | 16.1 | 20.0 | 13.3 | 28.6 |
| Post-sec (%) | 12.5 | 24.7 | 22.7 | 8.8 | 15.0 | 38.9 | 29.0 | 35.0 | 0.0 | 28.6 |
| <i>GEM Score Tertiles^{a,b,c}</i> | | | | | | | | | | |
| Equitable (%) | 29.9 | 53.8 | 40.0 | 15.9 | 38.3 | 36.1 | 35.5 | 45.0 | 0.0 | 7.1 |
| Average (%) | 29.5 | 31.2 | 30.7 | 36.2 | 18.3 | 44.4 | 51.6 | 45.0 | 40.0 | 35.7 |
| Inequitable (%) | 40.6 | 15.1% | 29.3 | 47.8 | 43.3 | 19.4 | 12.9 | 10.0 | 60.0 | 57.1 |

GF=girlfriend; CSW=commercial sex worker; USD=United States Dollars; MidSch=Middle School; Post-Sec=post-secondary

* USD rate for Tanzania Shilling calculated for February 1, 2009. 1 TZS = 0.00076 USD. The following converting website was used: <http://www.oanda.com/currency/converter/>^a Chi-squared test for difference between all 34 combination is significant, p<.0001^b Chi-squared test for difference between top 10 combination (those presented in this table) is significant, p<.0001^c Chi-squared test for difference between the 5 combinations with at least 2 'girlfriends' is significant, p<.0001

Table 5

Condom use by relationship type combination

| Relationship type combination | Condom use (%) with GF | Odds Ratio for condom use at last sex ^a | Adjusted Odds Ratio ^{a,b} |
|-------------------------------|------------------------|--|------------------------------------|
| TEMA, GHANA | | | |
| 2 GFs and 1Wife | 77.5 | 2.77 (1.32, 5.84) | 3.10 (1.40, 6.86) |
| 2 GFs and 1 Live-in | 70.0 | 1.88 (0.93, 3.78) | 1.98 (0.95, 4.16) |
| 3 GFs | 64.0 | 1.43 (0.84, 2.43) | 1.37 (0.79, 2.37) |
| 2 GFs and 1 Casual | 63.2 | 1.38 (0.77, 2.48) | 1.31 (0.72, 2.42) |
| 2 GFs and 1 CSW | 55.4 | REF | REF |
| MBEYA, TANZANIA | | | |
| 2 GFs and Wife | 73.7 | 2.67 (1.59, 4.50) | 2.34 (1.35, 4.06) |
| 2 GFs & Live-in | 68.3 | 2.06 (1.12, 3.81) | 1.91 (1.04, 3.51) |
| 3 GFs | 74.3 | 2.77 (1.83, 4.20) | 2.78 (1.82, 4.25) |
| 2 GFs and Casual | 61.7 | 1.54 (0.93, 2.56) | 1.27 (0.75, 2.15) |
| 2 GFs and CSW | 51.1 | REF | REF |

GF=girlfriend; CSW=commercial sex worker

Bolded means the odds ratio is significantly different than 1.00 (p<.05)

^a Accounting for clustering at the man level and venue level

^b Adjusted for education, salary, and age