Couple's desire for HIV testing and counseling and its association with women's empowerment in Kenya

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Abstract

Extensive literature has documented the level of desire for HIV testing and counseling (HTC) and its determinants at the individual level; however, few studies have considered the determinants at the couple level. Considering majority of the HIV infections occur among discordant couples in sub-Saharan Africa, at this stage of the epidemic and the cost-effectiveness of couple-oriented HTC, failure to better understand couple's desire for HTC is a missed opportunity. This paper aims to bridge this gap using the 2003 Kenya Demographic and Health Survey, hereafter referred to as KDHS. Descriptive, logistic and multinomial logistic regressions considering the complex survey design were applied. Among 980 couples analyzed, 50% were couples with both members desiring HTC, 18% with only female partners desiring HTC and 17% with only male partners desiring, whereas 16% with neither member desiring. Couple communication on HIV prevention, joint decision making as reported by women and physical violence toward women were positively associated with both desiring HTC. Women's sexual empowerment was also positively associated with testing desire, although not significantly. Multinomial logistic regression treating couple's desire for HTC as four distinct patterns complements the logistic regression results. The mechanisms of the significant factors, as well as research and policy implications are discussed at the end.

Introduction

HIV is predominantly transmitted through heterosexual intercourse in sub-Saharan Africa[1-3]. Heterosexual unions hence present an important opportunity to prevent further infections and to treat and care those infected. However, "couple relationships have not been given adequate attention by social/behavioral research in sub-Saharan Africa"[4]. Our understanding of how couples manage their HIV risk within union is still limited. Consequently, couple-oriented HIV prevention interventions are either underdeveloped or under-promoted. There has been increasing consensus that couple-oriented HIV testing and counseling (HTC), although widely embraced and promoted, is infrequently practiced and poorly understood[4, 5], and hence is a missed opportunity[4].

With sustainable international commitment, such as the potential renewal of the President's Emergency Plan for AIDS Relief (PEPFAR) beyond 2008, the scaling-up of antiretroviral treatment (ART) is likely to be a continuous effort. ART, which requires long-term treatment, often obligates patients to disclose their serostatus to their partners and families. HTC designed for couples, which facilitates HIV care and treatment seeking and HIV status disclosure in union, are hence in increasing demand. Understanding the magnitude of couple's desire for HTC and factors associated with their desire are therefore of tremendous policy and programmatic significance.

Literature review

Heterosexual transmission of HIV

Heterosexual transmission is responsible for more than 90% of adult HIV infections in sub-Saharan Africa[1-3]. A majority of the new infections are happening in union when the epidemic matures[6-8]. Prevention of transmission within couples hence plays a progressively more important role. The risk of HIV transmission through heterosexual intercourse has been widely documented. On a per coital act basis, the probability of HIV-1 transmission is 0.0011 among sero-discordant couples with one HIV positive and one negative partner in Uganda [9, 10]. But the risk doubles if the viral load is high and quadruples if genital ulcers are present. The probability of transmission per coital act also changes with the stage of HIV infection, with the initial infected period being the highest (0.0082 with 2.5 months after seroconversion) [10]. In stable

partnership with continual sexual contact, discordant couples are at much higher risk of HIV incidence than concordant negative couples (relative risk is 58 for women and 11 for men)[11]. In addition, women are disproportionately vulnerable to the infections within marriage because the male-to-female transmission rate is higher than the female-to-male[12, 13].

Effectiveness of couple-based HTC

Few interventions have been conducted to prevent HIV transmission within heterosexual relationships. However, couple-oriented HTC interventions have been shown to be effective and cost-effective[14, 15]. In a randomized controlled trial implemented in Kenya, Tanzania and Trinidad, voluntary counseling and testing (VCT) was effective in reducing HIV risk behavior, especially among couples[15]. The VCT couples reduced significantly more unprotected sex with their enrollment partners than the health information only group. Similar results were observed among discordant couples in Zaire[16], Rwanda[3], and Zambia[6] and, where after VCT condom use during reported sexual acts increased 5% to 77% in Zaire, from 4% to 57% in Rwanda, and from 3% to more than 80% in Zambia. VCT was also found to be highly cost-effective when it is targeted toward couples[14]. It competes favorably with other cost-effective public health interventions, such as child immunization. In addition to promoting condom use and reducing unprotected sex, couple-oriented HTC also demonstrates other benefits. HTC targeting couples has been shown to reduce seroconversion rate[3, 16], facilitate disclosure of the serostatus to partners (REF), increase up-take of Nevirapine and formula feeding[17], and increase couple communication[18]. Male partners' participation has also been found to strongly increase female partners' acceptance of HTC[5, 19, 20].

Women's empowerment and couple based HIV prevention interventions

To better understand and promote couple-based HIV prevention interventions and specifically couple-based HTC, it is necessary to understand factors associated with desire for testing and health-seeking behaviors. Recently, women's empowerment, as a multi-dimensional concept involving a process, has been considered in HIV/AIDS studies[21]. Women's autonomy, as a static measure of women's empowerment, is previously found to be associated with women's nutrition[22], pregnancy health care utilization[23], and contraceptive use[24]. As a health behavior that is far from becoming the social norm, adoption of HTC, especially the couple-based one, is

likely to be influenced by women's empowerment[21]. As reviewed by Malhotra and colleagues[21], empirical studies have measured women's empowerment using a dozen of indicators. Among them, we hypothesize three aspects, couple's interaction, household decision-making, and freedom from violence, are associated with couple's HIV prevention interventions. The following literature review is organized based on these three indicators.

Couple interaction, including couple communication and negotiation of sex, has been shown to be an important predictor of HIV testing desire and health-seeking behavior. In Uganda, men who had talked with their partners on HIV were 1.6 times more likely to desire for HTC [25]. Evidence from research on condom use shows that communication between partners and negotiation of sex is likely to increase adoption of condom among college students[26], unmarried adults[27], women[28], and couples[18]. In a recent paper on social network of HIV risk perceptions, spousal communication on HIV prevention is considered as a major determinant of couple's uptake of prevention behaviors[29]. On the other hand, the subordinate female role in sexual decision making is widely documented throughout East Africa[30]. As a result, instead of advocating for increasing women's condom use negotiation skills, male involvement in HTC is called for by some researchers[18].

In the domain of domestic decision making, joint decision making between wives and husbands, instead of dominant decision making by either member, has been found to be associated with improved health practice. For example, joint decision making is associated with increased male involvement in pregnancy health in Nepal [31]. If husbands and wives agree on wives' autonomy, women are more likely to utilize health care services[32].

When promoting couple-friendly HTC, one big concern is the potential domestic violence that could happen to women after disclosing their serostatus. If women are likely to experience violence after pursuing HTC, they may be more reluctant to do HTC. However, adverse events may not necessarily happen after couple based HTC. Specifically, couple-counseled women did not significantly report more adverse events, including physical violence, verbal abuse, divorce or separation, than individual-counseled women in Zambia[5]. On the other hand, Koenig and colleagues found in a community-based study that male partners' perceived risk of HIV infection

is associated with domestic violence[33]. In another study by the same team, coercive sex toward women is found to be a possible result of women's perception of their partners' high risk of infection[34]. Therefore, men who perceive themselves at increased risk of infection would want to know their HIV status. Their female partners, who experienced domestic violence such as coercive sex, may also perceive themselves at risk of infection and hence desire HTC. Couples who experienced domestic violence are hence probably more likely to desire HTC.

Despite of these evidence, gender issues haven't attracted much attention from social science research and HIV programs in sub-Saharan Africa[4]. The level and the underlying mechanisms of desire and behavior of pursuing couple based HTC are far from well understood. It has been demonstrated previously that the factors associated with desire for women and men to pursue HTC are quite different at the individual level[35]. In order to understand the interaction and dynamics of discussion and attitude around HTC within couples, studies among people in union need to be seriously considered, which to our knowledge is absent from the literature. In addition, most of the existing literature on couple's HTC is based on community samples which limit the generalizability of the findings. Many of these studies utilized only one partner, mostly females, as the index case, few treat couple as the unit of analysis. This paper aims to understand the level of desire for HTC within partnership and its social context, specifically women's empowerment, after controlling for couple's socio-demographic characteristics and HIV related factors.

The methodology of couple study

Couple oriented studies have been increasingly conducted in the past 15 years, mainly in the field of fertility, family planning, and reproductive health[31, 36-41]. The wave of the studies was inspired by the 1994 International Conference on Population and Development in Cairo, where reproductive rights and male involvement in reproductive health were emphasized. The sustained emergence of couple studies highlights the rising interests on reproductive health outcomes within couples, which is expected to be mainstreamed for the reproductive outcomes[42]. It is also reflected in the popular practice of interviewing men, in addition to women, in national representative surveys, such as the Demographic and Health Surveys, which in turn provides the abundance of data for further analyses of couple issues. Despite of the existing large amount of couple studies, most of them either focused in the area of fertility and contraceptive use or

investigated from the biomedical and epidemiological perspectives of HIV prevention, few couple studies examined HIV prevention and control from a social science perspective. This paper aims to contribute to bridging this gap.

The methodology of couple study can be broadly grouped into two categories, based on the unit of analysis[41, 43]. The first category includes studies based on information from individual spouse. These studies concentrate on the influence of either husband's or wife's reproductive intentions and related behaviors, such as Becker and Costenbader's study on husband's and wife's reports of contraceptive use[38]. The other category, in contrast, treats couple as one unit[31, 40, 41]. The information of both members is matched and joint couple-level variables are applied in the analyses. Both methodologies have their strength and limitations. However, the second approach is more appealing for the outcome of the current study, desire for HTC. Becker has pointed out in his review that reproductive health intentions from both partners have been shown to better predict the actual behaviors than data from only one member[36]. Considering the high cost-effectiveness of couple HTC[14], it is of great implications to examine factors that may affect couple's HTC seeking desire, instead of those of each spouse.

HIV and gender in Kenya

The gender gap of HIV prevalence is salient in Kenya. In 2003, the female and male HIV prevalence were 8.7% and 4.6%, respectively[44], making the female to male ratio of infection as high as 1.9 to 1 which is one of the highest in sub-Saharan Africa. The female disadvantages are even more dramatic for youths. In the 15 to 19 age group, women were 7.5 times more likely to be infected than men.

The Kenyan government has realized the substantial gender gap in the epidemic and actively implements policies and programs to improve the situation. A national guideline promoting couple-oriented VCT was in place in 2001[45]. A special report to incorporate gender into mainstream HIV/AIDS programs was published in 2002[46]. Mass media campaigns focusing on couples have been carried out around 2003. However, the impact of the program is limited in rural areas; it is also hard to be sustained since couples seeking VCT didn't increase dramatically after the campaign[47, 48]. Therefore, research is of great need to better understand the level of

couple's desire for HTC and its determinants if the actual behavior of couple's HTC seeking is to be better promoted.

Women's empowerment, on the other hand, while not as low as other countries, is far from optimal in Kenya. According to the KDHS, one in four women make decisions in the household either alone or jointly [44]. More than half of women and men respect women's denial of sex under a number of circumstances. However, another one quarter women do not have any say in the household decision making. In traditional Kenyan culture, women are expected to tolerate wife-beating. Two-thirds of the surveyed Kenyan women agreed that there is at least one reason to justify wife-beating. We investigate in the subsequent section the relationship between couple's desire for HTC and women's empowerment.

Conceptual framework, aims and hypotheses

Figure 1 presents the conceptual framework constructed for couple's desire for HTC. It is adapted based on the conceptual framework of the individual level factors of desire for HTC, and derived from other couple study literature. In addition to the couple-level socio-demographic characteristics and HIV-related variables, women's empowerment as measured by four domains – couple's communication, women's sexual empowerment, couple's joint decision making, and attitude and behavior of domestic violence – is hypothesized to be associated with couple's desire for HTC. Two aims and four hypotheses are specifically listed as below.

Aim1: To estimate the level of couple's desire for HTC in Kenya;

Aim2: To examine the association between couple's desire for HTC and women's empowerment.

H1: Couple communication on HIV prevention is positively associated with a couple's desire for HTC.

H2: Women's greater sexual empowerment in unions is positively associated with a couple's desire for HTC.

H2-1: Individuals within couples who both agreed that wife was justified to ask her husband use a condom when he had a STI are more likely to desire HTC.

H2-2: Individuals within couples who both agreed that wife was justified to refuse having sex with husband are more likely to desire HTC.

H3: Couple's joint decision making is positively associated with couple's desire for HTC.

H4: Tolerance attitude and actual behavior of domestic violence are positively associated with desire HTC.

H4-1: Couples agreed that wife beating was justified under at least one condition are more likely to desire HTC.

H4-2: Couples experienced domestic violence are more likely to desire HTC.

We first estimated the level of couple's desire for HTC. Then we examined the association between couple's desire for HTC and women's empowerment, after controlling for selected socio-demographics and HIV related variables. The paper concludes with a discussion on the policy and programmatic implications of the findings and suggestions for future research.

Data and analytical sample

KDHS 2003[44] was analyzed in this study. Among 1,430 matched couples, 1,399 couples had both heard of AIDS. Only individuals who were never tested for HIV were asked about their desire for testing in the future, resulting in a sample of 980 couples. The KDHS 2003 survey has a complex design with two-stage cluster sampling. The country was first stratified into urban and rural areas, where urban areas were over-sampled. 400 clusters were then selected from the master frame of enumeration areas[44].

Study variables

Couple's desire for HTC

The study variables and their coding are presented in Table 1. Couple's desire for HTC is estimated based on answers to the question – "(w)ould you want to be tested for the AIDS virus?" – yes, no, unsure, don't know, or missing. The answers other than "yes" were combined with the "no" category to generate a conservative estimate of desire. Two types of couple's desire were constructed as the outcome measurement: the binary outcome and the categorical outcome. The binary outcome groups couple's desire for HTC into both members desire versus

otherwise. The categorical outcome includes the following four categories: a) neither desire; b) women only desire; c) men only desire; and d) both desire.

Socio-demographic variables

Age and education (years of schooling) of female partners are continuous variables. To take account of male partners' age and education, the age and education differences between husbands and wives are used. One case is missing in each of women and men's education variables, both of which were replaced by the average of women and men's education, respectively. Household wealth, residence and province are the same for each member of the couples. Women and men's religion were included separately. Union status of the couple (both reported monogamous vs. otherwise) and duration of marriage (years since first marriage) were included to take account of the union effect. Parity of each member and history of child death were also included to control for potential confounding.

HIV-related variables

The HIV- related variables which were found to be associated with individual's desire for HTC were also included in the couple's analyses, though measured at the couple-level. HIV risk factors were first constructed. Couple's history or symptoms of sexually transmitted infections (STI) is defined as at least one member having STI history or symptom versus otherwise. Whether having any other partner in the past year were defined separately for women and men as a binary variable. Male circumcision was also included.

We then constructed several variables of HIV knowledge, self-perceived risk and stigma. Couple's HIV knowledge and stigma scores were constructed using principle component analysis (PCA) for female and male partners separately. PCA is a statistical technique to reduce number of variables while maintaining the most relevant information. It is based on a weighted linear combination of the variables with the greatest variance[49]. PCA was applied to abstract HIV knowledge score from 6 binary variables constructed based on the answers to the following 6 questions: (1) "Can people reduce their chances of getting the AIDS virus by having just one sex partner who has no other partners?"; (2) "Can people get the AIDS virus from mosquito or other insect bites?"; (3) "Can people reduce their chances of getting the AIDS virus by using a condom

every time they have sex?"; (4) "Can people get the AIDS virus by sharing utensils with a person who has AIDS?"; (5) "Can people reduce their chances of getting the AIDS virus by not having sex at all?"; (6) "Is it possible for a healthy-looking person to have the AIDS virus?". Similarly, stigma score was abstracted from 5 binary variables: (1) "Would you buy fresh vegetables from a vendor who has the AIDS virus?"; (2) "If a member of your family got infected with the virus that causes AIDS, would you want it to remain a secret or not?"; (3) "If a relative of yours became sick with the virus that causes AIDS, would you be wiling to care for her or him in your own household?"; (4) "If a female teacher has the AIDS virus, should she be allowed to continue teaching in school?"; (5) "Should children aged 12-14 be taught about using a condom to avoid AIDS?".

The results show (Table 2 and 3), for example, the eigenvalue of the first component for women's HIV knowledge is 3.32, explaining 55% of the variance of the 6 binary variables. The second component is less than 1. Women's HIV knowledge score range from -3.9 to 1.6, with mean of 0 and standard deviation of 1.8. For men, the knowledge score ranged from -5.6 to 1.1, with mean of 0 and standard deviation of 1.8. The stigma scores were obtained in the similar fashion. The higher the score, the more knowledge and stigma women and men have.

Couple's knowledge of HIV testing place was defined as both members knew a place for HIV testing versus otherwise. Similarly, couple's HIV anxiety, as measured by whether knowing someone who has died of AIDS, was dichotomized as both members knew someone versus otherwise. Lastly, self-perceived risk of getting infected was defined separately for women and men.

Women's empowerment

As reviewed previously, we identified from the literature three domains of women's empowerment that are most relevant to couple's desire for HTC, including couple's interaction (couple's communication and negotiation of sex), joint conjugal decision making, and domestic violence. Couple's communication and negotiation of sex were operationalized separately. Specifically, couple's communication on HIV prevention was constructed based on the question: "(h)ave you ever talked with (your husband/the man you are living with, or your wife/woman

who you are living with) about ways to prevent getting the virus that causes AIDS?" In one-way communication, one member of the couple, most likely men, are likely be dominant. Hence two-way communication between wives and husbands, instead of one member talking to the other, really matters in the context of studying couple's desire for HTC. Therefore, we defined couple's communication on HIV prevention as both members talked with their partners on preventing HIV versus otherwise. We intended to measure couple's communication in other aspects, such as on family planning and fertility. However, communication on family planning and fertility was only asked either among women or among men in KDHS 2003, which makes the measurement of couple's two-way communication impossible.

One question on women's sexual empowerment is newly added to KDHS 2003: whether wife is justified asking husband to use condom if he has STI. It is an ideal variable to measure women's sexual empowerment for current study, considering the importance of condom use in the context of HIV prevention and care. We dichotomized the answers to the question to "both agreed" and "otherwise". In addition, the classic DHS questions on the circumstances under which women are justified to refuse sex were also included in the analyses. Respondents were specifically asked whether "a wife is justified in refusing to have sex with her husband when": (1) She knows her husband has a sexually transmitted disease; (2) She knows her husband has sex with other women; (3) She has recently given birth; and (4) She is tired or not in the mood. The variables of agreeing that a wife is justified to refuse to have sex under all four conditions were first constructed for female and male partners. Then through cross-tabulation, couple agreeing wife justified to refuse sex under all four conditions was generated.

Couple's joint decision making measures couple's consensus on several decision-making processes. In KDHS 2003, women and men were each asked on household decision makings in five domains, with three overlapping ones. For women, the five domains are: (1) what food to cook daily; (2) making decisions on their own health care; (3) making large household purchases; (4) making daily household purchases; and (5) deciding when to visit family, friends or relatives. For men, in addition to (3), (4) and (5) that were asked among women, they were also asked on two other domains: (1) deciding what to do with the money she earns for her work; and (2) deciding how many children to have and when to have them. The answers to each of these

questions were grouped into 6 categories: respondent, husband/wife/partner, respondent and husband/wife/partner jointly, someone else, respondent and someone else jointly, and decision not made/not applicable. For each domain, a binary variable of "decision making jointly" versus otherwise was first generated. Then PCA was conducted separately for women and men to generate a continuous variable to measure the level of joint decision making. This continuous variable was finally dichotomized to generate a binary composite measure – "more jointly" versus "less jointly". In addition to joint decision making reported by women and men separately, similar analysis was performed for couples based on the three overlapping domains. Only if both women and men agreed that they made decision on that domain jointly, it was defined as "jointly". Based on the three binary variables generated through the three domains, a binary variable of "more jointly" versus "less jointly" decision making is generated using PCA for couples.

Domestic violence is measured by both the attitude toward domestic violence by female and male partners and the actual incidences of physical violence based on women's report. Attitude toward domestic violence was extracted based on the following question: "(i)n your opinion, is a husband justified in hitting or beating his wife in the following situations: (1) If she goes without telling him? (2) If she neglects the children: (3) If she argues with him? (4) If she refuses to have sex with him? (5) If she burns the food?" Binary variables of female and male partners' attitude toward domestic violence were first generated separately, being "1" if any one of the above question was answered "yes", and "0" otherwise. Then couple's attitude toward domestic violence was generated through cross-tabulation, which is dichotomized as "both agreeing that wife-beating justified under at least one condition" versus "otherwise". On the other hand, presence of physical violence was defined as "yes" if women's answer was "yes" to any one of the following questions: "(d)oes/did your (last) husband/partner ever: (1) push you, shake you, or throw something at you? (2) slap you or twist your arm? (3) punch you with his fist or with something that could hurt you? (4) kick you or drag you?; (5) try to strangle you or burn you? (6) threaten you with a knife, gun, or other type of weapon?; (7) attack you with a knife, gun, or other type of weapon?; (8) physically force you t have sexual intercourse with him even when you did not want to? And (9) force you to perform other sexual acts you did not want to?"

We intended to measure women's access to or control over resources which is a major component of women's empowerment[21], but failed to do so due to data constraint. Though women were asked on who decided how to spend the money she earned from her work, there are a lot of missing because many women didn't work for cash. Therefore, this domain of women's empowerment was not included in the analyses.

Method

Out of the 1399 couples who both heard of HIV before, only 6% had both members tested before the survey, and 24% had either female or male partners tested before. The rest 71%, 980 matched couples, constituted the analytical sample of the study, with unit of analysis being couples. The series of survey command with the prefix of "svy-" in Stata 8[50] were applied to simultaneously take account of stratification, clustering and weighting of the complex survey design of KDHS 2003. Men's weight was used for couple's analyses[40, 51]. Specifically, descriptive analyses for survey data (using "svyprop" or "svymean") were performed to examine the general characteristics of the sample. Then in the bivariate analysis, the associations between couple's desire for HTC and the categorical independent variables were examined by two-way tabulation (using "svytab"). To examine the significance of the associations, the Pearson chi-square statistic was corrected using the second-order correction of Rao and Scott [52] to take account of the survey design, and it was converted to an F statistic [50]. For the continuous independent variables, means of the variables by couple's desire were first obtained, then adjusted Wald-tests were carried out to test for the significance of the association. The adjusted Wald test is specified by

$$W = (Rb - r)'(RVR)^{-1}(Rb - r)$$

where W is the Wald test statistic, b is the estimated coefficient vector, V is the variance-covariance matrix, $Rb = r$ is the set of linear hypotheses to be tested. When using the "svy-" command, the adjustment uses an approximate F statistic, $(d - k + 1)W/(kd)$, where k is the dimension of the hypothesis test, d is the total number of sampled clusters minus the total number of strata. Under the null hypothesis, $(d - k + 1)W/(kd) \sim F(k, d - k + 1)$, where $F(k, d - k + 1)$ is an F distribution with k numerator degrees of freedom and $d - k + 1$ denominator degrees of freedom[50].

Multivariate logistic regressions (using "svylogit") were performed to examine the independent association between measures of women's empowerment and desire for HTC, after controlling for socio-demographics and HIV related variables. Specifically,

$$Logit[\Pr(Y_{\text{couple\_desire}} = 1)] = \beta_0 + \beta_1 \mathrm{X}_1 + \beta_2 \mathrm{X}_2 + \beta_3 \mathrm{X}_3$$

Where $Y_{\text{couple\_desire}}$ is the binary outcome of couples both having desire for HTC ($Y_{\text{couple\_desire}} = 1$) or otherwise ($Y_{\text{couple\_desire}} = 0$). X_1, X_2 and X_3 denotes the vector of socio-demographic variables, couple-level HIV related variables, and women's empowerment variables. β_0, β_1, β_2 and β_3 are the corresponding vectors of the regression coefficients.

The standard error (SE) and hence the 95% confidence interval for each coefficient were calculated based on the Taylor linearization method. In this method, the Taylor expansion is used to reduce the nonlinear quantity to an approximate linear format so that an estimator of the corresponding variance can be constructed. For an estimate $R = Y / X$, where Y and X are the population parameters. Using the delta method based on the Taylor expansion, we can get the variance of the estimator for R,

$$\hat{V}(\hat{R}) = \sum_{h=1}^{H} (1 - f_h) \frac{n_h}{n_h - 1} \sum_{i=1}^{n_h} (z_{yhi} - \bar{z}_{yh})^2$$

where $1 - f_h$ is the finite population correction, equaling 1 minus the sampling fraction, i.e. the number of sampled clusters over the total number of clusters in strata h. f_h is so small that it is often ignored. $z_{yhi} = \sum_{j=1}^{m_{hi}} w_{hij} y_{hij}$, and $\bar{z}_{yh} = \frac{1}{n_h} \sum_{i=1}^{n_h} z_{yhi}$, where $h = 1,...,H$ represent the strata, $i = 1,...,n_h$ enumerate the clusters in the h[th] stratum, and $j = 1,...,m_{hi}$ are the elements in the i[th] cluster in the h[th] stratum. y_{hij} is the sample statistic in the j[th] element in the i[th] cluster and h[th] stratum and w_{hij} is the corresponding weight [50]. If population proportion is to be estimated, y_{hij} is just a binary variable and x_{hij} is the total number of cases in the j[th] element in the i[th] cluster and h[th] stratum. To test a hypothesis, the adjusted Wald tests as described above were conducted. Odds ratio (OR), 95% confidence interval (CI), and p-values were reported from the logistic regression results. All the population sizes (N) were estimated considering complex survey design.

For the categorical outcome of couple's desire for HTC, multinomial logistic regressions (using "svymlogit") considering the complex survey design were applied. Specifically,

$$Log[\frac{\Pr(Y_{couple\_desire\_j})}{\Pr(Y_{couple\_desire\_0})}] = \gamma_0 + \gamma_1 X_1 + \gamma_2 X_2 + \gamma_3 X_3$$

where $Y_{couple\_desire\_0}$ is the category of neither member desired HTC, which is the multinomial regression base. $Y_{couple\_desire\_j}$ denotes the other three categories of couples' desire for HTC, namely both members desiring, women only desiring and men only desiring. X_1 , X_2 and X_3 are the same as in the logistic regressions. γ_0 , γ_1 , γ_2 and γ_3 are the corresponding coefficients. Relative risk ratios (RRR), and their 95% CI were presented accordingly.

Results

Descriptive analyses

Among 980 couples who both heard of AIDS but neither had been tested before the survey, wives' mean age was 30.6 years old (SE=0.3). Husbands on average were 6.6 years older than wives. Female partners had been in school for 6.3 years, whereas male partners had at least one more year of education. Couples were evenly distributed across the five quintiles of household wealth. 19% of the couples lived in urban areas. Central, Eastern, Nyanza, and Western Provinces all hosted more than 10% of the sample. Majority of the women and men in union were Christians. More than four-fifths of the couples claimed themselves as monogamous. On average, women had spent 12 years and men 13 years since their first marriage. Wives and husbands had 3.9 and 4.7 children, respectively. And one-fifth of the couples had both members experienced child death.

About 6% of the couples had at least one member with history or symptoms of STI. 1% of wives and 8% of husbands reported having other partner(s) in the past year. Almost nine out of ten husbands had been circumcised. Men had more knowledge yet more stigma than their wives. Four-tenths of the couples with both members knew a place for HIV testing. More than 70% of female and male partners perceived themselves at no risk or small risk of HIV infection. However, 18% and 9% of wives thought they were at moderate or great risk of HIV infection,

compared to only 9% and 3% of husbands, respectively. Almost two-thirds of the couples both knew someone who has died of AIDS.

Level of women's empowerment and couple's desire for HTC is presented in Figure 2. More than half of the couples have both talked to their partners on ways to prevent HIV. Almost two-thirds of couples both agreed that wife is justified to ask husband use condom if he has STI. One-third couples agreed that wife is justified to refuse sex under all four circumstances. Only one out of five couples both agreed that they made decisions more jointly in the household, whereas one out of three couples agreed that they made decisions less jointly. Strikingly, almost half of the couples both considered that wife-beating is justified under at least one situation, and 36% of wives had experienced some form of domestic violence (not shown). For the outcome of couple's desire for HTC, 50% of couples had both members desiring HTC, 18% had only women desiring and 17% only men desiring, and the rest 16% with neither member desiring.

Bivariate analyses

Among the couple-level socio-demographic variables, only province and women and men's religion reached statistical significance in the association with couple's desire for HTC. However, age, education, wealth, and residence are potential confounders, which were hence kept in the multivariate analyses. Among couple's HIV related factors, couples' history or symptom of STI, husbands not circumcised, wives' self-perceived risk, and couples' HIV anxiety were all positively associated with couple's desire for HTC. For the continuous variables of women and men's HIV knowledge and stigma, adjusted Wald-test showed that women and men had significantly more knowledge yet less stigma when they desired for HTC as a couple. Other couple's HIV related factors, including whether had other partner(s) in the past year, men's perceived risk of infection, and couple knowing a place for testing, were not significantly in the bivirate analysis and hence excluded from the multivariate analyses.

As shown in Table 4, each domain of joint decision making, as reported by women, men, and couples, was cross-tabulated with couple's desire for HTC separately. Interestingly, the direction of the associations was different for women than men and couples. Though not significant, the associations between couple's desire and three out of the five joint decision making domains

reported by women were in the direction of positive association with couple's desire for HTC, whereas those with all the domains reported by men and couples were in the opposite direction. Three domains as reported by men were even significantly yet negatively associated with couples' desire. However, after the multiple domains were combined in the PCA analysis, bivariate results suggest, as shown in the middle of Table 5, none of the joint decision making indices as reported by women, men and couples was significant. In terms of other women's empowerment measurements (Table 5), couples who talked about HIV prevention were significantly more likely to desire HTC. Both women's sexual empowerment measurements were positively associated with couple's desire for HTC, though only the condom negotiation was significant. Couple's physical domestic violence was strongly and positively associated with desire for HTC, but attitude toward violence was not.

Multivariate logistic regression analyses

After controlling for the couple-level socio-demographics and HIV related characteristics that were significant in the bivariate analysis, each of the four domains of women's empowerment was first included in the multivariate logistic regressions individually, then all four domains were included in the model together. The results didn't differ meaningfully between the individual inclusion and all inclusion of the four domains, hence only the results of the one-time inclusion of all four domains were presented here (Table 6).

Couples who had mutual communication on HIV prevention were 34% more likely to desire HTC (OR: 1.34; 95% CI: [0.97, 1.87]), compared to those who had only one-way discussion or no discussion at all. Therefore, hypothesis 1 is supported by the KDHS 2003.

In terms of women's sexual empowerment, both measurements demonstrated positive association with couple's desire for HTC. Specifically, couples agreed that wife was justified to negotiate condom use if husband had STI were 22% more likely to desire HTC. Similarly, couples in which both partners agreed that women were justified to refuse sex under all four conditions were 21% more likely to desire HTC. However, the odds ratio of both variables didn't reach statistical significance. Therefore, hypothesis 2 is only supported to some extent.

Consistent with the bivariate analysis, joint decision making as reported by women, men and couples were association with couple's desire for HTC in different directions. Couples in which women reported more joint decision making were 41% more likely to desire HTC (OR: 1.41; 95% CI: [1.00, 1.98]). However, if men reported more joint decision making, the couples were 19% less likely to desire HTC. Joint decision making reported by couples fell somewhere between the previous two associations. Therefore, hypothesis 3 is supported only among couples in which women reported more joint decision making.

Mixed results were observed between domestic violence and couple's desire for HTC. Couples who tolerated domestic violence were 15% less likely to desire HTC, which contradicts hypothesis 4-1. But women who experienced physical violence were 42% more likely to be in couples in which both partners desire HTC, than those who didn't experience any violence (OR: 1.42; 95%: [1.03, 1.96]). Hypothesis 4-2 is hence supported.

Several other multivariate analyses results are worth presenting. With female partners' age and level of education increasing, couples were significantly less likely to desire HTC. Consistent with individual level study[35], couples who resided in the North Eastern Province were only one-tenth as likely to desire HTC as couples in Nairobi (OR: 0.11; 95%: [0.03, 0.43]). Compared to Catholics, male partners were only about 30% as likely to be in couples with desire for HTC if they had no religion, other religion or didn't answer the question. Men's HIV knowledge was positively associated with couple's desire for HTC. Specifically, with one point increase in men's HIV knowledge score, couples were 14% (95% CI: [0%, 30%]) more likely to desire HTC. Lastly, men who were not circumcised were 2.64 times (95% CI: [1.51, 4.61]) more likely to be in couples desiring HTC.

Multivariate multinomial logistic regression analyses

Similar multivariate analyses were conducted for the four-category outcome of couple's desire for HTC, using multinomial logistic regression, to further examine the association between women's empowerment and different patterns of couple's desire for HTC (Table 7). Couples who had mutual communication on prevention of HIV were not more likely to be either couples in which only women or only men desired HTC, but were 32% (p=0.23) more likely to be

couples in which both members desire HTC, when compared to couples with neither member desiring. Couples who agreed that wife was justified to ask for condom use were more likely to be in couples with at least one member desiring HTC. The associations reached marginal significance ($p<0.10$) for couples with only women desiring and both members desiring. However, evidence is not as strong for couples when both members agreed that women were justified to refuse sex. Interestingly, though not significant, joint decision making as reported by women, men and couples were all positively associated with only women desiring HTC. Couples with more joint decision making reported by women and men were more likely to be only-men-desiring couples, but less likely to be so if more joint decision making was reported by couples. The association between joint decision making and the outcome of both members desiring were similar to the logistic regression results. However, different from the logistic regression results, couples tolerating domestic violence were more likely to have at least one member desiring HTC. But for couples with physical violence, they were less likely to have only women or only men desiring testing, but more likely to have both members desiring, though none of these association was significant.

Discussion

In Kenya, half of the population in union with both members desired to take HTC. Another one third couples had one member desiring to take HTC, leaving only a small proportion of couples who did not want to pursue HTC at all. Despite of the high demand for HTC among couples and the mass media campaign promoting couple-friendly testing in 2001[45], only 6% of the couples had both members tested by 2003. Apparently there is a huge gap between couple's desire for HTC and the actual adoption of the intervention. These results call for further investigation into couples' desire for HTC, so that program interventions can be better designed considering these factors. We studied the association between couple's desire for HTC and women's empowerment, after controlling for couple's socio-demographics and HIV related characteristics.

The fact that regression results did not differ substantially between individual inclusion and one-time inclusion of the four domains suggests that each aspect of women's empowerment is associated with couple's desire for HTC independently. Compared to couples with no more than one member talking about HIV prevention, those with two-way inter-spousal communications

were more likely to have both members desiring HTC. The finding is consistent with previous literature where couple's discussion on family planning is associated with increased intention or actual use of contraception[40, 41]. We attempted to measure couple's communication in other aspects of domestic life, such as family planning and fertility, both of which are also relevant to HIV prevention. However, communication in the two aspects was either only asked among women or among men, making it impractical to construct the mutual communication variables on family planning and fertility. Another limitation of the communication measurement is that there was no information on the timing of the communication, which makes the causal inference between couple's communication and desire for HTC impossible. No information was solicited on the content of couple's communication on HIV prevention either, which would also provide insights into couple's desire for HTC. Qualitative data show that men tend to talk about how to remain faithful whereas women usually try to persuade their husbands to be faithful[29]. Therefore, programs should be designed to help couples increase mutual communication on HIV prevention. Messages delivered in these programs need to be specifically tailored for women and men separately.

Though not significant for the binary outcome, couples both agreed that wife was justified to ask husband use condom if he had STI was marginally significantly associated with couples with only women desiring or both members desiring HTC. The non-significant result in the binary outcome is probably a result of combining only-women-desiring couples with neither-desiring and only-men-desiring couples. The effect of women's sexual empowerment on female partner's desire for HTC is then masked in the analysis of the binary outcome. This variable measures women's sexual empowerment under a relatively extreme circumstance when husband had STI and she knew about it. The measurement provides information on the minimum autonomy women need to have to protect themselves from getting infected when husbands had STI. The association between couple's desire for HTC and whether women were justified to refuse sex under the four conditions were even less straightforward. In the analysis of the binary outcome, the association was positive. However, when comparing to couples with neither member desiring HTC, couples who agreed women justified to refuse sex were less likely to have only women desire HTC. It could be so if couples who agreed that women justified to refuse sex tended to agree on other things, such as desire for HTC, so that more couples are in the both-desiring

category. However, it may not be the case since similar associations were not observed in the other measurement of women's sexual empowerment.

Couple's joint decision making and its association with desire for HTC deserves an extended discussion. We included three couple's joint decision making variables, one reported by women, one reported by men, and the third agreed by couples. In the analyses, only the one reported by women emerged to be significantly associated with couple's desire for HTC, both in the binary outcome and in the categorical outcome for both-desiring couples. On the other hand, joint decision making reported by men and agreed by couples were not only insignificant, they were sometimes even negatively associated with couple's desire for HTC. We speculate the discrepancy have something to do with men's over-reporting of joint decision making. Jejeebhoy compared wife's autonomy as reported by husbands and wives in India, and found husbands over-reported their wives' autonomy in all dimensions when compared to their wives' reports[53]. Men also more likely to misreport reproductive events than women[54].

For domestic violence, evidence is even more mixed. The attitude and behavior of domestic violence are associated with couple's desire in the opposite directions. The direction of the associations also changed when the outcome changed from binary to categorical. Literature presents equivocal evidence. Among Rwandan women who had HTC before, HIV positive women were more likely to report coercive sex and women with HIV positive partners were more likely to be physically abused[18]. Therefore, couples in which women experienced some kind of violence are at higher risk of HIV infection from their male partners. Since the question on desire for HTC was asked separately for women and men in KDHS, women who experienced physical violence domestically before may feel free to express their desire for HTC, and hence reflect as a high couple's desire for HTC. However, we suspect that the results could be quite different if these women were asked on desire for HTC in the presence of their partners. In the same vein, translating their desire into the actual behavior of pursuing HTC may also prove difficult.

The findings from both logistic and multinomial logistic regression analyses highlight a complex relationship between the four domains of women's empowerment and couple's desire for HTC.

Inter-spousal communications and women's sexual empowerment showed clearly positive association with couple's desire for HTC. Joint decision making and attitude and behavior toward domestic violence, on the other hand, exert mixed influence on the outcome. Compared to the logistic regression, multinomial logistic analysis shed some light on gender-specific associations. For example, when comparing to neither-desiring couples, women' HIV knowledge and women' self-perceived risk of HIV infection were significantly associated with being the only-women-desiring couples. Whereas men's stigma score was associated with being only-men-desiring couples (not shown).

In addition to the four hypotheses we formulated at the couple level, we also found a few interesting results worth discussing. Not surprisingly, age and education are negatively associated with couple's desire for HTC. Such a relationship supports program interventions targeting young couples to educate and mobilize them for HTC. Corroborating results from the individual analyses[35], couples residing in the North Eastern Province were much less likely to desire for HTC, which was probably a result of very low desire for HTC among women in the North Eastern Province. Male circumcision is not a significant factor at the individual level for desiring HTC [35], but a strong factor negatively associated with both member desiring HTC in union. It seems that uncircumcised married men were more eager to take HTC than their single counterparts. It could be that married men were more sexually active and hence more concerned with their reproductive health. Given that they knew circumcision protects against HIV infection, they are more motivated to pursue HTC.

There are some limitations that hamper us from better understanding the effects of couple characteristics on their desire for HTC. The richness of the decision-making process is difficult to document with the KDHS. Future studies should consider qualitative approaches. Couple's joint decision making has been operationalized by summing up number of decisions couples made jointly, which is then as a continuous variable[31, 39]. However, this approach has been criticized because of the additive feature of the indices[21]. We use a weighted summation of all decision making responses by principle component analysis a better scheme, which differentiates the individual contribution of each response by their importance to the resulting variable, as measured by its variation. However, our measurement has limitations as well. As pointed out by

Malhotra and collaborators, the measurement of women's empowerment is very contextual specific. It is not clear whether we have included all the domains of women's empowerment that are relevant to the outcome of couple's desire for HTC in Kenya. And in each of the domains we have included, whether we are able to include all the relevant aspects. Further theoretical work on women's empowerment in the area of HIV prevention is hence called for.

The measure of couple's desire for HTC is really a measure of wife's and husband's desire for HTC separately, which were then cross-tabulated to get the couple's desire. In other words, it is really a coincidentally similar attitude, rather than recognized consensus. Even if both husband and wife desired for HTC together, it may be more likely, though not necessarily, translated into them going for couple's HTC together. Especially in the case of physical violence, despite of the fact that we find women experienced any physical violence are more likely to be in couples who desire HTC together, chances are that women who experienced violence before would be reluctant to go with their husbands for HIV testing because of their legitimate fears of potential negative outcomes[55]. Therefore, the study results need to be interpreted with caution.

Despite of the above limitations, current paper has some inherent strength. To our knowledge, few studies have linked HTC with women's empowerment, even fewer conducted such studies at the couple level. We measured many couple's characteristics, from both wives and husbands' perspectives. Different from some studies, where only women reported communication is applied, we combined reported communication from both women and men to better capture the mutual communication on the subsequent HIV related outcomes. In addition, our study utilized nationally representative samples, which provides us confidence in generalizing the results to entire Kenya and perhaps to other sub-Saharan African countries with similar context.

In addition to the results from this study, conceptually, when considering couple's desire with their HIV status, several policy and programmatic implications could come out. A conceptual diagram depicting different combinations of couple's HIV serostatus and desire for HTC is presented in Figure 3. The four ellipses each represent the following populations: female partners who desire test (upper-left), male partners who desire test (upper-right), female partners who are HIV positive (lower-left), and male partners who are HIV positive (lower-right), respectively.

The area denoted by each letter hence represents couple populations with different desire and serostatus as listed below the diagram, e.g. “A” denotes couples in which women desire HTC, but men don't, and the couples are concordantly negative, and “K” represents couples who both desire HTC and both are HIV positive. Apparently, different HIV prevention and testing programs should be designed to target different couple populations denoted by these letters. For example, “D” and “E” are discordantly positive couples in which neither member desire HTC. They are groups which programs urgently need to target to promote desire for HTC so that further transmission within couples could be avoided. Group “G” and “H”, on the other hand, are also discordantly positive, yet the couples are willing to go for HTC. Therefore, the groups need to be provided with easy access of HTC and be facilitated with testing in no time to avoid further within-couple transmission.

Considering the numerous advantages of couple’s HIV testing and counseling and couple’s communication and women’s sexual empowerment that may affect couple’s pursuit of HTC, it is of paramount significance to translate the research results into policy and programmatic approaches. Programs intended to increase couple’s desire for HTC need to consider the dynamics and ramifications of couple’s decision making process. Couple’s communication on HIV prevention bears promise to promote couple-oriented HTC. Encouraging couple’s communication on HIV/AIDS and educating couples to empower women sexually by providing them with skills to negotiate condom use and refuse sex are also likely to benefit HIV prevention. Supporting women who have experienced violence and helping them translate their desire for HTC into actual behavior may also prove valid in certain context. Integrated approach, including rapid HTC and community outreach have also been shown to increase participation of couple based HTC[5, 8].

From this exercise, desire for HIV testing and counseling has been explored from couple’s perspective. Couple level analyses provide a better understanding of how women’s empowerment and other factors influence couple’s desire for HTC. In the future, the measurement of women’s empowerment needs to be further refined, so that its relationship with couple’s desire and hence behavior of HIV testing and counseling could be better understood. In so doing, policies and programs will be able to promote couple’s desire for HTC by generating

targeted interventions focusing on women's empowerment and other relevant couple-level factors.

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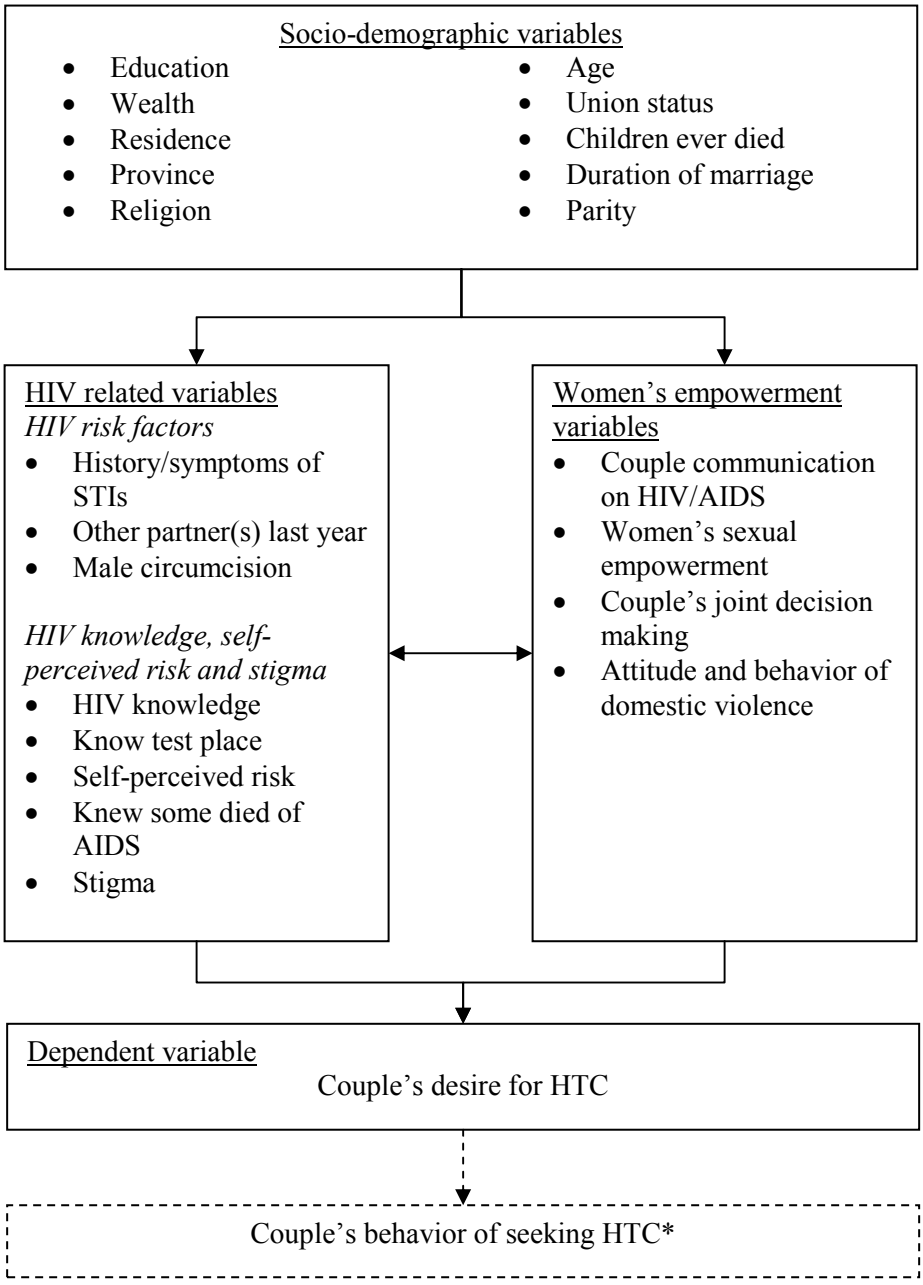
Figure 1. Conceptual framework of couple's desire for HTC



- Behavior of getting HTC was not directly studied.

Table 1. Study variables and coding

Variable	Category
Dependent variables	
Desire for HTC (binary)	Both members desire; Otherwise
Desire for HTC (categorical)	Neither desire; Women only desire; Men only desire; Both desire
Socio-demographic variables	
Age (women)	Current age, continuous
Age difference (couple)	Difference of age between men and women, continuous
Education (women)	Years of schooling, continuous
Education difference (couple)	Difference of years of schooling between men and women, continuous
Wealth (couple)	Poorest; Poorer; Middle; Richer; Richest
Residence (couple)	Urban; Rural
Province (couple)	Nairobi; Central; Coast; Eastern; Nyanza; Rift Valley; Western; North Eastern
Religion (women and men)	Roman Catholic; Protestant/other Christian; Muslim; No religion/Other religions/Missing
Union status (couple)	Both reported monogamous; Otherwise
Duration of marriage (women and men)	Difference between current age and age at first marriage, continuous
Parity (women and men)	Total children ever born, continuous
History of child death (couple)	Both had child(ren) died; Otherwise
HIV related variables	
History or symptoms of STI (couple)	At least one partner had STI history/symptoms; Otherwise
Having other partner(s) in the past year (women and men)	No; Yes
Male circumcision (men)	No; Yes
HIV knowledge (women and men)	Continuous
Know a place to get HIV test (couple)	Both knew a place; Otherwise
Self-perceived chance of getting HIV (women and men)	No risk at all; Small; Moderate; Great/Has AIDS
Know someone who has died of AIDS (couple)	Both knew someone; Otherwise
Stigma (women and men)	Continuous
Couple-level variables	
Talked to partners on ways to prevent HIV (couple)	Both talked; Otherwise
Wife justified to ask husband use condom if he has STI (couple)	Both agreed; Otherwise
Wife justified to refuse sex under all conditions (couple)	Both agreed; Otherwise
Joint decision making (women, men, and couple)	More jointly; Less jointly
Wife beating was justified under at least one condition (couple)	Both agreed; Otherwise
Experience of physical IPV (women)	At least one physical violence; None

Table 2. Principle component analysis results for HIV/AIDS knowledge score among members of matched couples who had heard of AIDS but never tested, Kenya, 2003

	Women			Men		
Variable	Proportion having correct knowledge	Sd	Factor loading	Proportion having correct knowledge	Sd	Factor loading
Reduce chances of AIDS by always using condoms during sex	0.60	0.49	0.37	0.69	0.46	0.35
Reduce chance of AIDS: have 1 sex partner with no other partner	0.79	0.41	0.47	0.89	0.31	0.46
Get AIDS from mosquito bites	0.55	0.50	0.37	0.70	0.46	0.38
Get AIDS by sharing food (utensils) with person who has AIDS	0.69	0.46	0.43	0.79	0.41	0.45
Reduce risk of getting sex by not having sex at all	0.78	0.42	0.47	0.89	0.31	0.46
Can a healthy person have AIDS	0.82	0.38	0.32	0.90	0.30	0.32
Eigenvalue of the first component			3.32			3.09
Difference between first and second eigenvalues			2.57			2.28
Proportion of variance explained by the first component			0.55			0.52
Number of observations included in PCA			980			980

Table 3. Principle component analysis results for HIV/AIDS stigma score among members of matched couples who had heard of AIDS but never tested, Kenya, 2003

	Women			Men		
Variable	Proportion of having stigma	Sd	Factor loading	Proportion of having stigma	Sd	Factor loading
Would buy vegetables from vendor with AIDS	0.49	0.50	0.55	0.28	0.45	0.59
Allowed to keep AIDS infection secret	0.35	0.48	0.05	0.28	0.45	0.30
Willing to care for relative with AIDS	0.21	0.41	0.52	0.11	0.31	0.42
Person with AIDS allowed to continue teaching	0.50	0.50	0.58	0.38	0.49	0.55
Should children be taught about condoms	0.47	0.50	0.30	0.40	0.49	0.29
Eigenvalue of the first component			1.84			1.87
Difference between first and second eigenvalues			0.81			0.83
Proportion of variance explained by the first component			0.37			0.37
Number of observations included in PCA			980			980

Figure 2. Level of couple's desire for HTC and women's empowerment, Kenya, 2003

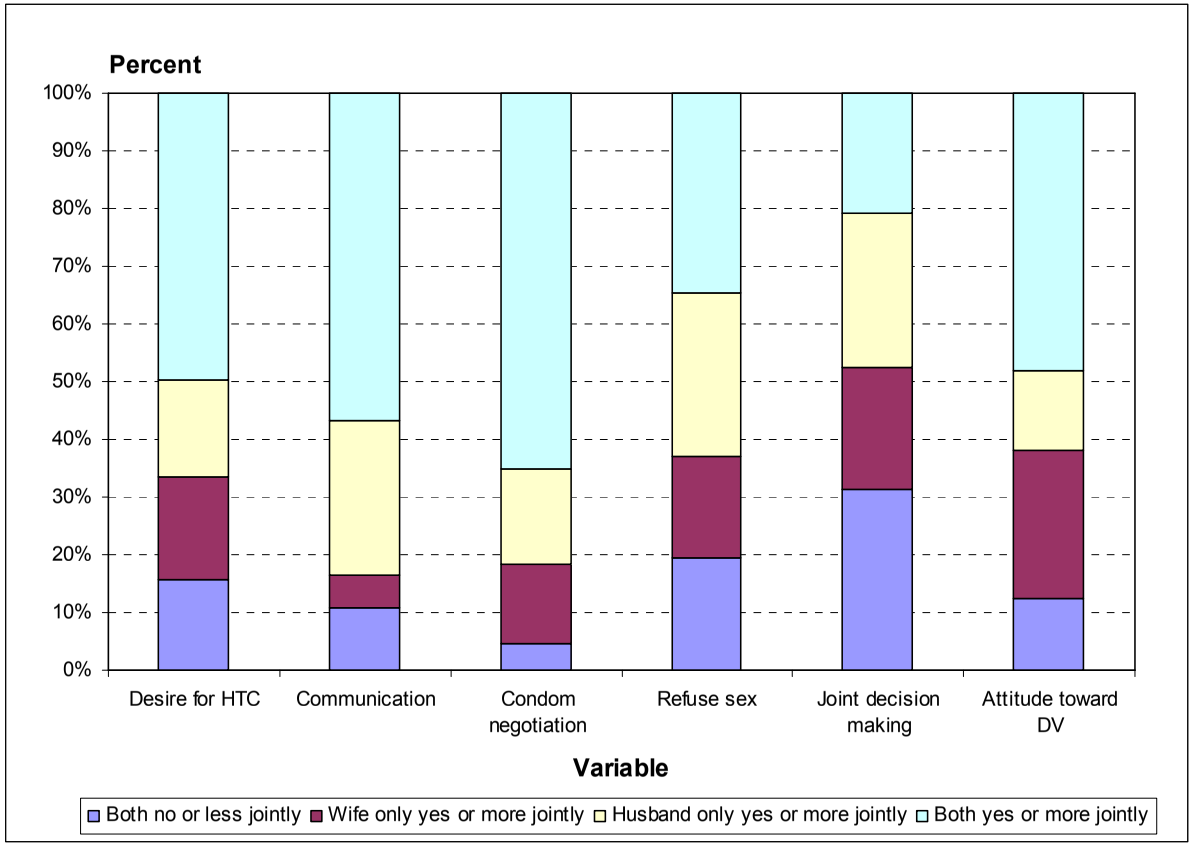


Table 4. Proportion desiring HTC, by joint decision making, as reported by women, men, and couples, Kenya, 2003

Characteristics	Women reported			Men reported			Couples agreed		
	Both desired	N	P-value	Both desired	N	P-value	Both desired	N	P-value
Women reported									
Women's health care									
Otherwise	0.490	816	0.462						
Jointly	0.526	164							
Daily food to cook									
Otherwise	0.495	916	0.779						
Jointly	0.515	64							
Large purchases									
Otherwise	0.500	719	0.756	0.503	651	0.642	0.497	881	0.936
Jointly	0.487	261		0.483	330		0.491	99	
Daily purchases									
Otherwise	0.493	754	0.783	0.511	843	0.036	0.501	953	0.135
Jointly	0.506	226		0.407	137		0.336	27	
Visits to family/relatives									
Otherwise	0.513	585	0.201	0.528	573	0.036	0.510	804	0.106
Jointly	0.471	395		0.451	407		0.434	176	
What to do with money wife earns									
Otherwise				0.524	616	0.039			
Jointly				0.449	364				
How many children to have									
Otherwise				0.527	363	0.168			
Jointly				0.478	617				

Table 5. The bivaraite association between couple's desire for HTC and women's empowerment measurements, Kenya, 2003

Characteristics	Desire for HTC (binary) Both desired	N	P-value
Couples' communication on HIV/AIDS			
At least one member didn't talk	0.440	425	0.006
Both talked	0.539	555	
Wife is justified to ask for condom when husband STI			
Otherwise	0.429	341	0.017
Both agreed	0.532	639	
Women justified to refuse sex			
Otherwise	0.475	641	0.125
Both agreed	0.535	340	
Women's joint decision making index			
Less jointly	0.473	569	0.144
More jointly	0.527	411	
Men's joint decision making index			
Less jointly	0.517	513	0.193
More jointly	0.473	467	
Couple's joint decision making index			
Less jointly	0.506	749	0.246
More jointly	0.463	231	
Wife beating justified under at least one condition			
Otherwise	0.507	509	0.511
Both agreed	0.484	472	
Any physical violence			
No	0.441	628	0.000
Yes	0.594	352	

Table 6. Selected results of logistic regression analyses* of couple's desire for HTC, Kenya, 2003

Explanatory variables	OR	95% CI	P-value
WOMEN'S EMPOWERMENT			
Couples' communication on HIV/AIDS			
At least one member didn't talk	Ref		
Both talked	1.34	0.97, 1.87	0.08
Wife is justified to ask for condom when husband STI			
Otherwise	Ref		
Both agreed	1.22	0.81, 1.84	0.34
Women justified to refuse sex			
Otherwise	Ref		
Both agreed	1.21	0.86, 1.69	0.28
Joint decision making (reported by women)			
Less jointly	Ref		
More jointly	1.41	1.00, 1.98	0.05
Joint decision making (reported by men)			
Less jointly	Ref		
More jointly	0.81	0.57, 1.13	0.21
Joint decision making (reported by couples)			
Less jointly	Ref		
More jointly	0.95	0.64, 1.42	0.80
Wife beating justified under at least one condition			
Otherwise	Ref		
Both agreed	0.85	0.62, 1.15	0.28
Any physical violence			
No	Ref		
Yes	1.42	1.03, 1.96	0.03
OTHER SIGNIFICANT COVARIATES			
Women's age	0.98	0.96, 1.00	0.03
Women's year of schooling	0.89	0.84, 0.95	0.00
Province			
Nairobi	Ref		
Northern Eastern	0.11	0.03, 0.43	0.00
Men's religion			
Roman Catholic	Ref		
No religion/Other religion/Missing	0.29	0.13, 0.63	0.00
Men's HIV knowledge	1.14	1.00, 1.30	0.05
Male circumcision			
Yes	Ref		
No	2.64	1.51, 4.61	0.00
F-statistic		F(40, 153) = 2.97	

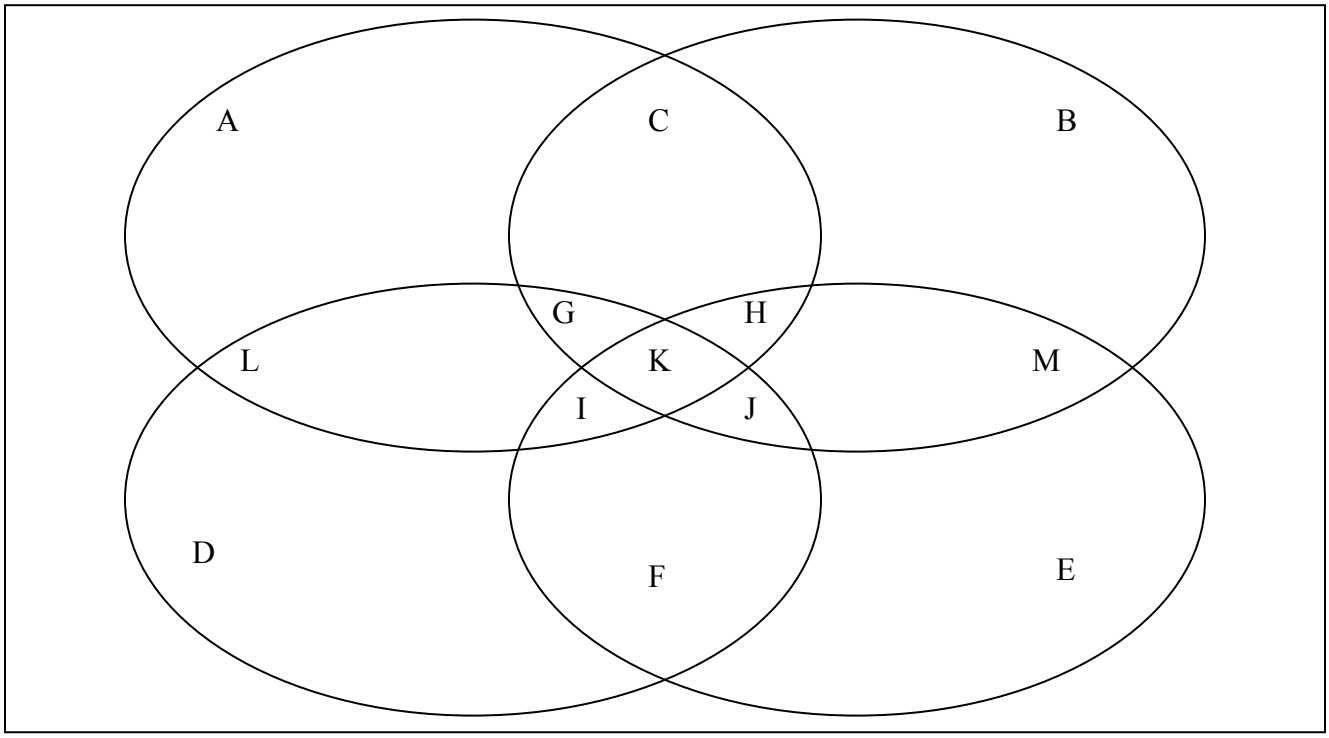
* Model also controlled for men and women's age and education difference, residence, women's HIV knowledge and stigma, women's perceived risk of infection, couple's STI, and couple's HIV anxiety.

Table 7. Selected results of multinomial logistic regression analyses of desire for HTC among couples, Kenya, 2003

Explanatory variables	Only women desire HTC			Only men desire HTC			Both desire HTC		
	RRR*	95% CI	P-value	RRR*	95% CI	P-value	RRR*	95% CI	P-value
WOMEN'S EMPOWERMENT									
Couples' communication on HIV/AIDS									
At least one member didn't talk									
Both talked	0.92	0.51, 1.65	0.771	1.04	0.59, 1.82	0.904	1.32	0.84, 2.09	0.226
Wife is justified to ask for condom when husband STI									
Otherwise									
Both agreed	1.75	0.98, 3.15	0.061	1.37	0.79, 2.35	0.259	1.63	0.96, 2.76	0.068
Women justified to refuse sex									
Otherwise									
Both agreed	0.89	0.51, 1.56	0.675	1.10	0.59, 2.04	0.767	1.19	0.71, 1.97	0.505
Joint decision making (reported by women)									
Less jointly									
More jointly	1.08	0.64, 1.85	0.766	1.40	0.81, 2.41	0.227	1.62	1.02, 2.57	0.041
Joint decision making (reported by men)									
Less jointly									
More jointly	1.13	0.62, 2.05	0.688	1.60	0.84, 3.03	0.149	0.98	0.58, 1.66	0.938
Joint decision making (reported by couples)									
Less jointly									
More jointly	1.04	0.55, 1.96	0.896	0.64	0.33, 1.25	0.195	0.84	0.47, 1.51	0.567
Wife beating justified under at least one condition									
Otherwise									
Both agreed	1.34	0.74, 2.42	0.325	1.41	0.79, 2.51	0.246	1.05	0.64, 1.72	0.839
Any physical violence									
No									
Yes	0.92	0.47, 1.78	0.795	0.87	0.48, 1.60	0.662	1.31	0.77, 2.22	0.315

*RRR: relative risk ratio, comparing with the base category of couples with neither member desiring HTC. Model controlled for couple level socio-demographics and HIV related covariates that are significant in the bivariate analyses.

Figure 3. Conceptual diagram of couple's serostatus and desire for HTC



The four ellipses each represent the following populations: women who wanted test (upper-left), men who wanted test (upper-right), women who were HIV positive (lower-left), and men who were HIV positive (lower-right), respectively. Therefore, the areas denoted by letters each represents the following populations of couples:

A – Women wanted test, but men didn't, and the couples were concordantly negative.
B – Women didn't want test, but men did, and the couples were concordantly negative.
C – Both wanted test, and both were concordantly negative.
D – Neither wanted test, but the couples were discordantly female positive.
E – Neither wanted test, but the couples were discordantly male positive.
F – Neither wanted test, but the couples were concordantly positive.
G – Both wanted test, but the couples were discordantly female positive.
H – Both wanted test, but the couples were discordantly male positive.
I – Women wanted test, but men didn't, and the couples were concordantly positive.
J – Women didn't want test, but men did, and the couples were concordantly positive.
K – Both wanted test, and both were concordantly positive.
L – Women wanted test, but men didn't, and the couples were discordantly female positive.
M – Women didn't want test, but men did, and the couples were discordantly male positive.
N – Women didn't want test, but men did, and the couples were discordantly female positive (not shown in the diagram).
O – Women wanted test, but men didn't, and the couples were discordantly male positive (not shown in the diagram).
Desire of couples: G + H + I + J + K + L + M + N + O