Married Women's Risk of STIs in Developing Countries: The Role of Intimate Partner Violence and Partner's Infection Status

By

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I. INTRODUCTION

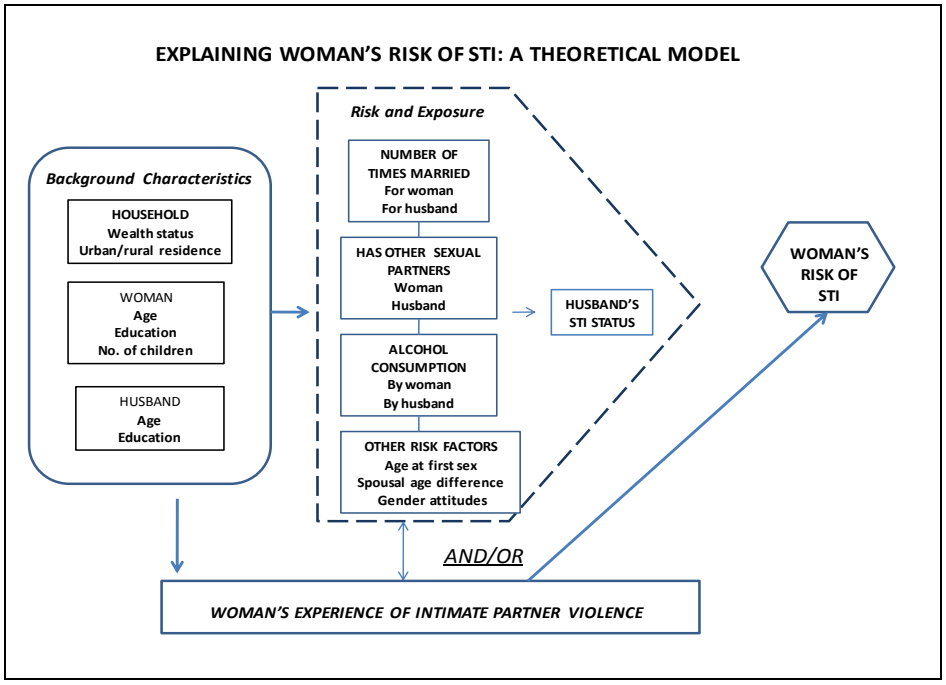
An increasing body of research provides evidence that intimate partner violence (IPV) is an important correlate of a wide range of adverse reproductive health outcomes for women, including sexually transmitted infections (STIs). However, much of the evidence pertains to the developed world and draws heavily on data from patients at STI clinics or women in domestic violence shelters (Augenbraun, Wilson, and Allister 2001; Plichta and Abraham 1996; Bauer et al. 2002; Wingood et al. 2000), leaving largely unanswered the question of whether the positive IPV-STI association is equally applicable to women in the general population of developing countries. One of the few exceptions is a study by Kishor and Johnson (2002) that examined the association of IPV and self-reported STD/STI symptoms for a representative sample of ever-married women in Haiti, Dominican Republic, and Cambodia and found that the experience of spousal violence makes it almost twice as likely that ever-married women have had an STI; and that this relationship is not diminished by controlling for wealth or education. The paper, however, did not explore the mediating effects of proximate STI determinants such as sexual behavior and husband's STI status.

In light of the many research gaps in understanding the pathways through which married women are exposed to the risk of a STIs, the objective of this paper is to answer the following questions for currently married women in the general population: Is the IPV-STI relationship largely explained by the partner's STI status and other sexual and related risk factors that can affect women's exposure to infection? Or is IPV also an *independent* risk factor for STIs among currently married women? An affirmation of IPV as an *independent* risk factor for STIs among women will open the door for a greatly needed discussion of the pathways that link IPV and STIs including HIV that do not rely almost exclusively on higher-risk behaviors as the pathway.

This paper addresses these questions within a comparative framework using data for a representative sample of couples in six countries with comparable data. The countries, two in the Caribbean (Haiti and the Dominican Republic), one in Asia (India), and one each in west Africa (Liberia), east Africa (Kenya), and south Africa (Zambia) were especially chosen to represent a wide range of cultural contexts and marital and sexual norms in order to maximize the generalizability of the results.

II. THEORETICAL MODEL AND ASSOCIATED LITERATURE

The figure below provides the conceptual framework for this paper. It depicts the pathways between IPV and women's risk of STIs that are to be investigated. The figure shows that the proximate determinants of a woman's risk of STIs include factors that affect her exposure to infection, including the STI status of her husband, other sexual risk factors such as multiple sexual partners, alcohol consumption, spousal age difference, age at first sex, and factors such as spousal age difference that can affect the ability to negotiate sex with husbands. Further, the model also focuses attention on the central hypothesis of this paper that women's experience of IPV is also a key risk factor for STIs among women in the general population and operates independently of other risk and exposure factors. Finally, women's risk of STI will be mediated by the background characteristics of women and men because both IPV and the proximate determinants of STIs are likely to vary by these characteristics.



Proximate determinants of STIs for married women: By definition, in order to spread, sexually transmitted infections need sexual activity that involves exposure to infection. A direct measure of such exposure is information on the sexual partner's infection status. However, the infection status of the partner is more often than not, unknown. Further, even a partner's current

infection status is unlikely to have a one-to-one relationship with the respondent's infection status for many reasons, including: the respondent may have more than one current sexual partner; she may have a long standing STI which precedes the current relationship; or she may have acquired the infection from her one and only sexual partner, her husband, who was subsequently cured, but had not sought treatment for herself. For these and similar reasons, several behavioral indicators need to be examined as proxies for infection exposure that assess sexual risks. Such indicators capture higher-risk sexual behaviors such as a multiplicity of sexual partners, particularly non-marital, non-cohabiting partners; an early age at first sex which, on the one hand increases the length of exposure to STIs and on the other, is a correlate of multiplicity of partners; and factors such as alcohol consumption, which is a correlate of higher-risk sexual behavior. A population-based comparative study of the correlates of HIV prevalence in 19 countries where blood samples were collected and tested for HIV from nationally representative household populations, finds that HIV prevalence is higher in all 19 countries the higher the number of lifetime sexual partners, and in most countries, for women/men who had sexual intercourse in the past 12 months with a non-marital, non-cohabiting partner, if alcohol was consumed at the time of last sex, and if sexual debut occurred before age 16, particularly for women (Mishra et al. 2009).

The limited amount of developing-country specific research that is based on the general population also points to these factors playing a significant role in increasing the risk of infection to STIs, in addition to HIV. A study using a sample of 2,019 women age 20-44 randomly selected in Moshi distirict of Tanzania found that the likelihood of women having a STI (assessed using blood and urine samples collected as part of the study) was significantly higher for women with multiple sexual partners (OR=2.41) than for women with only one partner. The study also found that alcohol consumption was directly and positively associated with women having multiple sexual partners (OR=1.66) and, through this relationship, alcohol consumption was indirectly and positively related to having an STI. The study did not include data on the infection status of any partners. A rare study of couples which examined the correlates of men's extramarital affairs, among other objectives, in three low-income communities in Mumbai, India also found a positive association between men's alcohol consumption and extramarital sexual activity (Shensul, et al., 2006). Other studies based on a population sample of women in Goa, India, emphasize the role of poverty and concern about husbands' extramarital relationships as

risk factors for reproductive tract infections, including STIs (Patel, et al., 2006; Weiss et al, 2008).

Other risk factors that, like alcohol consumption, can be enablers of higher-risk behaviors and STI infections include large spousal age differences and gender-role attitudes. Large spousal age differences are likely to enhance women's risk of sexually transmitted infections for at least two reasons: men entering marriage at older ages are more likely to be sexually experienced and thus may bring pre-existing infections to the marriage, and a large age difference can reduce the ability of the much younger wife to negotiate safe sex (Bruce and Clark, 2004). Notably, in India at least, spousal age difference declines steadily as age at marriage increases (Kishor and Gupta, 2009).

Gender-role attitudes that promote or even tolerate norms that emphasize the control of men over women are likely to negatively affect women's ability to control their own sexual life and the negotiation of safe sex with their husbands or other partners, if any. Krishnan et al. (2008) argue persuasively that significant population-level declines in the spread of HIV are greatly hindered by the assumption that individuals have decision making control. This assumption, especially in the case of women, is in direct contradiction with the reality of gender-power inequities in most societies, particularly when combined with poverty. A study in Cape Town, South Africa, which examined the role of gender attitudes and what the authors called 'sexual violence supportive beliefs or rape myths' in a population of men and women at risk of HIV transmission found that, in addition to sexual assaultive history and history of alcohol and drug use, belief in rape myths also significantly increases a man's risk of HIV; for women by contrast, only education and alcohol use were found to have a significant association with HIV risk (Kalichman et al. 2005).

IPV and STIs: The central focus of this paper is the other arrow in the figure above: the IPV-STI link in developing countries. An increasing amount of research is beginning to document the positive association of experience of IPV (sexual and/or physical) and STIs in developing countries for the general population of ever-married women (Dominican Republic, Haiti, and Cambodia: Kishor and Johnson 2006; Bangladesh: Decker et al. 2008; Ukraine: Dude, 2007; Goa, India: Weiss et al., 2008; Cape Town, South Africa, not just IPV but a history of sexual assault: Kalichman and Simbayi, 2004; among others). Despite the consistency of the IPV-STI association across many different cultural settings, the pathways through which the

experience of IPV affects the risk of STIs are still not fully understood.

Clearly one potential pathway for the STI-IPV link is through the association of IPV and the proximate determinants discussed above. In fact, research suggests that wives of abusive men may be at higher risk of STIs because abusive men appear to have a higher likelihood of indulging in other higher-risk behaviors positively associated with STIs, such as alcohol abuse, promiscuity, and polygamy (Abrahams et al. 2004). Fonck et al (2005), using data collected from 520 women presenting at an STI clinic in Nairobi, Kenya, found more risky sexual behavior, as also STIs, to be positively associated with partner violence. Similarly, in a study of predominantly minority women attending hospital-based health care clinics in the United States, current IPV perpetrated by their current partner was positively associated with a large number of higher-risk behaviors including multiple sexual partners, inconsistent and non use of condoms, and having a partner with known HIV risk factors (Wu et al., 2003). Dude (2007) also finds that in a population-based sample of women age 17-44 in Ukraine, women who have experienced physical IPV are significantly less likely to report recent condom use and more likely to report multiple sexual partners. Based on nationally representative data for Bangladesh, Silverman et al. (2007) show that men who reported perpetrating physical and/or sexual violence against their wives in the past year were more likely to report premarital and extramarital sexual partners and report having STIs or STI symptoms in the past year.

Similarly, alcohol abuse and IPV are also found to be consistently related. In a 10-country study of couples where the wife was age 20-44, the odds that women have ever experienced spousal physical or sexual violence were significantly higher for women whose husbands' drank alcohol (OR=1.33-3.63) than for women whose husbands did not drink. Women's own alcohol use was found to be positively associated in Moshi district of Tanzania (Gebremichael, Paintsil, and Larsen 2009) with a woman's history of physical (OR=2.05) and sexual (OR=1.63) violence.

Research is also, however, beginning to document the likelihood of the experience of IPV being an independent risk factor for STIs among women. For example, Fuentes (2008), using United States data for ethnically diverse women, finds that IPV poses enhanced risk in a multiplicity of ways that are interlinked and overlapping, and these pathways include not only an enhanced risk of higher-risk sexual behaviors and substance abuse, but also psychological factors such as depression and an inability to negotiate safe sex. Krishnan et al. (2008) emphasize the

role of women's disempowerment, gender inequities, and violence against women, especially within the context of poverty, as critical elements of the 'risk environment' for sexually transmitted diseases, including HIV. In addition to these pathways, IPV may also be an outcome of the disclosure of an STI to a partner (Zierler, Witbeck, and Mayer 1996).

This paper attempts to add to and enhance the existing literature on the IPV-STI association by using data on couples in six different countries spread across the developing world. The advantage of using couple data is that information on all key variables, including STI status, higher-risk behaviors, alcohol use, and background characteristics, are available for both members of the couple. Further, the perpetrator of the IPV is the male member of the couple—making it possible to examine whose characteristics, those of the perpetrator or of the wife, mediate, if at all, the STI-IPV association. The hypotheses examined in this paper are the following:

H_1: Women's risk of STIs in the past year and experience of IPV in the past year are positively associated.

H_2: Higher-risk sexual behaviors of husbands and wives explain part of the positive STI-IPV association.

H_3: Even after accounting for higher-risk sexual behaviors of both husbands and wives, women who experience IPV are at higher risk of STIs than women who do not, i.e., IPV has a net independent association with women's risk of STIs.

Despite the emphasis in the literature on the IPV-women's higher-risk behaviors-STI pathway, in these data for currently married couples, an additional expectation is that the women's risk of STIs will be associated more with their husbands' higher-risk behaviors, both directly as well as indirectly through the association of husbands' higher-risk behaviors and husbands' perpetration of IPV, than with their own such behaviors. This expectation stems from the fact that in the largely patriarchal societies in most of the countries included in this study, currently married women are less likely than their husbands to drink or have other higher-risk sexual behaviors. The only exception is likely to be low ages at first sex due in part to the much lower ages at marriage for women than men.

III. DATA AND METHODOLGY

Demographic and Health Surveys' data for nationally representative samples of couples in six countries in the three developing regions of the world are used to test the hypotheses discussed above. Specifically, the analyses are based on the matched sample of couples obtained from the Demographic and Health Surveys in three countries in Africa: Liberia (2007), Kenya (2003), Zambia (2007); one in Asia, India (2005-06); and two in the Caribbean: Haiti (2005-06), and Dominican Republic (2007). The DHS program uses multi-stage probability sampling to obtain nationally representative samples of households. In the countries included in this study, in each selected household, all women and men who stayed in the household the night before the interview and who meet the survey eligibility criteria are eligible to be interviewed. The eligibility criterion for women in all six surveys is all women 15-49 years of age; the eligibility criterion for men in Liberia is all men age 15-49, for India and Kenya it is all men age 15-54, and for the remaining countries, it is all men age 15-59. Although eligible women and men are interviewed separately, and not all women and men who are interviewed are married to each other or even married, the data collection methodology permits the identification of women and men who are married to each other and are co-resident in each sample household. Note that the definition of couples in this analysis includes both women and men who report themselves as currently married and those who are currently cohabiting with each other as if married. Accordingly, in this paper the term 'husband' and 'wife' includes cohabiting partners.

The analysis of IPV data further restricts the sample in two ways: a) IPV questions are typically asked only in a subsample of DHS households; and, in this subsample, in keeping with the ethical guidelines provided by the World Health Organization on the conduct of domestic violence research (World Health Organization 2001), only one randomly selected eligible woman per household receives the violence module. The selection of the woman for the domestic violence module of questions is done using the Kish grid (Kish 1949). The purpose of this further subsampling within households is to maintain confidentiality and ensure respondents' security when answering the questions on the experience of domestic violence; and b) As an added ethical precaution, the interviewer is required to discontinue the interview if privacy cannot be maintained during the implementation of the violence module. Special domestic violence weights are used to make the data on violence nationally representative and to account

for nonresponse.[1] The resulting weighted sample sizes for matched couples are shown in the last row of Table 1 and range from 1,018 in Kenya and 1,039 in Haiti to 3,946 in the Dominican Republic and 28,904 in India.

The variables in the analysis are described below and percentages/percent distributions for all variables are provided in Table 1.

Dependent variable

The dependent variable for the analysis, women's STI status in the 12 months preceding the survey, is based on a combination of questions to determine if the woman had a sexually transmitted disease (STD) or infection in the past year. This combination, which is similar in all six countries, includes a direct question (*In the past 12 months, have you had a sexually-transmitted disease?)* as well as the two questions on STI symptoms (*In the past 12 months have you had a genital sore or ulcer?* and *In the past 12 months have you had an unusual discharge from your vagina?).* If women said yes to one or more of these questions they are counted as having had an STD/STI symptom in the past 12 months.

The percentage of currently married women who self-report an STD/STI symptom varies from only 4-5% in Kenya and Zambia to 22-23% in the Dominican Republic and Haiti and 36% in Liberia. Given the sensitivity of the questions on STIs and the potential for inaccuracies (both of under and over-reporting) in self-reports for any disease, the prevalence rates are of less interest here than the association of these rates with explanatory variables as well as the consistency across countries.

Key independent variables

Women's IPV status: Women's IPV status is determined by asking married women the following set of questions which comprises a modified and greatly shortened conflict tactics scale used by Strauss (1990). Although the questions may vary slightly, in most countries, each respondent is asked if her husband ever did any of the following:

a) Push you, shake you, or throw something at you?

b) Slap you or twist your arm?

[1]For sample and weighting details see the national level reports available from Macro International, Calverton, Maryland or download information from www.measuredhs.com. The analysis in this paper uses the domestic violence sample weights for all countries except Bolivia where the women's weights are used and Bangladesh where the men's weights are used.

c) Punch you with his fist or with something that could hurt you?

d) Kick you or drag you?

e) Try to strangle you or burn you?

f) Threaten you with a knife, gun, or other type of weapon?

g) Attack you with a knife, gun, or other type of weapon?

h) Physically force you to have sexual intercourse even when you did not want to?

i) Force you to perform types of other sexual acts you did not want to?

Women could answer 'yes' or 'no' to each item; when the answer was a 'yes', women were asked about the frequency of the act in the 12 months preceding the survey. If a woman said 'yes' to one or more of these items she is considered as having experienced IPV ever in her current relationship; and, if she says that the violence occurred in the 12 months preceding the interview, she is considered as having experienced recent violence. Items (a)-(g) are counted as acts of physical violence and items (h)-(i), acts of sexual violence. Physical and/or sexual violence in the 12 months preceding the survey is one of the key explanatory variables of interest in this analysis.

Table 1 about here.

Husband's STI status: The husband's STD/STI symptom status is determined in the same way as the STD/STI symptom status of the wife described above. Husbands are also asked a direct question on whether they have had a STD in the past 12 months, followed by questions on genital sores or ulcers and a bad smelling unusual discharge. If the respondent answers yes to one or more of these questions he is counted as having had a STD/STI symptom in the past 12 months.

In all six countries, the proportion of couples in which the husband has physically and/or sexually assaulted his wife in the 12 months preceding the survey ranges from a low of 12% in the Dominican Republic and 16% in Haiti to 36% in Liberia and 43% in Zambia. A possible pathway for the IPV-STI association is through sexual violence, since such violence has the potential to increase the possibility of acquiring the partner's infection, if any. The proportion of married women who experience sexual violence ranges from a low of 3% in the Dominican Republic to 11-12% in Haiti and Kenya and 15% in Zambia. In all countries except Haiti, the majority of women who experience sexual violence also experience physical violence. Notably, however, in all six countries, women are more likely to experience physical IPV than sexual IPV.

Other individual-level risk factors

The analysis examines the link between women's STI status and several other risk factors. The individual-level risk factors included are:

Age at first sex: Both women and men were asked the age at which they first had sex. In this analysis, this continuous variable measured in years is grouped for both husband and wife into three categories: Age at first sex is 15 years or lower; age at first sex is 16 or 17 years; and age at first sex is 18 years or higher. In the very limited number of cases where the information on age at first sex is inconsistent or missing, the age at first marriage is used as a proxy for age at first sex. Literature suggests that the lower the age at first sex the greater the number of lifetime sexual partners. Further, in combination with current age, age at first sex also proxies the length of exposure to the risk of sexually transmitted diseases.

In all countries except India, at least one in three married women first had sex before age 16, including Liberia, where more than half first had sex before age 16. In India, where age at first sex for women typically occurs within marriage and age at marriage is slowly rising, one in four married women had sexual intercourse before age 16. The pattern of age at first sex for married men is quite different from the pattern for women in all countries. Notably, a higher proportion of men in the Dominican Republic and Haiti, had sex before age 16 than the proportion who first had sex at 17-18 or after 18. In India, 85% of married men had sex only at age 18 or higher.

Other sexual partners: In each country, women and men who have had sexual intercourse in the past 12 months are asked questions about their other sexual partners in the past 12 months and their relationship with these partners. For this analysis, the variable 'other sexual partners' identifies women/men who have had one or more sexual partner in the past year who was not a spouse or cohabiting partner. Notably, polygamous men who report sex with only wives are not categorized as having more than one partner. This is appropriate since the analysis also includes a separate variable on husbands' number of wives. Having multiple sexual partners is a major STI risk factor.

As expected, few women report having sexual partners other than their husband in the past 12 months (from 0.1% in India to 2% in Haiti and the Dominican Republic, with Liberia being the outlier at 6%). By contrast, men are much more likely than women to report an extramarital partner in the past 12 months (from a low of 1% in India to 20-25% in Haiti,

Liberia, and the Dominican Republic).

Husband has other wives: In all countries except the Dominican Republic, men were asked how many wives/cohabiting partners they had and women were asked if their husbands had any other wives. In this analysis, the responses of husbands rather than wives are used on the assumption that husbands' information would be more accurate. Nonetheless, it is notable that the responses to this question of husbands and wives are not necessarily the same. This variable is defined as two-category variable: men who have only one wife and men who have more than one wife. This variable, which also contributes to an understanding of the multiple sex partners-STI relationship, is analyzed separately from the variable defined above, in order to better understand whether the risk associated with having multiple partners varies by the type of partner. In four of the five countries for which information on husbands' other wives is available, about one in ten men report being polygamous. The corresponding proportion in India is 1%, however.

Alcohol consumption: The literature suggests that alcohol consumption is an important correlate of sexually risky behaviors for both women and men. In the DHS surveys included in this analysis, women were asked about their alcohol consumption in all six countries and men were asked about their alcohol consumption in all countries except Liberia and Zambia. As a consequence, for Liberia and Zambia, information available from women on their husbands' alcohol consumption is used as a proxy.

Women are much less likely than men to consume alcohol. Alcohol consumption among women is 12% or less in all countries except the Dominican Republic, where 70% of women consume alcohol. By contrast, 36-50% of men consume alcohol in all countries except the Dominican Republic, where 89% consume alcohol.

Attitude toward a wife's right to refuse her husband sex if he has an STD: Gender attitudes and roles have been identified as important for women's ability to protect themselves against sexually transmitted infections and, in fact, violence (Hindin, Kishor and Ansara, 2008). In order to measure gender-role attitudes, the DHS has a series of questions that present scenarios and ask whether certain types of behaviors by a husband or wife, as the case may be, are justified. One such question asks women and men if they think that a wife is justified in refusing to have sex with her husband 'if she knows he has an STD'. In this analysis, women and men are each categorized into two groups according to whether they said yes a wife is justified in

refusing to have sex with her husband if he has an STD or not.

Most women and men in all countries agree with a wife's right to refuse her husband sex. Among women this proportion ranges from 68% in Liberia to 97% in the Dominican Republic; among men it varies less ranging from 81% in Haiti to 96% in Kenya. Notably, wives are less likely than husbands to have this gender-egalitarian attitude in all countries except the two Caribbean countries.

Couple-related risk factors

Two risk factors specific to couples are also included in the analysis:

Number of times married: Information on prior marriages complements information on other current sexual partners and polygamy, and provides information on other sources of STI infection exposure. To fully capture and calibrate the effects of multiple marriages and minimize collinearity with other variables included in this analysis, a variable was created which combines the information for wives and husbands into four categories: Both wife and husband married only once, only husband married more than once, only wife married more than once, and both married more than once.

In all countries except the Dominican Republic, the majority of couples are those in which neither has been married more than once. Further, in most countries women are much less likely than men to have been married more than once. The proportion of couples where both wife and husband have been married more than once ranges from only 1% in India and 3% in Kenya to 10-21% in the Caribbean countries.

Spousal age difference: A large spousal age difference can have the effect of disempowering the younger spouse. Further, a correlate of a large spousal age difference is that the older spouse is likely to have been sexually active long before entering the current relationship. Consequently, a large spousal age difference also complements other information on STI risk associated with partners' other higher-risk behaviors. In this analysis, spousal age difference is calculated by subtracting the wife's age from her husband's age and divided into six categories: husband younger than wife; both husband and wife the same age; and husband older by: 1-4 years, 5-9 years, 10-14 years, and 15 or more years.

As expected, the majority of women are younger than their husbands. Surprisingly, the proportion of women married to men at least 10 years older than them is fairly similar in all countries (16-21%). Notably, few women are either the same age or older than their husbands in

India, Kenya, and Zambia; this group, however, accounts for 16-20% of couples in the remaining three countries.

Control variables

The control variables included in the analysis can be divided into those that describe individual characteristics and those that describe household characteristics:

Individual characteristics: These include age in years of both wife (in four categories, 15-19; 20-29; 30-39; 40-49) and husband (15-24; 25-34; 35-44; 45+); education level of both wife and husband (None, primary, and secondary or higher), and number of children (0; 1-2; 3-4; and 5+).

In general, the sample of women is somewhat older in the two Caribbean countries than in the other two, since ages at marriage are higher there. Educational attainment of women is particularly low in Haiti and Liberia, where only 22% and 16% of women, respectively, have any education beyond the primary level and relatively high in the Dominican Republic, where 48% of women have at least some secondary education or more. By contrast, educational attainment among men is highest in India, followed by Liberia, and least in Haiti. Finally, few couples in the sample have no children (5-9%). Thirty percent or more couples have five or more children in four of the six countries; in India and the Dominican Republic, by contrast, the proportion with five or more children is 18% and 15%.

Household characteristics: Area of residence and household wealth are the two household-level controls included in the analysis. The wealth status of the household is determined using a widely accepted wealth index constructed separately for each country. The wealth index uses data on household ownership of specified assets, including ownership of specific consumer items such as televisions, bicycles, cars, etc. and dwelling characteristics such as source of drinking water, sanitation facilities, and type of flooring material. Each asset/characteristic is assigned a weight generated through principal components analysis. The resulting asset scores are standardized in relation to a normal distribution with a mean of 0 and a standard deviation of 1. Each household is then assigned a score for each asset, and the scores are summed for each household. Individuals are ranked according to the score of the household in which they were interviewed. Within each country the sample is then divided into quintiles from one (lowest) to five (highest). This wealth index is consistent with expenditure and income measures and has been validated in a large number of countries (Rutstein and Johnson 2004).

Notably, by definition, the wealth index which is a relative measure of wealth status specific to every country, cannot be used to make poverty comparisons across countries.

The Dominican Republic is the most urbanized of all countries in the analysis, and Kenya the least. In the remaining countries about one-third of the couples are in urban areas.

Two variables that could potentially have been included in this analysis but were not are life-time number of partners and some measure of condom use. The former was not included because the analysis already includes for both husbands and wives their number of marriages and number of other recent sexual partners, and number of wives for husbands. Condom use was not included because of the potential for reverse causality in a sample of couples where the dependent variable is women having a STD/STI symptom and a key independent variable is husband's STD/STI symptom status. A couple could be using a condom because of the existing infection.

Methods

This paper uses bivariate and multivariate regression techniques to explore the relationship of the wife's self-reported STD/STI symptom status in the past 12 months with spousal IPV in the past 12 months and the husband's self-reported STD/STI symptom status in the same period. For bivariate analyses, chi-square tests are conducted to determine differences between the groups being compared and the associated p-values are presented. For multivariate logistic regression analyses, the odds ratios are shown. All analyses take into account the complex survey design of the DHS by incorporating sampling weights.

Several logistic regressions were run to explore the effects of all of the different elements of the conceptual model represented in the figure above and the proposed hypotheses guiding this paper. Specifically the regressions were:

Model 0A: The unadjusted association of spousal IPV in the past 12 months with women's STD/STI symptom status in the past 12 months

Model 0B: The unadjusted association of husbands STD/STI symptom status in the past 12 months with women's STD/STI status in the past 12 months

Model 1: This model adds women's individual characteristics (age, education, number of children) and household characteristics (area of residence and wealth quintile) to Model 0A.

Model 2: This model adds variables measuring women's higher-risk behaviors (age at first sex, other sexual partner, alcohol consumption, and attitude toward a wife refusing her

husband sex) to Model 1.

Model 3: This model adds husband's characteristics (age and education) and couple level higher-risk behaviors (number of times married and spousal age difference) to Model 2.

Model 4: This model adds husbands STD/STI symptom status to Model 3.

Model 5: This model is the full model and adds to Model 4 husband's higher-risk behavior variables (age at first sex, other sexual partners, number of wives, alcohol consumption and attitudes toward a wife refusing her husband sex).

IV. RESULTS

Bivariate analysis

Table 2 provides the results of the bivariate analysis and shows that, at the bivariate level at least, women's STD/STI status varies significantly only inconsistently across countries. The only exceptions are women's experience of spousal IPV and the husband's STD/STI symptom status.

Table 2 about here.

The percentage of women who report a STD/STI symptom is significantly higher (at least twice as high in three countries and more than one and a half times as high in two countries) in every country among women who have experienced spousal physical or sexual violence than women who have not. An examination of women's STD/STI symptom status by type of spousal IPV shows that in all countries the variation is greatest for women who have experienced violence that involves sexual force, i.e., they have either experienced sexual violence only (as in the Dominican Republic and Kenya) or have experienced both spousal sexual and physical violence (as in the other countries).

The percentage of women who report an STD/STI symptom is also higher in every country if the husband reports a recent STD/STI symptom than if he does not; however, the differential is significant in only four of the six countries (the Dominican Republic, India, Liberia and Zambia).

The only other variables by which the percentages of women with a STD/STI symptom vary significantly in three or more countries are wife's age at first marriage, other sexual partners for both wives and husbands, wife's alcohol consumption, number of times married, wife's age, and wife's education. In general, in couples where the spouse or husband has another sexual

partner, a higher proportion of women report a STD/STI symptom. The exceptions are the two countries where no STD/STI symptom case was found in the very small proportion of women who have other sexual partners (Haiti and Zambia). Similarly, in most countries, the percentage of women reporting an STD/STI symptom is similar or higher among women who themselves consume alcohol or whose husbands do so.

Notably, however, the direction of variation is not always consistent with the hypothesized relationship for several of the variables. For example, the percentage of women who report a STD/STI symptom is not consistently lower for women with a higher age at first sex (18+ years) than women who first had sex at ages below 16 or at 16-17: the relationship is in the predicted direction only in the Dominican Republic, India, and Zambia. The percentage of women who report a STD/STI symptom is also consistently lower for couples in which neither husband nor wife have been married more than once in all countries except in Haiti.

In the majority of countries, the percentage of women who report an STD/STI symptom tends to decline with women's and husband's age. Surprisingly, in most countries, the percentage of women who report and STD/STI symptom increases with women's and husband's education. There is no consistent relationship of the dependent variable with the other explanatory variables.

Three conclusions emerge from the bivariate analysis: a) the proportion of women with a STD/STI symptom varies as predicted with the key independent variables, particularly spousal IPV; b) not all sexual or other risk factors bear a consistent or predicted association with women's STD/STI status, and c) variables measuring women's own characteristics tend to be more consistently related to women's STD/STI status than other variables.

Multivariate analysis results

As mentioned above, a sequence of six logistic regressions were run to identify the factors that have a net effect on the likelihood of a woman reporting a STD/STI symptom in the 12 months preceding the survey and to see how the effects of the key variables change with the addition of other groups of explanatory variables. Table 3 shows how the odds ratios (OR) for the two key variables—spousal IPV and husband's STD/STI symptom status—change as blocks of explanatory and control variables are added in the modeling sequence described above. Table 4 shows the odds ratios for the full model for all variables included in the regression.

Table 3 about here.

Net association of women's STD/STI symptom status with recent spousal IPV: In keeping with bivariate results, the unadjusted OR shows a significant net association of IPV and the dependent variable in all countries. In this model (Model 0A), the odds that a woman who has experienced spousal IPV in the past 12 months will report a STD/STI symptom, are at least twice those for a woman who has not experienced spousal IPV. In Liberia the OR at 1.41 is lower than in than in any of the other six countries (OR=1.41), although the relationship is highly significant.

When the women's own and her household's characteristics are added to the equation (Model 1), the OR values decline in all countries except Haiti (where it remains unchanged), but, nonetheless, remain highly significant in virtually all countries. When women's own higher-risk behaviors are added to the regression, the decline in the OR value remains marginal and the significance is virtually unchanged in the Dominican Republic (OR=2.15 vs.2.32 in Model 0A), India (OR=2.07 vs. 2.29 in Model 0A), and Zambia (OR=2.47 vs. 2.59 in Model 0A). In Haiti (OR=1.93 vs. 2.00 in Model 0A) and Liberia (OR=1.36 vs. 1.41 in Model 0A) the marginal decline in the OR is accompanied by a decline in the level of significance. In Kenya alone, the addition of variables capturing women's higher-risk behaviors, reduce the level of significance of the STD/STI symptom-IPV relationship to a marginal level ($p<0.10$). Nonetheless, the data show very clearly that in all six countries, IPV has a positive significant (if only marginally so in the case of Kenya) association with women's likelihood of having a STD/STI symptom *net* of women's own and household characteristics and their higher-risk behaviors.

The addition to the husband's and couple characteristics (Model 3) does not have much of an effect on the ORs which decline somewhat in four countries, but rise slightly in Kenya and Zambia, with no decline in any country in the level of significance. Surprisingly, the addition of husband's STD/STI symptom status (Model 4) and higher-risk behavior variables (Model 5) also do not substantially alter either the odds ratios or the level of significance for the effect of spousal IPV. Even in the full model, the odds ratios for a woman reporting a STD/STI symptom if she has experienced spousal IPV are above 2.00 in the Dominican Republic, India, Kenya, and Zambia, and are 1.84 in Haiti and 1.36 in Liberia; and the association remains strongly significant in all countries, except Kenya where it is marginally significant.

Net association of women's STD/STI symptom status with husband's STD/STI symptom status in the past 12 months: The husband's STD/STI symptom status is included in Model 0B

and Models 4 and 5. The husband's STD/STI symptom status has a net positive association with the wife's STD/STI symptom status in only four of the six countries, namely the Dominican Republic, India, Liberia, and Zambia in all regression models. The addition of husband-related variables to the equations does not change the ORs substantially. Between Model 0B and Model 5, the ORs decline from 1.82 to 1.56 in India; from 1.65 to 1.61 in Liberia; and from 3.13 to 2.51 in Zambia, but increase in the Dominican Republic from OR=2.32 to 2.40. In all four countries where husband's STD/STI symptom status was significant in Model 0B, it is also strongly significant in the full model.

Net associations of women's STD/STI symptom status with each of the other variables in Model 5: The results discussed in this section are all from the full model (Model 5) and are shown in Table 4.

Table 4 about here.

Age at first sex: The only country where women's age at first sex has the predicted negative association with a women's STD/STI symptom status is Zambia (OR for age at first sex <16 is 2.15 vs. 1.00 for age at first sex 18+). In Haiti, women's age at first sex bears a non-linear relationship with women's STD/STI symptom status and in Liberia it bears a significantly positive association (OR for age at first sex <16 is 0.61 vs. 1.00 for age at first sex 18+).

Husbands' age at first sex is significantly associated with women's STD/STI symptom status in only one country, namely the Dominican Republic, where the relationship is negative as predicted.

Other sex partners: Surprisingly, husband's other sex partners has no significant association with a wife's likelihood of reporting a STD/STI symptom. However, in four of the six countries the odds of women having a STD/STI symptom if they have one or more sex partners other than their husband are much higher (ORs range from 1.66 in the Dominican Republic ($p<0.10$) to 9.97 in Kenya). The regression coefficients were not meaningful for this variable in Haiti and Zambia, since almost no women who had other sex partners reported a STD/STI symptom.

Husband has other wives: This variable is significantly related to women's STD/STI symptom status in only three of the five countries for which it is available; and is associated positively with women's STD/STI symptom status in only one of these countries (Zambia). In India and Kenya, contrary to expectations, the odds of a woman having a STD/STI symptom are lower if her husband has other wives.

Alcohol consumption: Husband's drinking of alcohol significantly increases the likelihood of a woman having a STD/STI symptom in Zambia, but lowers it in India; women's alcohol consumption is significantly associated with the dependent variable in two countries, the Dominican Republic and Kenya, and in both, the association is positive as predicted.

Attitudes toward a wife refusing a husband sex: In general, gender-role attitudes regarding a wife's refusal of sex to her husband are unrelated to a woman's likelihood of having a STD/STI symptom in most countries. Women's agreement with a wife's right to refuse her husband sex is significantly associated with the dependent variable only in the Dominican Republic and India, and men's agreement is significantly associated with the dependent variable only in Liberia. However, in India, a gender-egalitarian attitude among women is positively associated with a woman's likelihood of having a STD/STI symptom, as is men's gender-egalitarian attitude in Liberia. Only in the Dominican Republic is the likelihood of women having a STD/STI symptom lower if women have gender-egalitarian attitudes.

Number of times married: This variable defined at the couple level, bears a significant association with a woman's likelihood of having a STD/STI symptom in four of the six countries. Compared with couples where neither husband nor wife have been married more than once, women have higher odds of having a STD/STI symptom if the wife has been married more than once (OR=1.23) or if both wife and husband have been married more than once (OR=2.11); in Liberia, women have higher odds of having a STD/STI symptom only if the wife has been married more than once (OR=1.39); and in Zambia women have higher odds of having a STD/STI symptom only if both husband and wife have been married more than once (OR=1.74). However, in Haiti, women have lower odds of having a STD/STI symptom if the wife has been married more than once.

Spousal age difference: The relationship of this variable is significant in three countries, with no consistent pattern in the estimated relationship. Compared with couples where the husband is 15 or more years older, the likelihood of a woman having a STD/STI symptom is: lower for couples where both husband and wife are of the same age in the Dominican Republic (OR=0.59); lower in Haiti for couples where the husband is 5-9 years older than the wife (OR=0.46); and higher in India for couple where the husband is younger than the wife (OR=1.54).

Wife's characteristics: In general, women's characteristics do not bear a consistent relationship with a woman's likelihood of having a STD/STI symptom across countries. Wife's age has a

significant association with the dependent variable in four countries: in the Dominican Republic, women age 20-29 have the lowest likelihood of reporting a STD/STI; in India, the odds are significantly higher for women in all age groups, compared with the reference group (women age 40-49); in Liberia and Zambia, the relationship with age is non-linear, with women in the middle age groups having a higher likelihood of reporting a STD/STI symptom than the oldest women.

Although the wife's education is significantly associated with the likelihood of women having a STD/STI symptom in all countries, the relationship is negative only in Haiti and India. In the Dominican Republic and Liberia, it is non-linear with the likelihood being highest for women with only primary education. In Kenya and Zambia, it is women with secondary or higher education who have the highest odds of having a STD/STI symptom.

The odds of having a STD/STI symptom are highest for women who have five or more children in the Dominican Republic and India; however, in Liberia they are, in general, lower for women with children than with no children for women.

Husband's characteristics: Husband's age is most consistently associated with a wife's risk of having a STD/STI symptom in only the Dominican Republic where, compared with the oldest men, the odds increase as age declines. The relationship is also significant in Zambia, where the odds are significantly lowerof the wife having a STD/STI symptom only if the husband is age 15-19.

Surprisingly, husband's education is significantly associated with the dependent variable in only India where the odds of a woman having a STD/STI symptom are higher the lower is the husband's level of education.

Household characteristics: Women's likelihood of having a STD/STI symptom does not vary by area of residence in any country except Liberia, where women living in urban areas have lower odds of having a STD/STI symptom.

Wealth is also significantly associated with the dependent variable in only two of the six countries, India and Liberia. In India, compared with women in the lowest wealth quintile, women in other quintiles all have lower odds of having a STD/STI symptom. In Liberia, by contrast, the relationship of the dependent variable with wealth tends to be positive: women in the top three quintiles have higher odds of having a STD/STI symptom than women in the lowest wealth quintile.

Additional analysis of the relationship between IPV and women's STD/STI status

Given the clear importance of the IPV-STI relationship, two variants of Models 0A and Model 5 were run which included the four-category variable for spousal IPV in the past 12 months (no physical and sexual violence; physical violence only; sexual violence only; and both physical and sexual violence). This was done to examine which of the different types of spousal IPV is most consistently associated with a woman's likelihood of having a STD/STI symptom. The results of the two regressions are given in Table 5 for the IPV variable alone.

Table 5 about here.

In all countries, the relationships observed in Model 0A are also observed in the full model. In the full model, compared with women who have not experienced any IPV, the odds of having a STD/STI symptom are highest in the Dominican Republic for women who have experienced only sexual violence, followed by those who have experienced both physical and sexual violence and finally by those who have experienced only physical violence. In Haiti and Zambia, the odds are highest for women who have experienced both physical and sexual violence, followed by those who have experienced only physical violence. Women in Haiti and Zambia who have experienced only sexual violence are not different in this respect from women who have experienced neither physical nor sexual violence. In India, women who have experienced both physical and sexual violence have the highest odds of having a STD/STI symptom, followed by women who have experienced only sexual violence and then women who have experienced only physical violence. In Kenya, only women who have experienced sexual violence alone are significantly more likely to have a STD/STI symptom than women who have not experienced spousal IPV. In Liberia by contrast, the odds of having an STD/STI symptom are highest for women who have experienced both physical and sexual IPV, followed by women who have experienced only physical IPV. Contrary to expectations, women who have experienced only sexual IPV have lower odds in Liberia of reporting a STD/STI symptom than women who have not experienced any spousal IPV.

V. DISCUSSION AND CONCLUSIONS

This paper began with a conceptual model and three hypotheses about the relationship between women's risk of STIs and IPV.

- The first hypothesis was simply that women's risk of STIs and their experience of IPV

are positively associated. This hypothesis is fully supported in all six countries included in this paper. No other variable in the analysis was so consistently related to a woman's risk of STIs as women's experience of IPV.

- The second hypothesis was that higher-risk sexual behaviors will explain a part of the positive STI-IPV association. This hypothesis is also upheld. However, in most countries, the vast number of variables included in the analysis to capture higher-risk behaviors and attitudes, as well as other relevant control variables such as education and wealth, are able to reduce the odds ratios in all countries by only 15% or less. In five of the six countries, even in the full model, the relationship of IPV and women's risk of STIs remains significantly robust. In Kenya alone, the relationship becomes marginally significant in the full model. In the additional analysis done to explore the types of violence most closely associated with women's STI risk, however, even in Kenya, women who have experienced spousal sexual violence are found to be significantly more likely to have a STD/STI symptom than women who have experienced neither physical nor sexual spousal violence.
- The third hypothesis was that IPV has a positive association with women's risk of STIs that net of women's and men's higher-risk attitudes and behaviors. This hypothesis, which is a rider of the second hypothesis, is also strongly upheld as is obvious from the fact that the effect of IPV remains significant for all countries in the full model.

As expected in most countries the form of violence most closely associated with the risk of women having a STI is sexual violence, either on its own or in combination with physical violence. Notably, women who experience both types of violence are at a particular disadvantage with regard to STI risk in four of the six countries.

The analysis in this paper also yielded at least two surprises: the first was the total lack of consistency in the relationship of all variables other than IPV with a woman's risk of STIs. None of the eight variables measuring sexual risk, including the husband's STD/STI symptom status was consistently associated with the dependent variable in all six countries or even significantly related in all six countries. Even when significant, the relationship was often counter intuitive. The second surprise was that few of the husband's behaviors or characteristics had any significant association with women's STI risk. Contrary to expectations, if and when significant, it was largely women's own behaviors and characteristics that were found to be most relevant to

their risk of having a STI. One possible explanation for the weakness and inconsistency of the effect of known risk factors on women's likelihood of having a STI is that higher risk behaviors are being under-reported. Nonetheless, this potential data inadequacy alone is unlikely to explain the associations found in this analysis.

The implication of the consistent, robust, and positive IPV-STI relationship in all six countries found in this paper is that we still need to determine why this relationship exists. Most of the literature explains this relationship in terms of the experience of IPV promoting higher-risk sexual behaviors among women and that perpetrators of IPV are typically more likely than those who do not perpetrate IPV to engage in other risky behaviors. However, the analysis in this paper clearly shows that IPV has an association with women's risk of STIs, net of all of the various risk factors identified in the literature as correlates of either the experience of IPV or the perpetration of IPV. An obvious explanation which could be put forward is that women who experience IPV systematically over-report having a STD or STI symptom. This is however unlikely to be the case given a) the much more likely possibility of a some women over and other women under reporting STIs, b) the consistency of the IPV-STI relationship across countries that vary greatly in terms of cultural contexts, women's level of education, and wealth, and c) the fact that women's reports of STD/STI symptoms were not found to vary consistently with either husbands' or wives' education or household wealth, even though it is expected that more educated and wealthier couples would have better knowledge of STIs and recognition of their symptoms.

More likely explanations which need further research include:

- IPV increases women's risk of STIs because it disempowers women in intimate relationships in ways that prevent them from either having the will or the ability to protect themselves effectively or even at all.
- In addition to the direct disempowerment resulting from the violence itself, is the effect of fear of potential violence and consequences on women's behavior and choices. Choices made in an environment of fear may not necessarily be the most rational from the perspective of desired health behaviors and outcomes.
- Gender regimes in most countries make it less likely that women, both absolutely and compared with men, will seek care for a STI, particularly if they experience or live in fear of violence. Consequently, for many wives STI symptoms of infection may persist long

after the husband's infection has been cured through the care he sought.

- The finding that sexual violence alone or jointly in conjunction with physical violence is most strongly associated with women's risk of STIs suggests that there may also be a biological explanation: force used for and during sexual intercourse may put women at greater risk of transmission in the face of infection.

In conclusion this paper provides unequivocal support for the strong positive association of IPV with a women's risk of having sexually transmitted infections. Further, it suggests that to reduce women's risk of infection, programs and policies need to acknowledge IPV as a risk factor which is at least on par with other recognized risk factors, such as multiple sexual partners and unprotected sexual intercourse.

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Table 1: Descriptives by country of couples included in the analysis: selected countries.

	Dominican Republic	Haiti	India	Kenya	Liberia	Zambia
DEPENDENT VARIABLE						
Wife's STD/STI symptom status in past 12 months (%)						
Wives who had STD/STI symptom	23.2	22.0	9.7	3.5	36.0	4.9
KEY INDEPENDENT VARIABLES						
Wife's experience of spousal violence in the past 12 months (%)						
Has experienced physical or sexual violence	11.9	16.9	23.2	29.2	36.1	42.8
Only physical violence	8.7	5.7	17.4	17.1	27.2	27.5
Only sexual violence	0.7	6.9	1.9	4.2	3.4	4.0
Both physical and sexual violence	2.5	4.4	3.9	7.9	5.5	11.3
Husband's STD/STI symptom status in past 12 months (%)						
Husband had STD/STI symptom	2.3	5.8	3.3	2.4	15.8	5.1
OTHER INDIVIDUAL RISK FACTORS						
Age at first sex						
Wife's age at first sex						
Less than 16 years	34.2	33.2	25.7	36.6	52.9	36.5
16-17 years	24.5	21.9	41.2	26.9	33.4	33.0
18+ years	41.3	44.9	33.2	36.4	13.7	30.5
Husband's age at first sex						
Less than 16 years	42.2	46.2	5.4	39.0	18.0	28.9
16-17 years	28.7	20.9	9.8	19.0	32.9	22.4
18+ years	29.1	33.0	84.8	41.9	49.1	48.7
Other sexual partners (%)						
Wife has other sexual partners	1.6	1.7	0.1	1.1	5.6	0.6
Husband has other sexual partners	24.5	20.1	1.1	8.3	24.2	13.6
Husband has other wives (%)	na	9.5	1.3	11.9	10.2	9.6
Alcohol consumption (%)						
Wife drinks alcohol	70.0	8.5	2.4	4.1	2.8	12.3
Husband drinks	89.3	43.1	39.1	35.5	36.5	49.8
Attitude toward a wife's right to refuse husband sex if he has an STD (%)						
Wife agrees that women are justified	96.5	89.0	79.4	87.1	67.7	78.9
Husband agrees that women are justified	95.4	80.9	83.6	95.9	91.8	88.0
COUPLE-RELATED RISK FACTORS						
Number of times married (%)						
Neither married more than once	47.9	50.5	93.4	72.2	53.5	68.2
Husband only married more than once	17.5	17.2	4.9	21.8	16.5	15.5
Wife only married more than once	13.9	11.9	0.8	2.7	18.5	6.5
Both married more than once	20.7	20.3	0.9	3.4	11.6	9.8

Continued...

Table 1 *Continued*

	Dominican Republic	Haiti	India	Kenya	Liberia	Zambia
Spousal age difference (%)						
Husband younger	15.2	13.1	5.0	2.3	11.6	3.6
Both the same age	5.7	5.9	3.6	2.7	4.3	2.8
Husband older: 1-4 years	30.2	31.2	33.7	29.9	32.2	34.5
Husband older: 5-9 years	28.8	30.2	42.0	44.5	31.8	42.2
Husband older: 10-14 years	12.1	12.8	13.2	13.1	14.4	12.9
Husband older: 15+ years	7.9	6.8	2.5	7.4	5.7	3.9
CONTROL VARIABLES						
Age (%)						
Wife's age						
15-19	7.1	2.4	5.9	7.9	6.1	6.6
20-29	29.3	32.0	38.3	42.7	40.6	45.3
30-39	35.7	36.8	36.4	33.6	37.6	32.1
40-49	27.9	28.8	19.3	15.8	15.7	15.9
Husband's age						
15-24	8.4	3.7	7.3	7.6	8.4	8.5
24-34	29.7	30.7	33.9	34.9	34.4	39.7
35-44	32.9	36.8	35.7	36.4	40.5	30.9
45+	29.0	28.8	23.1	21.1	16.7	20.9
Education (%)						
Wife's education						
None	4.1	42.7	46.7	14.1	53.3	12.8
Primary	47.4	35.4	15.2	61.3	30.3	61.7
Secondary or higher	48.4	21.9	38.1	24.6	16.4	25.5
Husband's education						
None	5.1	29.4	24.0	8.8	22.0	5.8
Primary	51.4	42.4	20.6	53.7	27.3	51.9
Secondary or higher	43.5	28.1	55.4	37.4	50.7	42.3
Number of children (%)						
None	7.4	5.0	8.9	6.5	5.1	6.0
1-2	35.8	30.9	40.5	31.9	31.1	28.2
3-4	42.1	26.0	33.1	30.4	30.0	27.9
5 or more	14.7	38.1	17.5	31.2	33.8	37.9
Urban residence (%)	67.8	36.5	33.2	20.0	31.6	33.3
Wealth quintile (%)						
Lowest	18.3	22.2	17.3	19.5	20.8	23.7
Second	22.7	23.0	19.7	18.9	23.6	18.9
Middle	21.8	18.8	21.6	20.6	21.4	19.2
Fourth	19.4	19.6	20.9	20.6	17.6	20.8
Highest	17.8	16.3	20.5	20.5	16.6	17.3
Number of couples (weighted)	3,946	1,039	28,904	1,018	1896	2,401

na: Not available

Table 2 Percentage of currently married women age 15-49 who have had a self-reported STD or symptom of anf STI in the 12 months preceding the survey, according to each variable in the analysis: Selected DHS countries

	Percentage of women who have had a STD/STI symptom in the past year					
	Dominican Republic	Haiti	India	Kenya	Liberia	Zambia
KEY RISK FACTORS						
Experience of spousal IPV	***	***	***	*	***	***
Has not experienced spoual physical or sexual violence in past 12 months (%)	21.1	19.7	7.7	2.6	33.0	3.1
Has experienced in past 12 months, spousal						
Physical or sexual violence (%)	38.4	33.0	16.1	5.7	41.1	7.5
Only physical violence (%)	35.9	32.2	13.9	5.2	41.7	6.2
Only sexual violence (%)	50.0	29.6	17.2	16.3	14.1	4.2
Both physical and sexual violence (%)	43.9	39.1	25.5	1.3	54.3	11.8
Husband's STD status in past 12 months	***		***		***	***
Does not have STD/STI symptom	22.8	21.6	9.5	3.5	34.1	4.5
Had STD/STI symptom	40.4	27.9	16.0	4.0	46.0	13.0
OTHER INDIVIDUAL RISK FACTORS						
Age at first sex						
Wife's age at first sex	*	#	***		***	**
Lesss than 16 years	24.4	19.4	10.9	4.6	32.4	7.0
16-17 years	24.9	27.6	9.7	4.0	38.1	4.0
18+ years	21.1	21.2	8.7	2.2	44.6	3.5
Husband's age at first sex	*		***			
Lesss than 16 years	24.4	22.1	13.5	4.0	32.3	5.3
16-17 years	24.0	21.2	11.8	2.6	34.4	6.1
18+ years	20.6	22.2	9.2	3.5	38.4	4.2
Other sexual partners						
Wife has other sexual partners	***		***	#	***	
No	22.9	22.3	9.7	3.4	34.7	4.9
Yes	41.5	0.0	41.7	18.2	56.6	0.0
Husband has other sexual partners		**			#	#
No	23.2	20.1	9.7	3.3	34.8	4.6
Yes	23.2	29.3	10.9	5.9	39.6	6.8
Husband has other wives						
No	na	21.9	9.7	3.8	36.1	4.7
Yes		22.2	7.3	1.7	34.7	6.9
Alcohol consumption						
Wife drinks	***	#		**		
No	19.5	21.2	9.7	3.2	35.9	4.9
Yes	24.7	29.5	9.9	11.9	35.8	4.8
Husband drinks		*				***
No	21.0	19.4	9.9	3.0	35.7	3.2
Yes	23.4	25.3	9.4	4.4	36.3	6.7
Attiude toward a wife's right to refuse husband sex if he has an STD						
Wife's response	***		#			
No	35.3	16.5	9.1	1.5	34.6	4.0
Yes	22.7	22.7	9.8	3.7	36.6	5.2
Husband's response					*	
No	19.9	18.7	9.9	2.4	26.9	5.9
Yes	23.3	22.7	9.6	3.6	36.8	4.8

Continued...

Table 2 ***Continued***

	Percentage of women who have had a STD/STI symptom in the past year					
	Dominican Republic	Haiti	India	Kenya	Liberia	Zambia
COUPLE-RELATED RISK FACTORS						
Number of times married			***	***		*
Neither married more than once	22.9	23.4	9.5	3.3	33.9	4.3
Husband only married more than once	23.0	20.7	11.3	3.6	35.3	6.7
Wife only married more than once	24.5	16.9	12.3	0.0	40.0	3.2
Both married more than once	23.2	22.7	18.6	8.8	40.0	7.7
Spousal age difference		**	***			
Both the same age	18.6	23.0	9.8	0.0	40.7	7.4
Husband younger	22.1	28.7	14.8	4.2	35.3	9.2
Husband older: <5 years	23.6	26.2	10.3	4.6	33.4	3.6
Husband older: 5-9 years	24.8	14.6	9.0	3.3	39.1	4.9
Husband older: 10-14 years	24.1	20.3	8.4	3.7	32.7	5.8
Husband older: 15+ years	19.2	22.9	9.5	1.3	38.0	7.4
CONTROL VARIABLES						
Age						
Wife's age	***		***		#	
15-19	28.3	20.0	10.4	2.5	33.6	4.4
20-29	23.4	21.6	9.8	4.1	38.3	4.8
30-39	26.3	23.2	10.2	2.3	36.4	6.0
40-49	17.5	21.1	8.2	5.0	29.9	3.7
Husband's age	***		***			
15-24	29.4	25.6	10.4	2.6	39.0	2.9
24-34	25.2	24.5	10.9	3.9	35.6	5.1
35-44	24.6	21.4	9.2	3.2	37.0	5.3
45+	17.8	19.4	8.5	3.3	32.5	5.0
Education						
Wife's education	*		***		*	*
None	17.8	22.3	11.8	1.4	33.3	1.9
Primary	24.7	22.0	10.3	4.0	39.5	5.2
Secondary or higher	22.1	21.1	6.9	3.6	38.1	5.7
Husband's education			***			
None	20.2	18.6	11.1	0.0	35.0	5.1
Primary	22.7	23.6	11.1	4.1	34.4	5.1
Secondary or higher	24.1	23.2	8.5	3.1	37.2	4.6
Number of children			***		*	
None	21.2	26.9	8.8	3.0	48.5	2.8
1-2	24.3	20.2	8.3	3.7	36.8	5.8
3-4	22.7	23.2	9.7	2.3	36.6	3.9
5 or more	22.8	21.9	13.3	4.7	32.5	5.4
Urban residence			***			#
No	23.8	21.7	10.6	3.4	34.7	4.4
Yes	22.9	22.4	7.9	3.9	38.6	6.1
Wealth quintile			***		***	
Lowest	25.9	19.5	13.4	4.5	29.7	4.6
Second	23.4	22.2	11.5	4.7	31.3	3.5
Middle	24.1	21.5	9.8	2.9	37.2	5.2
Fourth	21.5	25.0	7.3	1.4	46.2	5.6
Highest	20.9	25.0	7.1	4.3	38.0	6.3
Number of couples (weighted)	3,946	1,039	28,904	1,018	1,896	2,401

# p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Table 3: Logistic regression results for currently married women having a self-reported STD/STI symptom: Odd ratios for the effects of any spousal physical or sexual violence in the past 12 months and for husband having an STD/STI symptom in the past 12 months.

	Dominican Republic OR	Haiti OR	India OR	Kenya OR	Liberia OR	Zambia OR
Experienced spousal phyiscal or sexual violence in past 12months (Ref. cat.: *No*)						
Yes (Model 0A: IPV, no controls)	2.32***	2.00***	2.29***	2.21*	1.41***	2.59***
Yes (Model 1: IPV+household and women's characteristics)	2.19***	2.01***	2.06***	2.13*	1.37**	2.48***
Yes (Model 2: Model 1+women's higher-risk behaviors)	2.15***	1.93**	2.07***	1.93#	1.36**	2.47***
Yes (Model 3: Model 2+husband's characteristics+couple's characteristics)	2.10***	1.90**	2.05***	1.96#	1.35**	2.56***
Yes (Model 4: Model 3+husband's STI status)	2.13***	1.90**	2.94***	2.01#	1.34**	2.45***
Yes (Model 5: Model 4+ husband's high risk behaviors)	2.14***	1.84**	2.07***	2.08#	1.36**	2.19***
Husband has STI/STI symptom in the past 12 months (Ref. cat.: *No*)						
Yes (Model 0B: Husband's STI status, no controls)	2.32***	1.44	1.82***	1.40	1.65***	3.13***
Yes (Model 4: Model 3+husband's STI status)	2.32***	1.45	1.56***	0.50	1.62***	2.84**
Yes (Model 5: Model 4+ husband's high risk behaviors	2.40***	1.35	1.56***	0.43	1.61**	2.51**

# p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Table 4: Logistic regression results for currently married women having a self-reported STD/STI symptom in the past 12 months: Odds ratios for the full model (Model 5) for couples

	Dominican Republic OR	Haiti OR	India OR	Kenya OR	Liberia OR	Zambia OR
Experienced spousal phyiscal or sexual violence in past 12months			*See Table 3*			
Husband has STD/STI symptom in the past 12 months			*See Table 3*			
Individual risk factors						
Age at first sex (Ref. cat.: For both wife and husband: *18 or more years)*						
Wife's age at first sex						
< 16 years	0.99	0.84	0.94	2.03	0.61 **	2.15 **
16-17 years	1.13	1.66 *	0.93	2.14	0.78	1.14
Husband's age at first sex						
< 16 years	1.21 #	0.89	1.07	0.90	0.78	1.16
16-17 years	1.25 *	0.74	1.01	0.50	0.88	1.40
Sex partners other than wife(wives) in the past 12 months (Ref. cat.: *For both wife and huband: None)*						
Wife had other sex partner(s)	1.66 #	0.07 #	4.84 ***	9.97 *	2.25 ***	0.00
Husband had other sex partner(s)	0.90	1.38	0.98	1.79	1.07	1.11
Husband has other wives (Ref. cat.: *No*)						
Yes	na	1.11	0.52 **	0.17 *	1.01	1.96 *
Alcohol conumption (Ref. cat. *For both wife and husband: Does not drink*)						
Wife drinks	1.28 **	1.28	0.84	5.54 **	0.80	0.65
Husband drinks	1.13	1.23	0.86 ***	0.87	0.98	1.84 **
Attitude toward a wife's right to refuse husband sex if he has an STD (Ref. cat. *For both wife/husband: Disagree*)						
Wife agrees	0.51 ***	1.51	1.12 *	2.14	1.10	1.18
Husband agrees	1.19	1.02	1.09	0.98	1.40 #	0.75
Couple-related risk factors						
Number of times married (Ref. cat.: *Both married only once*)						
Husband only married more than once	1.07	0.70	1.23 *	1.58	0.90	1.36
Wife only married more than once	1.00	0.58 #	1.15	0.33	1.39 *	0.45
Both married more than once	0.98	0.74	2.11 ***	2.72	1.32	1.74 #
Spousal age difference (Ref. cat.: *Husband older by 15 or more years)*						
Husband younger	0.64	1.38	1.54 *	2.41	1.28	2.38
Both the same age	0.59 #	1.14	1.03	0.81	1.55	1.92
Husband older by 0-4 years	0.85	1.00	1.13	3.04	1.08	0.93
Husband older by 5-9 years	1.02	0.46 *	1.00	2.28	1.33	1.08
Husband older 10-14 years	1.14	0.82	0.98	2.95	0.86	1.12

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Table 4: Continued

	Dominican Repbulic OR	Haiti OR	India OR	Kenya OR	Liberia OR	Zambia OR
Wife's characteristics						
Wife's age (*Ref. cat.: 40-49 years*)						
15-19	0.77	1.48	1.48 *	0.72	1.21	3.15
20-29	0.70 #	1.30	1.26 *	0.74	1.82 *	2.51
30-39	1.14	1.22	1.32 **	0.39	1.49 *	2.66 *
Wife's education (Ref. cat.: *None*)						
Primary	1.49 #	0.76	0.98	3.37	1.24 #	2.75 *
Secondary or higher	1.25	0.54 #	0.73 ***	4.95 #	1.05	4.03 **
Number of children (Ref. cat.: *0*)						
1-2	1.44 *	0.66	1.04	1.42	0.62 *	1.36
3-4	1.33	0.71	1.15	0.95	0.60 *	0.84
5 or more	1.53 #	0.82	1.53 ***	2.79	0.53 *	1.27
Husband's characteristics						
Husband's age (Ref. cat.: *45 years or more*)						
15-24	2.89 ***	0.81	1.03	0.59	0.80	0.21 #
25-34	2.09 ***	1.21	1.17	1.55	0.68	0.52
35-44	1.60 **	1.06	0.94	1.40	0.94	0.57
Education of husband (Ref. cat.: None)			#			
Primary	1.14	1.36	1.13 *	(a)	0.89	0.79
Secondary or higher	1.31	1.37	1.10 #	0.69	0.84	0.57
Household characteristics						
Area of residence (Ref. cat.: *Rural*)						
Urban residence	0.97	0.95	0.97	1.26	0.72 *	1.03
Wealth quintile (Ref. cat.: *Lowest*)						
Second	0.88	1.03	0.87 *	0.83	0.99	0.75
Middle	0.94	1.16	0.82 **	0.44	1.46 *	1.24
Fourth	0.86	1.42	0.67 ***	0.35	2.19 ***	1.09
Highest	0.97	1.47	0.82 *	0.72	1.64 *	1.38
Constant	0.71	0.11 **	0.27 ***	0.02	0.86	0.00

(a): No education and primary education were merged for Kenya because of 0 cases for the dependent variable if the husband had no education

na: Not available

# p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Table 5: Logistic regression results for currently married women having a self-reported STD/STI symptom in the past 12 months: Odd ratios for the effects of any spousal physical or sexual violence in the past 12 months by type of spousal IPV in Model 0 and Model 5.

	Dominican Republic OR	Haiti OR	India OR	Kenya OR	Liberia OR	Zambia OR
Model 0A: IPV, no controls						
Experienced spousal phyiscal or sexual violence in past 12months (Ref. cat.: *No*)						
Exeperienced only physical violence	2.09***	1.45**	1.92***	1.95	1.45**	2.11**
Experienced sexual violence only	3.69**	0.34**	2.47***	6.97***	0.34**	1.33
Experienced both physical and sexual violence	2.88***	2.42***	4.07***	0.60	2.42***	4.32***
Model 5: Full model						
Experienced spousal phyiscal or sexual violence in past 12months (Ref. cat.: *No*)						
Exeperienced only physical violence	1.93***	1.72#	1.76***	1.76	1.38**	1.80*
Experienced sexual violence only	3.55**	1.60	2.15***	11.04***	0.37**	1.15
Experienced both physical and sexual violence	2.69***	2.47***	3.57***	0.36	2.53***	3.71***

# p<0.10, * p<0.05, ** p<0.01, *** p<0.001