

## **Social Determinants of HIV Testing among Married Couples in Swaziland**

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### **Abstract:**

Most of HIV infection in Southern and Eastern Africa is attributed to heterosexual transmission in the context of marriage or cohabitation. Although knowing HIV-status could be the first step in practicing appropriate HIV prevention methods within a relationship, uptake of HIV testing has been limited among married couples. Yet few studies have examined predictors of their participation in testing by adopting couple-level perspectives and using population-based survey data. Employing the 2006/07 Swaziland Demographic and Health Survey data, this study aimed to identify social factors associated with uptake of HIV testing among married couples (n=717). A multinomial logistic regression model was used for the analyses. The results suggested that couple's lack of stigma towards and knowledge of people infected by HIV as well as wife's self-efficacy towards negotiation of safer sex were important factors associated with having both spouses tested. Promotion of couple-oriented HIV testing may be more effective through addressing stigma reduction, involvement of HIV-infected people in prevention activities, and enhancement of married women's self-efficacy to engage in safer sex.

### **Introduction:**

Most of HIV infection is attributed to heterosexual transmission through marriage or cohabitation in sub-Saharan African (SSA) countries with generalized HIV/AIDS epidemic. While many HIV-prevention approaches focus on youth and "high-risk" populations, including commercial sex workers and migrant workers, few have targeted married or cohabiting couples who are actually at great risk of HIV infection since many do not know their own or their partner's HIV status. HIV testing and counseling serves as both a critical prevention and treatment method in the control of HIV epidemics (WHO, 2003).

In resource-poor settings, including many SSA countries, voluntary counseling and testing (VCT) has become increasingly available. Acceptance of VCT has been quite low, however, as UNAIDS estimated in 2000 that only 10% of people who are HIV-infected are aware of their positive status (UNAIDS, 2000; CRHCS, 2002). In addition, data from eleven countries in SSA, which represent 19% of the epidemic in the region, suggested that the median percentage of respondents who had ever received an HIV test and its result was 9.5% among women and 7.9% among men between 2005 and 2007 (WHO/UNAIDS/UNICEF, 2008). At the same time, a high proportion of sero-discordant couples where one partner is HIV positive and the other negative is estimated in SSA (de Walque, 2007). In some settings, it is estimated that 60-94% of new heterosexually acquired infections occur within marriage or cohabitation (Dunkle et al., 2008). It is urgent for the public health sector to understand factors associated

with uptake of HIV testing among couples in order to effectively prevent transmission of HIV among those at risk.

Given the high prevalence of new HIV infection among couples and high estimated percentage of sero-discordant couples in SSA, it is crucial to identify knowledge about HIV status and sexual behavior among married or cohabiting couples rather than at the individual level as has been a primary focus in the past. While the majority of studies on VCT uptake examine individual motivation to test HIV status, there are few studies conducted among couples. It is reported that barriers against HIV testing are often different between women and men (Allen et al., 2007; Kranzer, 2008; Maman et al., 2001; Wringe et al., 2008). But, it is less clear how these diverse barriers affect uptake of HIV testing among couples through social and economic norms as well as gender-based power dynamics within their relationships. Focusing on Swaziland, which has the highest reported HIV prevalence at 26% in 2007, the study addresses the gap in our knowledge of couple-oriented factors associated with uptake of HIV testing (UNAIDS, 2008).

### **Context: HIV epidemic and testing among couples in Swaziland**

Swaziland has the highest reported HIV prevalence in the world with 26% adults aged 15-49 years living with HIV/AIDS in 2007 (UNAIDS, 2008). Since the first HIV infection was officially announced in 1986, the Swazi government has led and coordinated various multi-sectoral approaches to respond to HIV/AIDS epidemic in the country. Although Swazi people have high awareness of their potential susceptibility to and seriousness of the disease, only about 50% of adults correctly understand HIV/AIDS and means of its transmission (Central Statistical Office (CSO) [Swaziland] & Macro International Inc., 2008). In addition, uptake of HIV testing is rather low with only 36% of women and 17% of men having ever gone for HIV testing and received the results. Among married couples, 43% of women and 30% of men knew their HIV status while only 19% of couples had both spouses received HIV testing (Central Statistical Office (CSO) [Swaziland] & Macro International Inc., 2008). Swaziland is, however, one of the countries which included VCT in their national HIV/AIDS policy documents and made VCT implementation plans guided by international lessons learned in pilot and research projects (CRHCS, 2002). Other neighboring countries in the region with similarly high HIV prevalence indicate less prevalence of HIV testing uptake among married couples. For example, in Lesotho with 24% of the population aged 15-49 HIV positive, 11% of married women and 12% of married men have taken HIV testing while only 3% of both husband and wife know their HIV status. Zimbabwe with 18% of adults living HIV positive suggests that 7% of married couples have received an HIV test while there are 13% of couples which both husband and wife know their HIV status in Zambia with 16% of HIV prevalence among adults (NERCHA, GHAP/WB & UNAIDS, 2009; Ministry of Health and Social Welfare

(MoHSW) Lesotho, Bureau of Statistics (BOS) Lesotho & ORC Macro., 2005; National Statistical Office (NSO) [Malawi] & ORC Macro., 2005; Central Statistical Office (CSO), Ministry of Health (MoH), Tropical Diseases Research Center (TDRC), University of Zambia & Macro International Inc., 2009; Central Statistical Office (CSO) [Zimbabwe] & Macro International Inc., 2007). In order for prevention efforts to be most effective, it is important to identify factors associated with both husband and wife in married couples knowing their HIV status. Examining conditions in Swaziland, the results could suggest possible applications to the neighboring countries.

### **Objectives:**

Reflecting on current challenges in preventing couples' HIV infection, the objective of the study is to examine social factors associated with HIV testing among married<sup>1)</sup> couples in Swaziland. Results can contribute to development of strategies for increasing uptake of HIV testing and counseling among couples in Swaziland.

To meet the objective, the study answered the following question by testing four hypotheses:

1. What social and economic factors are associated with HIV testing uptake among married couples?

Hypothesis 1-1: When both husband and wife have comprehensive knowledge about HIV/AIDS and means of its transmission, the couple is more likely than a couple in which neither spouse has comprehensive knowledge to go for HIV testing.

Hypothesis 1-2: When both husband and wife report lack of stigma towards people living with HIV/AIDS (PLWHA), the couple is more likely than a couple in which both spouses report stigma to go for HIV testing.

Hypothesis 1-3: When both husband and wife have known PLWHA, the couple is more likely than a couple in which neither spouse has known PLWHA to go for HIV testing.

Hypothesis 1-4: When a wife shows high self-efficacy toward negotiating safe sex, the couple is more likely than a couple in which a wife shows no or low self-efficacy to go for HIV testing.

**Data:**

The study used the 2006-07 Swaziland Demographic and Health Survey (SDHS), which is a nationally representative dataset and cross-sectional. The survey was conducted between July 2006 and February 2007 by trained interviewers. A household sample was selected using two-stage cluster sampling and disproportionate stratification to obtain separate estimates for urban and rural domains. At first stage, 275 clusters were selected with probability proportional to size from a list of enumeration areas based on the 1997 Swaziland Population and Housing census. There were 111 clusters in urban areas and 164 clusters in rural area. At second stage, 5,500 households were selected from household sampling frames created for each cluster. All men and women aged 15-49 years identified in these households were eligible for individual interviews, where a total of 5,301 women and 4,675 men were identified (Central Statistical Office (CSO) [Swaziland] & Macro International Inc., 2008). Employing the matched data for couples, the analysis used the total number of 717 married couples that both a wife and husband responded whether one has participated in HIV testing. Of these couples, 19.6% had both wife and husband knew their HIV status.

**Outcome:**

The study used a four-category outcome variable for participation in HIV testing among couples. The outcome variable was created based on the responses from husband and wife to the questionnaires; “Have you ever been tested to see if you have the AIDS virus?” and “Did you get the results of the test?” The first group includes the couples in which neither a wife nor husband was tested, or one had been tested but did not receive the result (*neither tested*). The second group consists of couples in which the wife was tested and received the result, but the husband was not tested or was tested but did not receive the result (*wife only tested*). The third group consists of couples in which the husband participated in the testing and knew his HIV-status but the wife did not know her status (*husband only tested*). The last group is couples with both wife and husband that know their HIV-status (*both spouses tested*).

**Key explanatory variables:**

The study included ten predictors as follow: couples’ comprehensive knowledge about HIV/AIDS, lack of stigma towards PLWHA, knowledge of PLWHA, rejection of DV, acceptance of wife’s refusal to have sex with her partner, wife’s self-efficacy towards negotiating safer sex, wife’s first sex before marriage, husband’s first sex before marriage, his belief in fidelity of married women, wife counseled on the testing on prenatal care visit. In addition, the following four control factors were included: couples’ education level, employment status, marriage duration and place of residence.

**Methods:**

The study used a multinomial multivariate logistic regression. This allowed the association of each key predictor to differ for each group of the outcome. Since the four-category outcome that the study used was not accumulatively ordered due to imbalanced gender-based power dynamic in the husband and wife relationship, it is important to explore whether and how different coefficients of each key predictors become across distinguished cases of four outcome groups.

The multinomial logistic regression examined associations between uptake of HIV testing and couples' comprehensive knowledge of HIV/AIDS, lack of stigma towards PLWHA, knowledge of PLWHA and wife's self-efficacy towards negotiating safer sex among 717 couples. Comparing with a probability of neither wife nor husband having been tested, coefficients allowed estimating odds of HIV testing uptake by a change in both spouses', only a wife's, or only a husband's comprehensive knowledge, lack of stigma, knowledge of PLWHA and in wife's self-efficacy.

Data analysis was conducted with STATA 10.1 (STATA Corp, College Station, TX). Empirically estimated standard errors will be obtained using the primary sampling unit as the cluster unit.

**Result:****Sample Characteristics**

Defining marriage as including both formal and informal cohabiting unions, this study included 717 married couples: 510 of the formally married and 207 of those living together, who reported on whether each spouse had ever participated in HIV testing. Table 1 showed that 38.7% of the couples had been married less than or equal to 4 years followed by 22.9% having been married from 5 to 9 years, and 38.4% having been married more than or equal to 10 years. These marriage durations were according to wives' responses. As Swazi people value education, attendance in secondary or higher education was reported among both wife and husband among 42.7% of the couples (Table 1). Among women, 56.8% attended secondary or higher education while 12.1% had no education. The proportion of men with secondary or higher education was 57.4% followed by 30.3% with primary education (not shown). On the other hand, women's participation in the workforce was still limited compared to men's: 50.2% of women were currently working compared to 79.5% of men (not shown). At the couple level, 42.6% of couples had both wife and husband currently working (Table 1). The table also showed that 68.7% of the couples lived in rural areas.

Although most, if not all, couples had heard about HIV/AIDS, 32.1% had both a wife and husband with correct comprehensive knowledge about the means of HIV transmission, prevention and HIV/AIDS symptoms (Table 1). In addition, the table showed that in 24.0% of the couples both the wife and husband scored below or equal to 8 on the knowledge scale about HIV/AIDS. The percentage of the couples having a wife with comprehensive knowledge about HIV/AIDS was slightly higher than the couples with a husband who correctly understood facts about HIV/AIDS (22.5% vs. 21.4%, Table 1).

More than 75.0% of the couples had at least one spouse who knew PLWHA. However, the stigma and discrimination against these people still existed in society as only 20.2% of the couples had both a wife and husband without stigma towards AIDS and PLWHA and 34.5% were those with both spouses having some degree of stigma (Table 1). The table showed that the percentage of the couples having a wife without stigma was slightly lower than the couples with a husband who did not suggest stigma (22.0% vs. 23.2%, Table 1). On the other hand, the percentage of the couples having a wife who knew PLWHA was higher than the couples with a husband who knew people infected with HIV (23.5% vs. 20.5%, Table 1).

About two-thirds of wives were categorized as having high level of self-efficacy towards negotiating safer sex in the study (Table 1). The table, however, showed that more than half of the wives still believed that a woman is not justified in refusing to have sexual intercourse with her partner or requesting the use of a condom under specific conditions (knowledge that the partner has a sexually transmitted disease (STD), being tired or not in the mood, feeling unwell, recent birth, or knowledge that the partner has sex with other women). On the other hand, 47.3% of the husbands reported accepting a partner's refusal of sexual intercourse or request for condom use under specific conditions (his STD infection, partner is tired, or not in the mood, or partner knowledge of his other sexual partners). Only 16.7% of married couples have acceptance among both spouses of women's right to refuse sex under all of the specified conditions (Table 1). In addition, according to Table 1, more than half of the couples indicated some degree of tolerance to DV under particular conditions (going out without telling a husband, neglecting children, arguing with him, refusing to have sex with him, burning foods, and having sex with other men).

**Table 1: Percentage distribution of married couples in Swaziland by selected background characteristics**

Background characteristics	Married couples	
	(%)	(n)
<b><i>Education level</i></b>		
Both or one spouse with no or primary education	57.29	404
Both with secondary or higher education	42.71	313
<b><i>Marriage duration</i></b>		
0 – 4	38.67	275
5 – 9	22.93	161
10 +	38.40	281
<b><i>Residence</i></b>		
Rural	68.72	447
Urban	31.28	270
<b><i>Employment status</i></b>		
Neither or one spouse currently working	57.44	407
Both currently working	42.56	310
<b><i>Comprehensive knowledge about HIV/AIDS</i></b>		
Neither knows	23.99	170
Wife only knows	22.46	158
Husband only knows	21.44	150
Both know	32.11	239
<b><i>Lack of stigma towards PLWHA</i></b>		
Both stigma	34.53	254
Wife only lack of stigma	22.00	155
Husband only lack of stigma	23.24	166
Both lack of stigma	20.23	142
<b><i>Knowledge of PLWHA</i></b>		
Neither knew	24.55	179
Wife only knew	23.46	163
Husband only knew	20.51	148
Both knew	31.46	227
<b><i>Rejection of DV</i></b>		
Neither or one spouse rejects	55.65	386
Both reject	44.35	331
<b><i>Acceptance of wife's refusal to have sex</i></b>		
Neither accepts	33.59	246
Wife only accepts	19.12	134
Husband only accepts	30.62	217
Both accept	16.67	120
<b><i>Wife's self-efficacy towards negotiating safer sex</i></b>		
No or Low	31.92	222
High	68.08	495

Table 1 Continued: Percentage distribution of married couples in Swaziland by selected background characteristics

Background characteristics	Married couples	
	(%)	(n)
<i>Wife's first sex before marriage</i>		
At marriage	28.15	198
Before	71.85	519
<i>Husband's first sex before marriage</i>		
At marriage	17.71	129
Before	82.29	588
<i>Husband's belief on fidelity of married women</i>		
Doesn't believe	78.77	565
Believes	21.23	152
<i>Wife counseled on the testing at prenatal care visit</i>		
Not counseled/not applicable	49.67	359
Counseled	50.33	358
<b>Total</b>	<b>100</b>	<b>717</b>

## Bivariate analyses

### *Participation in HIV testing among married couples*

The measurement of couples' participation in HIV testing had four categories: the reference group included couples without testing among wives or husbands (neither tested). The other three groups were: wife only had participated in HIV testing and received the result (wife only tested), husband only had gone for the testing and received the results (husband only tested), and both wife and husband had been tested and received the results (both tested). Many married couples in Swaziland were not aware of their HIV-status as only 19.6% of married couples reported testing of both spouses. While 43.4% of couples had neither spouse tested, some couples reported that only one spouse had participated in HIV testing; 10.9% husband only, and 26.1% wife only.

### *Social and economic differentials in the prevalence of HIV testing among married couples*

Table 2 showed that marriage duration, place of residence and couples' education level and employment status were all associated with the prevalence of HIV testing among married couples, although the magnitudes of the associations varied (not shown). In particular, the prevalence of both tested was 26.1% among couples in which both spouse attended secondary or higher education as compared to 14.8% among those with at least one spouse with no or primary education. Among the couples living in rural areas, the prevalence of both tested was 16.7% as compared to 26.1% among the couples who live in urban areas. Also, the prevalence of both spouses tested was 25.1% when both wife

and husband are currently working as compared to 15.6% among the couples having neither or only one spouse working. Moreover, when couples have been married for more than or equal to 10 years, the prevalence of wife only tested was 20.7% as compared to 29.7% among the couples who have been married for less than or equal to 4 years.

As expected, comprehensive knowledge about HIV/AIDS among both a wife and husband was significantly related to the couples' uptake of HIV testing, particularly for both tested. For example, the prevalence of both spouses tested was 27.3% among the couples with both spouses having comprehensive knowledge about HIV/AIDS as compared to 13.3% of the couples with neither wife nor husband having comprehensive knowledge (Table 2). In addition, the table presents the prevalence of both tested at 18.2% among the couples with comprehensive knowledge among wives only.

Table 2 also indicated a similar pattern in testing of both spouses among couples with both a wife and husband showing lack of stigma towards HIV/AIDS and PLWHA as compared to the couples with both spouses having stigma. Of the couples with both spouses indicating lack of stigma against HIV/AIDS and PLWHA, the prevalence of both tested was 27.3% while only 12.1% of the couples with both spouses showing stigma were both tested. Moreover, the prevalence of both tested was 25.1% among the couples without stigma among wives only (Table 2).

The table also presented that the couples' knowledge of PLWHA was significantly associated with their participation in HIV testing. In particular, the prevalence of both tested was 27.5% among couples with both spouses knowing PLWHA versus 12.4% among the couples with neither wife nor husband knowing someone who was HIV-infected. In addition, 23.9% in both tested were reported when only the husband knew PLWHA (Table 2).

**Table 2: Prevalence of HIV-testing among married couples in Swaziland, by selected factors**

Factors	Neither tested (%)	Wife only tested (%)	Husband only tested (%)	Both tested (%)	Sig.	# of married couples
<b>Education level</b>						
Both or one spouse with no or primary education	48.07	26.30	10.87	14.76	**	404
Both with secondary or higher education	37.03	25.85	10.99	26.14		313
<b>Marriage duration</b>						
0 – 4	39.06	29.73	11.03	20.18	^	275
5 – 9	36.40	29.00	11.16	23.44		161
10 +	51.83	20.73	10.66	16.78		281
<b>Residence</b>						
Urban	35.66	28.54	9.71	26.09	*	270
Rural	46.86	25.00	11.47	16.68		447
<b>Employment status</b>						
Neither or one spouse working	47.46	26.49	10.47	15.59	*	407
Both currently working	37.82	25.59	11.52	25.06		310
<b>Comprehensive Knowledge about HIV/AIDS</b>						
Neither knows	55.36	24.46	6.91	13.27	***	170
Wife only knows	35.72	36.42	9.67	18.19		158
Husband only knows	48.66	23.73	10.87	16.74		150
Both know	36.18	21.71	14.81	27.30		239
<b>Lack of stigma towards PLWHA</b>						
Both stigma	48.42	29.01	10.43	12.14	*	254
Wife only lack of stigma	36.59	26.37	11.92	25.12		155
Husband only lack of stigma	43.12	24.71	13.31	18.85		166
Both lack of stigma	42.32	22.46	7.92	27.30		142
<b>Knowledge of PLWHA</b>						
Neither knew	54.62	24.63	8.34	12.41	***	179
Wife only knew	51.30	27.47	8.35	12.88		163
Husband only knew	39.70	22.71	13.75	23.85		148
Both knew	31.02	28.46	13.00	27.52		227
<b>Rejection of DV</b>						
Neither or one spouse rejects	46.62	26.16	10.06	17.15		386
Both reject	39.25	26.04	11.99	22.72		331
<b>Acceptance of wife's refusing to have sex</b>						
Neither accepts	45.89	22.31	12.64	19.16		246
Wife only accepts	46.87	24.48	10.36	18.29		134
Husband only accepts	37.87	29.29	10.28	22.56		217
Both accept	44.30	29.77	9.27	16.67		120

Table 2 Continued: The prevalence of HIV-testing among married couples in Swaziland, by selected factors

Factors	Neither tested (%)	Wife only tested (%)	Husband only tested (%)	Both tested (%)	Sig.	# of married couples
<b><i>Wife's self-efficacy towards negotiating safe sex</i></b>						
No or Low	49.16	26.05	11.02	13.77	*	222
High	40.63	26.13	10.87	22.37		495
<b><i>Wife's first sex before marriage</i></b>						
At marriage	45.21	28.96	6.85	18.98		198
Before	42.63	24.99	12.51	19.87		519
<b><i>Husband's first sex before marriage</i></b>						
At marriage	42.10	22.63	17.33	17.93	^	129
Before	43.62	26.85	9.54	19.98		588
<b><i>Husband's belief on fidelity of married women</i></b>						
Doesn't believe	45.56	27.13	9.92	17.38	**	565
Believes	35.15	22.30	14.62	27.93		152
<b><i>Wife counseled on the testing at prenatal care visit</i></b>						
Not counseled/not applicable	50.84	15.86	13.91	19.38	***	359
Counseled	35.97	36.21	7.96	19.86		358
<b>Total</b>	<b>43.35</b>	<b>26.11</b>	<b>10.92</b>	<b>19.62</b>		<b>717</b>

^ p<0.10, \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Table 2 indicated some gender-oriented factors were significantly associated with couples' participation in HIV testing. For example, when a wife indicated high self-efficacy towards negotiating safer sex, the prevalence of both tested was significantly high at 22.4% as compared to 13.8% among the couples with a wife who had low or no self-efficacy to negotiate safer sex. Moreover, when a husband believed in the fidelity of married women, the prevalence of both tested was significantly higher: 27.9% among couples in which the husband believed in the fidelity of married women versus 17.4% among couples in which the husband did not. In addition, when a husband accepted wife's refusal to have sex with him, a high prevalence of wife only tested was reported at 29.3% as compared to 22.3% when both wife and husband did not accept wife's refusal to have sex. Couples having both spouses reject domestic violence (DV) indicated a higher prevalence of both tested at 22.7% as compared to 17.2% of the couples having neither wife nor husband reject DV (Table 2). These gender sensitive factors suggest the necessity to further explore these associations.

Table 2 also indicates associations of some explanatory variables with the prevalence of wife only tested and husband only tested. In particular, a wife's counseling on the testing at a prenatal care visit showed a significant association with a higher prevalence of wife only tested. Of the couples with a wife counseled, 36.2% were wife only tested as compared to 15.9% of the couple with a wife who was not counseled or hasn't been pregnant. Also, when a husband first had sexual intercourse at marriage, the higher prevalence of husband only tested is reported at 17.3% as compared to 9.5% among couples with a husband who had sexual intercourse before marriage.

### **Multivariate analyses**

#### ***Social and economic factors associated with couples' participation in HIV-testing***

Tables 3 showed Relative Risk Ratios (RRR) for the association of key selected factors with couples' participation in HIV-testing based on each model. Table 3 showed no significant association between both spouses having comprehensive knowledge about HIV/AIDS and both being tested for HIV relative to neither being tested. This result does not support the first hypothesis of RQ1 that when both wife and husband have comprehensive knowledge, the couple is more likely to go for HIV-testing. On the other hand, couples' comprehensive knowledge was significantly and positively associated with husband only tested relative to neither tested (RRR=3.20; 95% CI = 1.42, 7.25). Although husband's individual comprehensive knowledge did not suggest any statistical significant association with couples' participation in HIV-testing, wife's individual comprehensive knowledge suggested a significant and positive association with wife only tested and a marginal significant association with husband only tested relative to neither tested (RRR=2.32; 95% CI = 1.26, 4.29, and RRR=2.27; 95% CI = 0.93 5.53, respectively).

Table 3 also presented a significant and positive association of couples in which both a wife and husband show lack of stigma towards PLWHA with both tested relative to neither tested (RRR=2.54; 95% CI = 1.36, 4.76). The result supported the second hypothesis of RQ1 that when both wife and husband show lack of stigma towards PLWHA, the couple is more likely to go for HIV-testing. At the same time, lack of stigma shown by only one spouse, either by a wife or by a husband, was also positively associated with both tested relative to neither tested. The magnitudes of associations between a wife without stigma and both tested were higher than of a husband without stigma (RRR=2.50; 95% of CI = 1.83, 4.53, vs. RRR=1.83; 95% of CI = 0.96, 3.51).

Table 3 suggested significant and positive associations of the couples having both a wife and husband who know PLWHA with all categories of couples' participation in HIV-testing. In particular, the

magnitude of the association with both tested was the highest as compared to testing among husband only or wife only tested, relative to neither tested (RRR=2.77; 95% of CI = 1.40, 5.50, RRR=2.46; 95% of CI = 1.12, 5.40, RRR=1.95; 95% of CI = 1.07, 3.53). This finding supports the third hypothesis of RQ1 that when both wife and husband have known PLWHA, the couple is more likely to go for testing. In addition, Table 3 showed that a husband's individual knowledge of PLWHA was positively associated with both tested relative to neither tested (RRR=1.95; 95% of CI = 0.95, 3.98).

Table 3 showed that the association of a wife's self-efficacy in negotiating safer sex with both tested was positive and marginally significant relative to neither tested after controlling for other factors (RRR=1.62; 95% of CI = 0.93, 2.81). The finding was in the same line with the fourth hypothesis for RQ1 that when a wife shows high self-efficacy towards negotiating safer sex, the couple is more likely to go for HIV testing.

The model showed significant and positive associations of husband's belief in the fidelity of married women with both tested and husband only tested relative to neither tested (RRR=2.39, 95% of CI = 1.39, 4.09, and RRR=2.05; 95% of CI = 1.09, 3.87, respectively). Also, consistent in all models, associations of wife's and husband's timing of first sex before marriage with husband only tested was reported. The direction of these associations with husband only tested was different between a wife's and husband's timing of sexual debut. In particular, when a husband had sex before marriage, the likelihood of husband only tested was consistently lower relative to neither tested (RRR=0.51; 95% of CI = 0.27, 0.96). On the other hand, when a wife had sex before marriage, the likelihood of husband only tested was consistently higher relative to neither tested. The association was marginally significant (RRR=1.91; 95% of CI = 0.89, 4.14). When a wife had been counseled on the testing at a prenatal care visit, she was more likely to be tested individually (wife only tested) relative to neither tested (RRR=3.06; 95% of CI = 1.91, 4.92). The model showed when a husband accepted wife's refusal to have sex with him, the likelihood of wife only tested was higher relative to neither tested (e.g. RRR=1.68, 95% of CI = 1.01, 2.80). When both wife and husband are currently working, the couples are more likely to have both tested (RRR=1.59; 95% of CI = 0.97, 2.59).

**Table 3: Multivariate multinomial logistic regression analysis of the associations of married couple's comprehensive knowledge about HIV/AIDS, lack of stigma towards PLWHA, knowledge of PLWHA and wife's self-efficacy towards negotiating safer sex as well as selected factors with their participation in HIV-testing in Swaziland**

Independent var.	Wife only tested			Husband only tested			Both tested		
	RRR	Sig.	95% of CI	RRR	Sig.	95% of CI	RRR	Sig.	95% of CI
<b><i>Comprehensive Knowledge about HIV/AIDS</i></b>									
Neither knows	1.00			1.00			1.00		
Wife only knows	2.32	**	(1.26, 4.29)	2.27	^	(0.93, 5.53)	1.61		(0.70, 3.74)
Husband only knows	0.86		(0.45, 1.65)	1.79		(0.78, 4.12)	1.04		(0.49, 2.20)
Both know	1.00		(0.53, 1.87)	3.20	**	(1.42, 7.25)	1.48		(0.68, 3.21)
<b><i>Lack of stigma towards PLWHA</i></b>									
Both stigma	1.00			1.00			1.00		
Wife only lack of stigma	1.07		(0.64, 1.80)	1.32		(0.65, 2.71)	2.50	**	(1.83, 4.53)
Husband only lack of stigma	0.99		(0.58, 1.71)	1.28		(0.61, 2.68)	1.83	^	(0.96, 3.51)
Both lack of stigma	0.79		(0.42, 1.49)	0.78		(0.33, 1.84)	2.54	**	(1.36, 4.76)
<b><i>Knowledge of PLWHA</i></b>									
Neither knew	1.00			1.00			1.00		
Wife only knew	1.00		(0.50, 1.98)	1.06		(0.47, 2.41)	0.83		(0.39, 1.77)
Husband only knew	1.29		(0.63, 2.63)	1.80		(0.77, 4.17)	1.95	^	(0.95, 3.98)
Both knew	1.95	*	(1.07, 3.53)	2.46	*	(1.12, 5.40)	2.77	**	(1.40, 5.50)
<b><i>Wife's self-efficacy towards negotiating safer sex</i></b>									
No/Low	1.00			1.00			1.00		
High	1.04		(0.66, 1.65)	1.07		(0.60, 1.90)	1.62	^	(0.93, 2.81)
<b><i>Education level</i></b>									
Both or one spouse with no or primary education	1.00			1.00			1.00		
Both with secondary or higher education	1.08		(0.66, 1.75)	1.04		(0.56, 1.94)	1.50		(0.87, 2.57)

Table 3 Continued : Multivariate multinomial logistic regression analysis of the associations of married couple's comprehensive knowledge about HIV/AIDS, lack of stigma towards PLWHA, knowledge of PLWHA and wife's self-efficacy towards negotiating safer sex as well as selected factors with their participation in HIV-testing in Swaziland

Independent var.	Wife only tested			Husband only tested			Both tested		
	RRR	Sig.	95% of CI	RRR	Sig.	95% of CI	RRR	Sig.	95% of CI
<b><i>Marriage duration</i></b>									
0 – 4	1.00			1.00			1.00		
5 – 9	1.17		(0.67, 2.03)	1.07		(0.49, 2.33)	1.33		(0.70, 2.54)
10 +	0.57	*	(0.35, 0.94)	0.68		(0.33, 1.42)	0.68		(0.40, 1.18)
<b><i>Residence</i></b>									
Urban	1.00			1.00			1.00		
Rural	0.76		(0.47, 1.24)	1.23		(0.66, 2.30)	0.76		(0.46, 1.28)
<b><i>Employment status</i></b>									
Neither or one spouse working	1.00			1.00			1.00		
Both currently working	1.20		(0.73, 1.97)	1.14		(0.63, 2.09)	1.59	^	(0.97, 2.59)
<b><i>No tolerance to DV</i></b>									
Neither or one spouse no tolerance	1.00			1.00			1.00		
Both no tolerance	1.23		(0.79, 1.92)	1.17		(0.67, 2.03)	1.26		(0.76, 2.08)
<b><i>Acceptance of wife's refusal to have sex</i></b>									
Neither accepts	1.00			1.00			1.00		
Wife only accepts	1.00		(0.50, 1.99)	0.84		(0.41, 1.71)	0.81		(0.41, 1.59)
Husband only accepts	1.68	*	(1.01, 2.80)	0.93		(0.49, 1.76)	1.33		(0.75, 2.37)
Both accept	1.30		(0.70, 2.43)	0.56		(0.23, 1.36)	0.56	^	(0.28, 1.11)
<b><i>Wife's first sex before marriage</i></b>									
At marriage	1.00			1.00			1.00		
Before	0.80		(0.51, 1.24)	1.91	^	(0.89, 4.14)	1.07		(0.65, 1.76)
<b><i>Husband's first sex before marriage</i></b>									
At marriage	1.00			1.00			1.00		
Before	1.15		(0.68, 1.96)	0.51	*	(0.27, 0.96)	0.99		(0.53, 1.86)

Table 3 Continued : Multivariate multinomial logistic regression analysis of the associations of married couple's comprehensive knowledge about HIV/AIDS, lack of stigma towards PLWHA, knowledge of PLWHA and wife's self-efficacy towards negotiating safer sex as well as selected factors with their participation in HIV-testing in Swaziland

Independent var.	Wife only tested			Husband only tested			Both tested		
	RRR	Sig.	95% of CI	RRR	Sig.	95% of CI	RRR	Sig.	95% of CI
<b><i>Husband's belief on fidelity of married women</i></b>									
Does no believe	1.00			1.00			1.00		
Believes	0.91		(0.52, 1.61)	2.05	*	(1.09, 3.87)	2.39	**	(1.39, 4.09)
<b><i>Wife counseled on the testing at prenatal care visit</i></b>									
Not counseled /not applicable	1.00			1.00			1.00		
Counseled	3.06	***	(1.91, 4.92)	0.78		(0.43, 1.39)	1.53	^	(0.96, 2.45)
<b>Number of married couples</b>			<b>717</b>						

^ p<0.10, \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

## Discussion:

### *Summary of social factors associated with participation in HIV testing among married couples*

#### *1) Couples' comprehensive knowledge about HIV/AIDS*

The study showed a lack of association between couples' comprehensive knowledge about HIV/AIDS and both spouses tested after controlling for influence of stigma towards PLWHA. This did not support hypothesis 1. In addition, none of the interaction terms between couples' comprehensive knowledge and a lack of stigma were significant. However, findings from this study suggested a significant association between both spouses' comprehensive knowledge and husband only tested after controlling for stigma. It could be that both spouses' comprehensive knowledge is not a strong factor for the likelihood of having wives tested jointly with husbands.

According to the study, there was a positive association of individual wife's comprehensive knowledge with wife only tested. As HBM recognized knowledge as one of the key factors to affect the likelihood of taking an expected action, the HBM framework could apply to married women for their individual participation in HIV testing in Swaziland. On the other hand, the study found no association between husband's comprehensive knowledge and husband only tested. This suggested a need to further

explore other barriers to HIV testing among men in Swaziland. Other studies from different countries have showed inconsistent patterns of association between respondents' knowledge and their participation in HIV testing. For example, a lack of significant association was found between women's knowledge about HIV prevention methods and utilization of HIV testing after controlling for socio-demographic factors in Ghana (Tenkorang & Owusu, 2010). Moreover, among men in rural Malawi, better knowledge of HIV prevention behaviors lowered the likelihood of having been tested (deGraft-Johnson et al., 2005). These inconsistent patterns of an association between HIV testing and knowledge about HIV prevention suggest a need to identify how best information can be translated into the desired action.

## ***2) Couples' stigma towards PLWHA***

The study identified that both wife and husband were more likely to be tested when both spouses did not show stigma towards PLWHA. The association between lack of stigma among both wife and husband and both spouses tested remained after controlling for their comprehensive knowledge about HIV and AIDS. This finding supported hypothesis 2, and is consistent with the results of many studies showing a positive association between absence or low level of stigma towards PLWHA and uptake of HIV testing at the individual level (Ayuo et al., 2009; Hutchinson & Mahlalela, 2006; Meiberg et al., 2008; Mugisha et al., 2010; Puleruitz et al., 2008; Sambisa et al., 2010). In particular, this result shared a similar pattern with findings from a study with women and men living in a black township in Cape Town, South Africa: a high prevalence of stigma among non-test takers as compared to test takers, and no difference on HIV/AIDS knowledge between non-test takers and test takers (Kalichman & Simbayi, 2003). In addition, some studies reported that high level of stigma prevented people not only from taking VCT but also from receiving and disclosing the test result (Puleruitz et al., 2010; Ogden & Nyblade, 2005). The present study suggested urgent need to tackle stigma to promote utilization of HIV testing among married couples.

The lack of a significant association of one spouse's stigma with individual participation in testing could indicate that stigma matters for behaviors at the interpersonal level, and could possibly affect dialogue on HIV and AIDS with others. Moreover, the study confirmed a stronger magnitude of an association between lack of stigma among women and both spouses tested as compared to lack of stigma among men. The same pattern remained even after controlling for couples' comprehensive knowledge. Studies in Zimbabwe and South Africa showed a similar pattern at the individual level: stronger influence of women's lower level of stigma on their uptake of HIV testing than of husbands' stigma level on their participation in testing (Hutchinson & Mahlalela, 2006; Sambisa et al., 2010). This study clarified that stigma was often generated through gender lenses differently by a wife and husband and affects their

behaviors accordingly (Mbonu et al., 2010; Ndinda et al., 2007). Shamos et al. (2009) addressed the needs of more social and emotional support for women than men to handle stigma to pursue healthy behaviors while they experienced more discrimination than men with no guaranteed supports from family and friends in Swaziland. Nyanzi-Wakholi et al. (2009) echoed the gender-oriented diverse needs for women and men in Uganda, noting that women were concerned more about family-inflicted stigma as compared to men who worried about community-inflicted stigma. It is important to note that the study was not able to distinguish types of stigma, such as received stigma, internal stigma and associated stigma (Greeff et al., 2008), which could affect wives' and husbands' attitudes and behaviors in a different manner. However, the result stressed the need to identify how to reduce women's stigma, which is linked to their fear of stigmatization, in a way that they do not lose their social networks and livelihood (Root, 2010; Zamberia, 2009).

### ***3) Couples' knowledge of PLWHA***

The study identified that both spouses were more likely to have been tested when both a wife and husband had known PLWHA. This result supported hypothesis 3, which was concerned with the association between estimated susceptibility to HIV infection and participation in testing. In Swaziland, both spouses know PLWHA in one third of all married couples (Central Statistical Office (CSO) [Swaziland] & Macro International Inc., 2008). People's knowledge about PLWHA could suggest their engagement with HIV/AIDS-related conversations within their social networks, including family, friends, and co-workers. Based on their awareness of PLWHA, people could estimate a degree of their own susceptibility to the infection. According to HBM, perceiving a high risk of HIV infection could be a motivating factor to participate in HIV testing in order to identify appropriate HIV prevention, treatment and care. In addition, the study found a strongest positive association between both spouses' knowledge of PLWHA and both tested as compared to the association with wife only tested or with husband only tested. This could indicate possible additional influence from interpersonal factors, such as dialogue, that were promoted by both wives' and husbands' knowledge of PLWHA rather than only one spouse's knowledge.

Moreover, the study revealed an association between individual husband's knowledge of PLWHA and both tested, which could indicate strong influence of male social networks on couples' behavior. Since the significant association appeared to be with both tested, not with husband only tested, utilization of male social network could be a key factor to promote HIV testing among couples under the social condition that a husband is often viewed as a decision-maker and could determine wives' participation in testing (Allen et al., 2007; Kranzer, 2008; Maman et al., 2001). The result could be that

men might make perceived susceptibility to HIV infection more applicable to a couple's potential risk rather than to individual risk, and could lead to both spouses tested. This finding could point to the importance of both promoting men's awareness of perceived risk to HIV infection and providing opportunities for males to discuss with others that anyone can be at risk in testing among couples.

The study revealed that individual wife's knowledge of PLWHA was not significantly associated with both spouses tested, although more wives have known PLWHA than husbands. This may suggest weak influence of female social networks on couples' behavior. In addition, the result suggested no association between individual woman's knowledge of PLWHA and wife only tested. This contradicts with findings from other countries, such as Malawi with a high HIV prevalence at 12% and Ghana with a low HIV prevalence at 2%. These countries indicated a positive association between women's knowledge about PLWHA and their participation in HIV testing at the individual level (deGraft-Johnson et al., 2005; Tenkorang & Owusu, 2010; UNAIDS, 2008). Although this difference may reflect on Swazi women's social vulnerability and male leadership in the context of interpersonal relationships through marriage in the country, further study should be conducted.

#### ***4) Wives' self-efficacy towards negotiating safer sex***

The study confirmed an association between wife's self-efficacy for negotiation of safer sexual intercourse and both spouses tested, providing support for hypothesis 4: when a wife can ask a partner to use condom and refuse sexual intercourse when she does not want, both spouses are more likely to have been tested for HIV. On the other hand, no association between wife's self-efficacy and wife only tested was found. This suggested that self-efficacy to negotiate safer sex among women could affect the likelihood of participation in HIV testing at the couple level rather than the individual level. This result may suggest a window of opportunity for overcoming concerns of which some studies addressed dominant husbands' decision-making power that could prevent their wives from having sufficient access to HIV-testing in other countries (Allen et al., 2007; Kranzer, 2008; Maman et al., 2001; Turan et al., 2010). However, it is important to note that wife's self-efficacy might not be translated into her desired behavior and action. As gender-oriented power inequality is suggested among couples in Swaziland, the study examined different levels and types of influence from wives and husbands on couples' participation in HIV testing through examining hypotheses 1 to 4.

#### ***Policy and Program Strategy Development***

Findings from the present study suggested different social factors and levels of influence by wives and husbands on uptake of HIV testing among married couples. Nearly all married couples have

heard of HIV/AIDS in Swaziland, but only one third of those had understanding of the means of HIV transmission and prevention among both spouses (Central Statistical Office (CSO) [Swaziland] & Macro International Inc., 2008). Their low comprehensive knowledge of HIV/AIDS requires continuing health education on its prevention. However, the study suggested that influencing HIV testing behavior among couples is not a matter of simply conveying basic HIV knowledge, but rather there is the urgent need to address couples' stigma towards PLWHA. Confirming that stigma reflected on gender-oriented differences and has been deeply rooted in society, the study emphasized the importance of considering stigma reduction strategies to promote HIV testing among married couples in a gender sensitive manner. The study also addressed the importance of increasing couples' awareness of PLWHA and wife's self-efficacy towards negotiating safer sex for having both spouses been tested. In summary, the study recommended the following three key strategies for couple-oriented HIV testing in Swaziland:

1. HIV-related stigma reduction among married couple, particularly among wives
2. Inclusion of PLWHA in HIV/AIDS prevention promotion among married couples, particularly among husbands
3. Enhancement of married women's self-efficacy towards negotiation of safer sex

First, it is the priority for married couples to diminish stigma towards HIV/AIDS and PLWHA, especially among wives. HIV/AIDS-related stigma appeared to prevent both spouses from knowing their HIV status. It is recommended to organize activities that reduce barriers between HIV-infected people and HIV-negative ones. The HIV-negative people should be encouraged to support social and economic actions that HIV-affected people established for their positive living in their community. There are many examples around the world of such actions, which tackle stigma by having PLWHA pursue productive lives. For example, in Zimbabwe, HIV-positive women play soccer to improve their self-esteem by showing that they are active even while taking medication (Stavropoulou, 2009; MSF, 2009). In Cambodia and India, HIV-positive women started income generating activities, such as sewing through a project called "women and wealth" (UNDP, 2010). Government and non-government partners have supported these activities. Especially for women, it is essential to identify means for social and emotional supports so that they can reduce stigma and its related fear to pursue HIV testing.

Although this study considered stigma towards PLWHA, it is important for the government of Swaziland to recognize that stigmatization related to HIV and AIDS occurs due to not only HIV-positive status but also visiting a HIV testing site. Swaziland started to have home-based HIV testing and counseling (HTC) available in August 2010 with assistance from Uganda where the door to door HTC

approach has been utilized (The Swazi Observer, 2010). This added to three current models of HTC: free-standing centers offering client initiated services, outreach HTC services, and integrated HTC services that were provided through provider initiated approach and at health facilities for clinical care and disease prevention, in the country (NERCHA & UNAIDS, 2010). The increased availability of HTC with confidentiality of the participation may assist generalize usage of the testing services by diminishing stigma.

Second, it is important that married couples have personal knowledge of PLWHA, particularly increasing husbands' awareness of those infected by the virus, in order to have the couples go to testing. It could be that their knowledge of PLWHA allows the couples to increase perceived susceptibility to HIV infection, which leads to testing as the main entry to prevention, care and treatment. It is recommended, particularly for men as opinion leaders, to have participatory learning activities about HIV prevention that involve critical thinking and dialogue with peers, such as "Stepping Stone." Positive behavior changes among men who participated in Stepping Stone sessions were documented in South Africa (Jewkes et al., 2008). Swazi men could recognize perceived risk to the infection more applicable at the couple level than at the individual level through discussion.

Third, it is recommended to enhance married women's self-efficacy to negotiate safer sexual intercourse, considering the importance for wives to gain decision-making power over their reproductive health and sexuality. Moreover, this should be addressed in such a way as to improve interpersonal relationships with husband, including promotion of problem solving skills and spousal dialogue which appeared to be a key factor to couples' participation in testing.

### ***Limitations of the research***

Despite the advantages of adopting a couple-centered approach in the analysis and the use of a nationally-representative sample, this study faced a few notable limitations. First, as SDHS data were cross-sectional, the findings could not attribute causality to the hypothesized relationships between selected predictors and HIV testing uptake or fidelity among couples, or condom use among HIV-affected couples. Significant findings indicated associations. Second, data were constructed based on self-reported responses from study participants. Because HIV issues and sexual behaviors are sensitive to discuss, the possibility of information bias, such as social desirability, should be noted. Sexual behaviors could be assessed by both self-reporting and biological markers (Allen et al., 2003). Third, data did not confirm whether couples had gone for testing together or whether couples disclosed test results to each other. This information is important because sexual behavior could change after a husband and wife are aware of

both their own and their partner's HIV status. In addition, having couples tested together could reduce a chance that a husband or a wife could go for HIV testing without informing their partner and/or keep the result a secret. Having matched couples' data available, the DHS questionnaires should include more questions about spousal dialogues on their health behaviors, although discrepancies on responses from a wife and husband could be a challenge. Despite these limitations, the unique focus of this study on couple-related factors contributed to the limited knowledge base on the determinants of HIV-prevention behavior among couples in contexts affected by AIDS.

### ***Recommendations for further research***

Few studies have focused on HIV/AIDS issues in Swaziland despite the fact that the country faces the highest HIV prevalence in the world. The present study was the first national population-based study on HIV-testing among the married men and women in Swaziland, having contributed to development of strategies for increasing their uptake of testing. Below are some recommendations for future research.

First, it is essential to consider frequency and content of spousal discussions related to HIV and AIDS, including disclosure of test results. It is also useful to consider other factors including sense of trust among couples, which may affect the spousal dialogue. Second, it is important to collect more contextual information about the current HIV testing condition, such as quality of care in health facilities by utilizing qualitative research methods.

It is essential to conduct research from a couple-level perspective because the approach reveals social, cultural and economic influences generated through a gender lens on HIV prevention methods that require efforts of both a wife and husband. Given the current pattern of HIV infection among married couples and their limited usage of HIV testing, the public health sector should provide more evidence-based interventions. Couple-oriented strategies in HIV prevention are in need in the context of a generalized HIV epidemic in Southern and Eastern Africa.

**Note:**

1) Married couples include those who are legally married or living together.

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