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Women's Health Knowledge, Sexual Empowerment, and HIV/AIDS in Sub-Saharan Africa

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Abstract

The HIV/AIDS epidemic is one of the greatest challenges facing economic and social development in sub-Saharan Africa. Women of reproductive age (15 - 49) have the greatest risk and prevalence of HIV in this region. Increased female vulnerability to HIV stems from limited access to health care and lack of autonomy to make decisions regarding sexual health and education. Using Demographic and Health Surveys data from seven sub-Saharan African countries, this paper finds important associations between women's own sexual health knowledge, sexual empowerment and HIV status. Women who know more about sexual health knowledge in terms of contraceptive methods, fertility, and menstrual cycles are more likely to report greater control over their sexual lives compared to women with no understanding of sexual health. Also, we find that sexual empowerment is negatively associated with being HIV positive for urban and uneducated women. Hence, this paper indicates a possible direction for future policies aiming at lowering HIV incidence and fostering female autonomy in sub-Saharan Africa.

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1. Introduction

According to UNAIDS (2010b) there were an estimated 33.4 million people living with HIV in 2009. When compared to 26.2 million infected in 1999, the growth of the HIV epidemic is obvious. Today sub-Saharan Africa is the world's region most affected by HIV and is a popular topic within the epidemiologic and economics literature. UNAIDS (2010b) estimates that 22.5 million people in sub-Saharan Africa are living with HIV, with the majority being females of reproductive age (de Walque (2009); Dugassa (2009)). Also, women living in sub-Saharan Africa account for 60% of new HIV infections, and young women (ages 15 -19) are three times as likely to be infected than their male counterparts.

While examining the "education vaccine" against HIV, Vandemoortele and Delamonica (2002) have outlined the four "S's" that fuel the HIV epidemic: silence, shame, stigma, and superstition. Formal education may play a key role in de-constructing these negative psychological and cultural implications of the HIV epidemic. In fact, data comparing genders by level of education and knowledge about HIV prevention, indicates that women are unable to practice safe sexual behavior to the same degree as their male counterparts due to existing social and gender norms (Brent (2006); Dupas (2006); de Walque (2007); de Walque (2009); Dinkelman, Levinson, and Majelantle (2006)). Therefore, there is a need to further explore channels exploiting the "ignorance" regarding safe sex practices and female autonomy. If sexual health knowledge can empower women to take control of their sex lives and to actively make safe decisions for themselves, the likelihood of having lower HIV infection rates in sub-Saharan Africa is greater.

Females are biologically more susceptible to HIV infection through heterosexual transmission, but increased vulnerability also stems from social, legal, and economic disadvantages (UNAIDS (2010b)). Poor health, having concurrent sex partners, limited access to health care, and barriers to information and methods to prevent HIV infection are some examples. The UNAIDS (2010a) Fact Sheet on Women, Girls and HIV indicates that women have limited decision-making power and control over financial assets which further exacerbates their risk for HIV infection. Lack of rights and empowerment appears to be one of the biggest obstacles for African women in avoiding infection.

Women's empowerment is hard to define, let alone capture with any single variable. The United Nations (1990) has determined five components of women's empowerment: women's sense of self-worth; the right to have and to determine choices; the right to have access to opportunities and resources; the right to have the power to control their own lives, both within and outside the home; and their ability to influence the direction of social change to create a more just social and economic order, nationally and internationally. Better sexual health knowledge can play a direct role in each constituent of the definition, whether through increasing control over fertility, family planning decision making, or more in-depth conversations about safe sex.

By providing a gateway to healthy choices, comprehensive sexual health knowledge can lead to better relationships between sexual partners. According to MacPhail, Terris-Prestholt, Kumaranayake, Ngoako, Watts, and Rees (2009), women want to openly discuss family planning with their partners. Perhaps increased level of knowledge about various types of contraceptives not only provides women choices but also encourages a more in-depth discussion among partners about birth control. It has been documented that high

fertility usually elevates an African women's status among her community (United Nations (2007)). Hence, women who better understand how their own bodies behave and methods of contraception can potentially be more in control over their fertility. Furthermore, open conversations about family planning could also lead to better decisions regarding safe sex and HIV prevention. Knowledge of multiple types of birth control methods could prove very helpful in managing fertility by allowing women to dictate when they do or don't wish to become pregnant. MacPhail, Terris-Prestholt, Kumaranayake, Ngoako, Watts, and Rees (2009) highlights women's need for covert contraceptives in some instances. Using a covert contraceptive method even though the partner disagrees with birth control appears; therefore, to be a valid measurement of women's sexual empowerment.

Hence, this paper aims to establish a link from women's knowledge about own health (contraceptive use, sexually transmitted infections (STI), and menstrual cycles) to sexual empowerment (women's decision to use a contraceptive method even if partner disapproves) and HIV status. We use female data from the demographic health surveys (DHS) of seven sub-Saharan African countries to estimate: first, the impact of women's health knowledge on women's sexual empowerment; and second, the impact of sexual empowerment of HIV status of these same women. While we only measure one specific action concerning female empowerment, that of sexual empowerment, Malhotra and Schuler (2005) state that empirical research has shown various dimensions of empowerment may be closely interlinked.

Our findings suggest that increased knowledge of contraceptives and fertility, but not STIs, are associated with greater sexual empowerment, indicating that sex education may be an important channel in promoting female autonomy in sub-Saharan Africa. And, we also find sexually empowered women are less likely to be HIV positive, with this effect being significant for uneducated relative to educated women and urban women relative to women living in rural areas.

2. Data and Methodology

This paper investigates two distinct associations; that of sexual health knowledge and sexual empowerment, and of HIV status and sexual empowerment for non-single women in Africa. Given the binary nature of our dependent variables, every model is estimated using a probit regression and the exact matching estimator (Rosembaum and Rubin (1983) and Abadie and Imbens (2006)) and average treatment (partial) effects are reported. It is important to notice that endogeneity due to selection on unobservables cannot be completely ruled out. Hence, in the absence of a valid instrument, we must rely very heavily on the validity of our controls in order to establish causal relationships. Even though we follow the literature in the choice of our controls (de Walque (2006) and de Walque (2009)), we still need to interpret our findings with caution.

The data was collected from the fourth wave of DHS. These surveys provide valuable information about sexual behaviors and attitudes related to the HIV/AIDS epidemic (de Walque (2006)). Because data from various countries are not always complete, only seven countries with matching variables are used: Burkina Faso (2003), Cameroon (2004), Ghana (2003), Guinea (2005), Kenya (2003), Malawi (2004), and Rwanda (2005).

We use the following variables as controls: age, religion, multiple marriages, wealth, residential location, and level of education which is consistent with de Walque (2006) and

de Walque (2009). As Vandemoortele and Delamonica (2002) emphasize, HIV epidemics differ by country, hence we also include dummy variables to control for country.

UNAIDS (2009) states that individuals aged 15 to 49 are most susceptible to HIV infection with a prevalence rate of 5.2% and young women between the ages of 15 and 19 are particularly vulnerable. Thus, this paper utilizes the DHS measurement of age as reported by the respondent. Second, religious affiliation could have different impacts on HIV status. The Christian religions have been slow to openly discuss HIV prevention, and in many congregations sex is still a taboo subject; however, Islamic leaders, have seemingly been more open to condom use and other HIV protection methods (Trinitapoli (2006)). While many different religions exist in sub-Saharan Africa, religion has been categorized into four groups - Catholic, Protestant (which includes other Christians too), Muslim, and other religions (which includes Animists and no religious affiliation). Nearly 40% of women surveyed affiliate with the Catholic religion. In the same way various religions handle the topic of HIV/AIDS, they may choose to ignore or promote women's rights (Soothill (2010)). Thus religion cannot be disregarded in either set of models.

Marriage is defined as being legally wedded or living together with the intention to stay together. We use a variable that captures women who have been married more than once as our marital status variable. Even though, our sample only encompasses ever married women (75% of all respondents) as our sexual empowerment question was only asked to this sub-group, the number of marriages is another important factor to consider in our models (Malhotra and Schuler (2005); de Walque (2009)).

The three biggest sources of potential variation within the models stem from an individual's educational achievement, socioeconomic status, and residential location. According to de Walque (2009), level of education is a good predictor of sexual behavior. Of the women interviewed for the DHS and in our sample, 35.71% are educated at the primary level, 15.22% at the secondary level, and only 1.41% have had some degree of higher education (Table I). This leaves 47.6% of women reporting no education whatsoever. Educational attainment is measured by the respondent's highest level of education attended.

Next, conflicting data regarding socioeconomic status and HIV status indicates higher prevalence among both the poor and wealthy. However, because the wealth quintiles provided by the DHS can be misleading when comparing multiple countries, the method of creating a 'wealth proxy' from a set of dummy variables as in de Walque (2009) is used for all regressions. The presence of an earth floor and the absence of durable goods like a bicycle, motorcycle, electricity, radio, television, and refrigerator in the main residence of the respondent are proxies for poverty. Finally, rural or urban location must be considered as Glick (2007) found that HIV incidence is now higher among individuals living in urban areas. The DHS provides a variable indicating whether the respondent lives in an urban or rural region.

Due to the nature in which HIV transmits, sexual health knowledge is a key factor in any campaign aiming to lower HIV/AIDS incidence. In determining sexual health, a definition needed to be set. Several variables from the DHS capture various aspects of sexual health like condom use, how many sexual partners the respondent has had or currently has, and attitudes about HIV/AIDS and other STIs. After careful examination of all the data, it appears that sexual health knowledge can be divided into three categories: knowledge of contraceptive methods, knowledge of women's health and fertility, and knowledge of STIs. Aside from the fact that other variables may exist, these three categories represent comprehensive sexual

health knowledge in this model.

The DHS asks women whether they know about the following contraceptive methods: birth control pill, an intrauterine device (IUD), hormone injections, condoms, female sterilization, male sterilization, periodic abstinence (rhythm), and withdrawal. Also the DHS asks women if they know about any modern contraceptive method (knowprev). We use these two set of variables in our models to capture the contraceptive use dimension of women's sexual health knowledge. Of the women captured in this study, 84.72% know about the birth control pill; 45.91% of the IUD; 83.72% of hormone injections; 81.71% of condoms; 52.3% of female sterilization; 26.96% of male sterilization; 43.74% of abstinence; and 37.55% of withdrawal (Table I). Also 92.43% know about any type of contraceptive method. As it is apparent, these different modes of contraception exerts some degree of heterogeneity in these women's responses justifying their use in our model.

To capture knowledge of women's health and fertility, women who understood that human ovulation occurs during the middle of the menstrual cycle are noted as having correct information as compared to their misinformed counterparts in a dummy variable (knowovl). Data was collected from the portion of the DHS that asks women if they knew when females were most fertile - just before menstruation, during menstruation, right after menstruation, in between periods, or "don't know". Women answering "in between periods" were noted as correct, and all other answers were collectively noted as "misinformed". Of the women interviewed in the DHS, only 19.24% knew correct information about fertility (Table I). This finding is consistent with The United Nations' Population Bulletin's (2007) claim that, in Africa, there exists a high level of misinformation about fertility, specially in underpowered women.

To capture knowledge of STIs, another section of the interview inquired if the respondent had ever heard of AIDS or other STIs. A dummy variable (knowSTI) separating women who have knowledge of AIDS and STIs and women who had no information about these diseases adds another dimension in analyzing the impact of sexual health knowledge on women's sexual empowerment. The DHS asks women if they are aware of various STIs including AIDS. Women who answered yes to knowing about one or more STIs were compared to those who had no knowledge concerning these diseases. In the case of STI knowledge, 96.2% of women interviewed had heard of at least one type of STI (Table I). Perhaps the current media and public health campaigns aimed at HIV prevention contribute to this high number.

As described previously, the notion of women's empowerment is characterized by many variables and is hard to fully capture. Malhotra and Schuler (2005) outline women's empowerment as the power to make strategic life choices when they were previously unable. It seems that women who are able to break free of the patriarchical norms could have better decision-making power in regards to their health. To capture the ability to make life decisions, specifically about health, we combined two questions from the DHS to form a dummy variable (Emp) denting women who are empowered and those who are not. The first question is whether or not the respondent believes her partner approves of contraceptive methods. Of the women interviewed, 49.44% believe their partners disagree with using a method to avoid pregnancy. Second, they were asked if they were currently using any type of contraceptive method and 18.74% of women interviewed are using some form of birth control. The action of women using birth control even though they believe their partner is not in agreement demonstrates their willingness and ability to transgress patriarchal norms and to make

decisions that directly impact their life and wellbeing. Only 4.52% of women surveyed fit this criterion, but the sample size (48,749 women) is still large enough to produce sufficient variation (table I).

Finally, of all the women interviewed, who were randomly selected for the blood test, and are part of our sample, 7.31% are HIV positive (Table I). According to the UNAIDS (2008) Global Summary of the AIDS Epidemic, the HIV prevalence rate obtained from DHS samples is consistent with the actual HIV prevalence rate in sub-Saharan Africa from 2001 to 2008 (time period of HIV testing) of around 6%, making the HIV prevalence in our sample slightly higher, but not cause of much concern.

3. Results

3.1 Women's Sexual Empowerment

The results of this study parallel the findings of The Sixth African Development Forum (ADF-VI (2008)), in that women's empowerment and health decisions are positively associated and are very important. With the exception of knowledge of STIs, we find evidence that sexual health knowledge concerning ovulation and most contraceptive methods appears to have a positive impact on women's sexual empowerment (tables II and III). Knowledge of STIs is not significant, which could be evidence women are more concerned about fertility and family planning decisions than health. This would be consistent with the findings in Makinwa-Adebusoye (2002) that increased fertility can elevate a women's social status. Even if women focus more on fertility, actions based around improving health and fertility are still reducing the likelihood of contracting an STI. That is, knowledge about ovulation and birth controls are acting as conduits to decrease the likelihood of contracting an STI, even if this is not the reason women are protecting themselves.

Regarding knowledge about the menstrual cycle, all results are positive and robust across specifications. Using the matching estimator as our preferred model, women who are properly informed about ovulation and fertility are 2% more likely to use contraceptives despite her partner's opinion against birth control when compared to women who are misinformed about the menstrual cycle (table II). Understanding ovulation patterns and fertility can help women choose critical times to use contraceptives. For example, a woman may choose to use a diaphragm or spermicidal cream on days she is ovulating and most fertile. This type of fertility awareness-based method of birth control can greatly reduce the chance of an unwanted pregnancy and allow women to take better control of their lives. Knowledge of the menstrual cycle is significant at all levels and indicates that educating women about fertility and reproduction can positively impact women's rights. Mbizvo and Bassett (1996) state that there is a need for women to better understand and share the responsibility of family planning in order to foster safer, healthier sexual relationships. Women who understand the menstrual cycle will be able to actively take part in fertility regulation with her partner.

The second sexual health variable, knowledge of contraceptives, takes greater precedence in our results. In general, women who have some knowledge of birth control are 3.8% more likely to be sexually empowered than those women who have no knowledge of contraceptive methods (table II). When broken down into individual forms of birth control, some variables are significant and positive with the exception of male sterilization. Abstinence (2.9%) has

the greatest positive impact on women's sexual empowerment, while hormone injections, female sterilization, condoms, and withdrawal have no impact (table III). Religion could play a role in explaining why abstinence has the greatest influence, as sex is still a taboo subject for many religious leaders (Trinitapoli (2006)).

From these results, it appears that methods that are easier for women to control are those exerting a positive impact on sexual empowerment. For example, female sterilization and hormone injections require women to see a clinician, which is not ideal for many women. Mbizvo and Bassett (1996) claim that there is a disproportionate emphasis on procedures that affect the female partner, like female sterilization, in terms of family planning. Thus, women may feel that methods like sterilization and injections are invasive and risky and not in their control. This might also be true for condoms and the withdrawal method, which are mainly dictated by men. Similarly, the negative significance of male sterilization could be because women also do not see this as in their control, that is, if their partners are "sterilized", they answered no to our women's empowerment variable question as they are not the ones implementing the method. On the other hand, the use of the pill, IUDs, or abstinence, which are all significant and positive, are all methods, under normal conditions, in which the woman has more decision power.

Moreover, we find that the quality of birth control information a woman has is positively associated with sexual empowerment (table IV). The marginal effects demonstrate that women who only know about one birth control method are around 3% more likely to be sexually empowered, while, comparatively, women who know about all inquired methods are about 7.1% more likely to be sexually empowered. These results indicate that the more knowledge a woman has about various types of birth control methods the more control she has of her sexual health decisions. The 2007 WHO report on Women's Health and Human Rights (WHO (2007)) states that every government has the obligation to respect and protect women's rights within their country. State officials and policymakers looking to do so should consider campaigns that focus on educating women about all forms of contraceptives and about the ovulation cycle. Dugassa (2009) and Wojcicki (2005) explain that women in sub-Saharan Africa must be empowered in order to lower HIV prevalence. This paper complements these studies by investigating one specific channel, that of sexual health knowledge on women's sexual empowerment; and finds this association to be positive and significant.

Because our measure of sexual empowerment assumes that every women that is currently not using a contraceptive is less empowered than women who are (especially if their partners disapproves of contraceptive use), we re-estimate our results in table V by slightly re-defining our dependent variable as a robustness check. Table V reports average partial effects for all health knowledge variables using two different definitions of empowerment. First, we only use the variable that captures using any contraceptive method or not. Second, we use this same variable, but only for women whose partners disapproves of contraceptive use. It is clear that our results are not sensitive to these changes as most of the health knowledge variables have the same effects as in our original results.

3.2 HIV Status and Women's Empowerment

The second set of results investigates the impact of women's empowerment on HIV status, and finds that overall, women who have more control over fertility (sexual empowerment) are

3.48% less likely to be HIV positive than women who have less control over fertility decisions (table VI). A closer look at this result, however, reveals other interesting associations.

Sexual empowerment only shows association with HIV status when we interact sexual empowerment with education (Emp_primedu; Emp_secedu; Emp_hiedu) and with location of residence (Emp_rural)[1]. Specifically, our results indicate that sexual empowerment diminishes the likelihood of being HIV positive in uneducated women compared to any women with any degree of education. These results may be linked to the findings in de Walque (2009) that increased educational attainment is associated with higher HIV prevalence, which we find in our model as well. That is, the more education one has, the better the understanding about the probabilities of becoming HIV infected. This could lead to an increase in risky behavior impeding any effect that sexual empowerment may exert on decreasing the likelihood of being HIV positive. Because there is still a very large number of uneducated women in sub-Saharan Africa (close to 50%), we can still conclude that more sexual empowerment is beneficial to prevent future HIV infections.

Another interesting result from table VI indicates sexual empowerment can also serve to mitigate the positive association of urban location with HIV prevalence that Glick (2007) describes. That is, women who live in rural areas are 2% less likely to be HIV positive; however, women who live in rural areas and are sexually empowered are 2.89% more likely to be HIV positive than their urban counterparts. Also, women who are empowered and live in urban areas are 3.48% less likely to be HIV positive. This can potentially indicate that empowerment policies targeted in rural areas are needed or are not very effective.

4. Conclusion

This study complements previous research and indicate that targeting women's sexual empowerment may have positive implications in preventing HIV. It also suggests that the more information about contraceptive methods and fertility a woman knows, the more likely she is to be empowered. Hence, this may have implications for future public policies aimed at lowering HIV incidence in sub-Saharan Africa.

However, this paper examines a narrow dimension of women's empowerment. In order to effectively address women's empowerment in potential prevention programs, more empirical studies regarding factors that promote empowerment is required. To better understand the effect of these factors on empowerment, future research should analyze more examples of women's empowerment than covered in the scope of this study. Malhotra and Schuler (2005) outline many different forms of women's empowerment that can be used in future research. Also, additional research can improve our knowledge about women's empowerment and its association with HIV infection. Additional in-depth analysis relating to women's empowerment can improve our understanding of the gender-gap in HIV prevalence in sub-Saharan Africa and can also provide a framework for effective HIV prevention policies.

[1]In the version of the model with no interactions, sexual empowerment was not significant.

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Table I: Summary Statistics: Sexual Empowerment, HIV Status, Health Knowledge, and some Controls

Variable	Mean	Standard Error	Observations
		Empowerment	
Emp.	0.045	0.207	48,749
		HIV Prevalence	
HIVpos	0.073	0.260	29,018
		Health Knowledge	
knowprev	0.924	0.264	66,266
pill	0.847	0.359	66,256
IUD	0.459	0.498	66,078
injections	0.837	0.3691	66,249
condom	0.817	0.386	66,241
female sterl.	0.523	0.499	66,251
male sterl.	0.269	0.443	66,232
abstinence	0.437	0.496	66,247
withdrawal	0.375	0.484	66,222
knowSTI	0.962	0.191	66,246
knowOvul	0.192	0.394	66,176
		Some Controls	
noedu	0.476	0.482	66,266
primedu	0.357	0.479	66,266
secedu	0.152	0.359	66,266
hiedu	0.014	0.118	66,266
rural	0.749	0.433	66,266
mult. marr.	0.177	0.381	66,266
age	31.37	8.84	66,266

Table II: Association Between Women's Health Knowledge and Sexual Empowerment (Average Partial Effects)

	Probit	Logit	LPM	Matching
Age	0.003***	0.003***	0.003***	yes
	[0.000]	[0.000]	[0.000]	
Agesq	-0.001***	-0.001***	-0.001***	yes
	[0.000]	[0.000]	[0.000]	
Mult. Marr.	0.012***	0.012***	0.013***	yes
	[0.002]	[0.002]	[0.003]	
Rural	-0.004	-0.003	-0.003	yes
	[0.003]	[0.002]	[0.003]	
Prim. Educ.	0.012***	0.013***	0.012***	yes
	[0.003]	[0.003]	[0.002]	
Sec. Educ.	0.016***	0.017***	0.020***	yes
	[0.003]	[0.003]	[0.004]	
Terc. Educ.	-0.010	-0.009	-0.016	yes
	[0.008]	[0.008]	[0.010]	
Know. Prev.	0.056***	0.064***	0.032***	0.038***
	[0.007]	[0.008]	[0.002]	(0.000)
Know. STI	0.005	0.007	0.001	0.002
	[0.008]	[0.009]	[0.004]	(0.912)
Know. Ovul.	0.016***	0.015***	0.019***	0.021***
	[0.002]	[0.002]	[0.003]	(0.000)
Country Effects	yes	yes	yes	yes
Wealth Effects	yes	yes	yes	yes
Religion Effects	yes	yes	yes	yes
Wald-Chi2/F-test	709.8***	740.83***	26.30***	
Pseudo R^2	0.059	0.059	0.020	

*** significant at 1%, ** significant at 5%, * significant at 10%; Robust p-values in brackets for probit, logit and LPM estimators. Abadie-Imbens p-values in parenthesis for matching estimator.

Table III: Specific Birth Control Knowledge and Empowerment (Average Partial Effects)

	Probit	Logit	LPM	Matching
Age	0.003***	0.002***	0.002***	yes
	[0.001]	[0.001]	[0.000]	
Agesq	-0.001***	-0.001**	-0.001**	yes
	[0.000]	[0.000]	[0.000]	
Mult. Marr.	0.011***	0.011***	0.013***	yes
	[0.002]	[0.002]	[0.003]	
Rural	-0.003	-0.003	-0.002	yes
	[0.003]	[0.002]	[0.003]	
Prim. Educ.	0.006**	0.006**	0.007**	yes
	[0.003]	[0.003]	[0.002]	
Sec. Educ.	0.007*	0.007*	0.011**	yes
	[0.004]	[0.004]	[0.004]	
Terc. Educ.	-0.018**	-0.017**	-0.024**	yes
	[0.008]	[0.008]	[0.010]	
Pill	0.009**	0.009**	0.008**	0.014*
	[0.004]	[0.04]	[0.003]	(0.080)
IUD	0.005**	0.004*	0.005**	0.014***
	[0.002]	[0.002]	[0.002]	(0.002)
Injections	-0.001	-0.002	-0.001	-0.001
	[0.004]	[0.004]	[0.004]	(0.989)
Condom	0.014***	0.015***	0.008***	0.001
	[0.004]	[0.005]	[0.003]	(0.902)
Female Sterl.	-0.003	-0.003	-0.002	0.002
	[0.002]	[0.002]	[0.002]	(0.649)
Male Sterl.	-0.005*	-0.004*	-0.007**	-0.007*
	[0.002]	[0.003]	[0.003]	(0.110)
Abstinence	0.027***	0.028***	0.025***	0.029***
	[0.002]	[0.003]	[0.002]	(0.000)
Withdrawal	0.004*	0.004*	0.005**	0.004
	[0.002]	[0.002]	[0.002]	(0.296)
Know. STI	0.007	0.008	0.002	0.021
	[0.008]	[0.009]	[0.004]	(0.233)
Know. Ovul.	0.012***	0.011***	0.015***	0.014***
	[0.002]	[0.002]	[0.003]	(0.000)
Country Effects	yes	yes	yes	yes
Wealth Effects	yes	yes	yes	yes
Religion Effects	yes	yes	yes	yes
Wald-Chi2/F-test	889.39***	933.98***	21.54***	
Pseudo R^2	0.069	0.069	0.024	

*** significant at 1%, ** significant at 5%, * significant at 11%; Robust p-values in brackets for probit, logit and LPM estimators. Abadie-Imbens p-values in parenthesis for matching estimator.

Table IV: Quality of Birth Control Knowledge and Empowerment (Average Partial Effects)

	Probit	Logit	LPM
Age	0.030***	0.002***	0.002***
	[0.001]	[0.001]	[0.001]
Agesq	-0.001***	-0.001**	-0.001**
	[0.000]	[0.000]	[0.000]
Mult. Marr.	0.011***	0.011***	0.013***
	[0.002]	[0.002]	[0.003]
Rural	-0.003	-0.003	-0.002
	[0.003]	[0.002]	[0.003]
Prim. Educ.	0.007**	0.008**	0.008***
	[0.003]	[0.003]	[0.002]
Sec. Educ.	0.010**	0.010***	0.014***
	[0.004]	[0.004]	[0.004]
Terc. Educ.	-0.015*	-0.014*	-0.020**
	[0.009]	[0.009]	[0.010]
Qual1	0.026***	0.031***	0.008**
	[0.009]	[0.011]	[0.003]
Qual2	0.040***	0.048***	0.018***
	[0.008]	[0.010]	[0.003]
Qual3	0.059***	0.068***	0.034***
	[0.008]	[0.009]	[0.003]
Qual4	0.061***	0.070***	0.036***
	[0.008]	[0.009]	[0.003]
Qual5	0.064***	0.073***	0.039***
	[0.008]	[0.009]	[0.003]
Qual6	0.069***	0.078***	0.045***
	[0.008]	[0.009]	[0.003]
Qual7	0.074***	0.083***	0.051***
	[0.008]	[0.009]	[0.004]
Qual8	0.070***	0.079***	0.044***
	[0.008]	[0.010]	[0.004]
Know. STI	-0.001	-0.002	-0.003
	[0.008]	[0.010]	[0.004]
Know. Ovul.	0.014***	0.013***	0.017***
	[0.002]	[0.002]	[0.003]
Country Effects	yes	yes	yes
Wealth Effects	yes	yes	yes
Religion Effects	yes	yes	yes
Wald-Chi2/F-test	779.23***	816.18***	22.70***
Pseudo R^2	0.065	0.065	0.022

*** significant at 1%, ** significant at 5%, * significant at 10%; Robust standard errors in brackets for probit, logit and LPM estimators.

Table V: Robustness Checks: Modified Sexual Empowerment Variable (Average Partial Effects - Logit Model)

$y_i = 1$ if using contraceptive, $y_i = 0$ otherwise			
Model 1		Model 2	
Pill	0.048***	Know. Prev.	0.359***
	[0.008]		[0.022]
IUD	0.037***	Know. STI	0.058***
	[0.004]		[0.020]
Injections	0.061***	Know. Ovul.	0.045***
	[0.008]		[0.004]
Condom	0.056***		
	[0.008]		
Female Sterl.	0.003		
	[0.005]		
Male Sterl.	0.013***		
	[0.004]		
Abstinence	0.064***		
	[0.004]		
Withdrawal	0.028***		
	[0.004]		
Wald-Chi2/F-test	6096.07***	Wald-Chi2/F-test	4880.21***
Pseudo R^2	0.149	Pseudo R^2	0.132
$y_i = 1$ if using contraceptive, $y_i = 0$ otherwise; given partner disapproves			
Model 1		Model 2	
Pill	0.020**	Know. Prev.	0.135***
	[0.008]		[0.015]
IUD	0.017***	Know. STI	0.029
	[0.004]		[0.017]
Injections	0.002	Know. Ovul.	0.037***
	[0.007]		[0.004]
Condom	0.027***		
	[0.009]		
Female Sterl.	-0.001		
	[0.005]		
Male Sterl.	0.001		
	[0.005]		
Abstinence	0.063***		
	[0.005]		
Withdrawal	0.019***		
	[0.004]		
Wald-Chi2/F-test	1612.07***	Wald-Chi2/F-test	1160.5***
Pseudo R^2	0.146	Pseudo R^2	0.119

*** significant at 1%, ** significant at 5%, * significant at 11%; Robust p-values in brackets.

Table VI: Association Between HIV Status, Sexual Empowerment, Education, and Location of Residence (probit regression)

	Marginal Effects	90% C.I.
Age	0.008***	[0.005, 0.010]
Agesq	-0.0001***	[-0.000, -0.000]
Mult. Marr.	0.034***	[0.028, 0.040]
Know. Prev.	0.006	[-0.008, 0.021]
Know. STI	0.043*	[0.005, 0.081]
Know. Ovul.	-0.008**	[-0.014, -0.001]
Rural	-0.021***	[-0.028, -0.014]
Prim. Educ.	0.013***	[0.005, 0.020]
Sec. Educ.	0.014**	[0.005, 0.023]
Terc. Educ.	-0.001	[-0.025, 0.022]
Empowerment	-0.034*	[-0.064, -0.004]
Emp_rural	0.028*	[0.003, 0.054]
Emp_primedu	0.023	[-0.005, 0.051]
Emp_secedu	0.020	[-0.013, 0.053]
Emp_hiedu	0.035	[-0.048, 0.120]
Country Effects	yes	
Wealth Effects	yes	
Religion Effects	yes	
Wald-Chi2	645.14***	
Pseudo R^2	0.112	

*** significant at 1%, ** significant at 5%, * significant at 10%.