Investigating the timing of first sexual intercourse in the context of HIV/AIDS in Edo State, Nigeria

Eric Y Tenkorang, PhD[1]
Eleanor Maticka-Tyndale, PhD[2]
Isaac Luginaah, PhD[3]

[1] Social Justice and Sexual Health Research Lab. Dept. of Sociology, Anthropology and Criminology, University of Windsor.
[2] Social Justice and Sexual Health Research Lab. Dept. of Sociology, Anthropology and Criminology, University of Windsor
[3] Department of Geography, University of Western Ontario, London-Ontario.

Abstract

Using the Information-Motivation-Behavioral Self Efficacy and Skills (IMB) model and applying discrete time hazard techniques, this study examines the correlates of age of first sexual intercourse for rural youth aged 11-17 enrolled in junior secondary schools in Edo State, Nigeria. Results indicate strong significant relationships between components of the IMB model and age at first sex for boys and girls, in particular for boys. Perceiving one's self at risk of contracting HIV from sex delays the timing at first sex while experiencing pressure from others to engage in sex hastens the timing for boys and girls. Boys with knowledge about HIV have lower risks of experiencing first sexual intercourse earlier, but those who endorse more myths about the disease have higher risks. Boys who thought they could not abstain from sex had earlier first sex. Boys and girls with high condom use self-efficacy also had earlier timing to first sex.

Keywords: Nigeria; Edo-State; age at first sex; knowledge about AIDS; discrete time hazard models; perception of risk

Introduction

Various authors have conceptualized the initiation of sexual activity in early adolescence (e.g. at 15 years or less) as risky given that it predisposes adolescents to the risk of HIV infection (Akwara et al. 2003; Desgrees du Lou, 1999; Tapert et al. 2001; Tenkorang et al. 2009; Tenkorang and Maticka-Tyndale, 2008). Early sexual debut poses special risks for young people not only because they often lack knowledge of how to prevent STI's, including HIV/AIDS, but also because at this stage of the life course they are often unable to successfully negotiate for safer sex (Hulton et al. 2000; Zulu et al. 2002). In fact, early sexual intercourse has been linked to other risky sexual behaviors including lack of condom use and multiple sexual partnerships. A study among young men in a rural district of KwaZulu-Natal, South Africa by Harrison et al. (2001) showed that youth were more likely not to use condoms during sexual intercourse and to have had multiple and casual partners when they had their first sexual encounter before age 15. Similarly, Akwara et al. (2003) reported that Kenyan youth are about 50 percent more likely to have multiple sexual partners and to have sex without condoms when their sexual debut occurs as early as 15 years. Evidence thus far shows that delays of first sexual intercourse may be an important strategy towards AIDS risk reduction, but very few studies have examined postponement as a preventive strategy.

Using the Information-Motivation-Behavioral Self Efficacy and Skills model (IMB) developed by Fisher and Fisher (1993), the present study investigates the correlates of first sexual intercourse among rural youth in Edo State, Nigeria. The IMB model portrays adoption of self-protective behavior, such as delaying sexual intercourse, as dependent on knowing that the behavior reduces the risk of HIV infection, being

motivated to take up the behavior, and being equipped with the requisite self-efficacy and skills to take on the self-protective behavior.

Context

Nigeria has an adult HIV prevalence of 3.1% (UNAIDS, 2008: 43), with 2.3% of women and 0.8% of men aged 15-24 years estimated to be infected (UNAIDS, 2008: 217). While this appears low compared to countries of southern and eastern Africa, it is one of the highest rates of infection in the West African sub-region (Mberu, 2008). With a population of almost 150 million, Nigeria has the third highest number of HIV infected adults in the world (after South Africa and India). Most recently, prevalence has stabilized (UNAIDS, 2008). Some suggest this may be due to the enormous inflow of funds from the Nigerian government and non-governmental organizations including the American President's Emergency Plan for AIDS Relief (PEPFAR) (see Ojieabu et al., 2008). Declines in prevalence have also been partly attributed to the launching of a National Health Policy in 2000 whose main target was to change behaviors that led to the contraction of sexually transmitted infections among adolescents (Slap et al. 2003).

Edo State, our study site, is located in the Southern Niger Delta area of Nigeria. It is one of the poorest and least industrialized states, yet it has one of the highest literacy rates (Policy Project, 2004). Several studies point to higher percentages of sexually active youth in this state than most others in the country, an active commercial sex industry and international sex trafficking as indicators that youth in the state are vulnerable to STIs and HIV (Ojieabu et al. 2008; Policy Project, 2004; Temin et al. 1999; WHARC, 2003). Youth vulnerability is confirmed in a recent report published by the Women's Health

Action Research Centre that noted increases in HIV prevalence among youth from 7% in 1995 to 13.3% in 2000 with approximately 74.6 % of these infections among adolescent girls (WHARC, 2003). Such data make Edo State, and in particular youth in this state, a high priority area for HIV/AIDS prevention and programming.

One such initiative is the *HIV Prevention for Rural Youth (HP4RY)* (Maticka-Tyndale, Onokerhoraye, & Esiet, 2007) programme funded by the Global Health Research Initiative of Canada. The goal of this initiative is to increase behaviours that protect against HIV infection among youth using the Family Life and HIV Education (FLHE) programme in Junior Secondary Schools combined with community-based programming. The specific objectives related to youth behaviours are to shift the scripting of sexual activity among youth in Edo State toward later initiation of sexual intercourse, reduction in the number of sexual partners, and increased use of condoms. The FLHE programme, like many others, is built on a foundation of increasing knowledge, motivation, and skills, or what Fisher and Fisher (1993) refer to as an IMB model of behaviour promotion and change. In this paper we use baseline data collected before initiation of programming in schools and communities to examine the power of the IMB model to predict age of first sexual intercourse, one of the primary targets of the HP4RY programme.

Methods

Sample

The analyses for this paper use survey data collected from JSS 1, 2 and 3 students (approximately equivalent to North American grades 7-9) attending 30 public schools in Edo State. Schools were randomly selected using proportional geographic sampling, with

3 schools that met the sampling criteria selected from each of 10 Local Government Areas proportionately distributed over 3 Senatorial Districts in the state. Sampling criteria included: location in a rural community (under 20,000 population), having at least one government employed teacher responsible for an FLHE carrier subject (English, social studies, and integrated science), not having current or future planned HIV interventions underway in the school or its local community, accessibility to the community by road, and agreement from community and school leaders to participate in the project. Data for the current analyses were collected between October 2008 and February 2009.

Data Collection

All students attending school on data collection days were invited to complete self-report surveys. Surveys were completed in sex segregated classrooms with space between students to provide a measure of privacy. Multilingual project staff read surveys aloud in English and Pidgin English while students followed along on their own copies and marked their answers. Students were able to ask for repetition and clarification from project staff.

Surveys were scanned using SNAP software (see www.snapsurveys.com) with trained project staff and a principle investigator checking for inconsistencies or potential errors during scanning. Data were converted to SPSS for analysis.

Questionnaire Development

The student questionnaire was modeled on a combination of the WHO/UNESCO HIV Prevention Evaluation Kit (WHO, 1999) and a survey used with students in a similar age group in Kenya (see www.psabh.info). The research process and questionnaires were

pre-tested in a local school. Research procedures and data collection instruments were reviewed by Research Ethics Boards of 3 Universities in Canada and at the University of Benin in Nigeria as well as by the Edo State Ministry of Education.

Measures

The dependent variable used for this study is a timing variable, 'age at first sexual intercourse'. Respondents were asked specifically whether they had ever engaged in sexual intercourse (defined as penile-vaginal penetration) and, if so, their age at first sexual intercourse. Respondents who had not experienced intercourse by the time of the survey were right censored. The focal independent variables included knowledge about ways to avoid the spread of HIV/AIDS, myths surrounding HIV transmission, experience of pressure to indulge in sexual intercourse, peer role modeling related to sexual experience, perception of one's own risk of contracting HIV/AIDS from sex, personally knowing someone who has died of AIDS, abstinence and condom use self efficacy and communication with teachers and peers about HIV/AIDS. We also examined timing of first sexual intercourse in relation to socio-cultural variables including religion, family structure and ethnic group.

Five of the independent variables (factual knowledge, transmission myths, communication, sexual pressure and condom use self efficacy) were scalar measures created by summing the responses to conceptually relevant questions weighted by their factor loadings. Thus scales were standardized around a mean of 0 and standard deviation of 1 and had a sufficient dispersion of values to satisfy requirements for interval measures. Factor scores and loadings were obtained using the factor analysis option in LISREL. Factual knowledge and myths about HIV prevention and transmission were

created from responses to 10 questions (5 factual and 5 local myths). Factual knowledge questions asked whether respondents knew that HIV/AIDS could be prevented by avoiding sex; having fewer sexual partners; not sharing razor blades, knives or sharp objects; being faithful to an uninfected partner; using condoms; and not sharing blades in circumcision. Questions about local myths asked respondents whether HIV could be transmitted through wearing the clothes of someone sick with AIDS, sharing plates of food with an infected person, mosquitoes, shaking hands with someone sick with AIDS, or whether you were safe when you had sex with someone you knew well. Correct responses on knowledge questions were coded '1' and incorrect were coded '0'. On the myth questions, responses endorsing myths were coded '1' and those rejecting myths were coded '0.' Factor loadings for the latent constructs ranged from 0.623 to 0.747 and the reliability coefficients (Cronbach's alpha) were 0.70 and 0.64 for *prevention knowledge* and *transmission myths* respectively. Higher values on the knowledge scale indicate correct knowledge and higher values on the myth scale show endorsement of myths.

Nine questions asked about communication with peer educators, parents and teachers about HIV, condoms and abstaining from sex (yes=1, no=0). Missing cases on this variable were imputed using the Expectation Maximization (EM) algorithm. Factor loadings for *communication about HIV* ranged from 0.59 to 0.66 with a reliability coefficient (Cronbach's Alpha) estimated as 0.71. Higher values on this scale indicated greater communication.

Motivations related to first sexual intercourse were measured both in terms of the pressures motivating participants toward early initiation and the personal motivations that

would push them to delay initiation. The former were measured with a scale that used indicators developed from research in Kenya with a similar age group (Maticka-Tyndale et al., 2004; 2007). Students were asked whether they had ever felt pressured to engage in sexual intercourse because their friends encouraged them, an older person encouraged them, their boyfriend or girlfriend wanted to, they would receive money or gifts, someone had arranged for them to have sex, or someone had tried to physically force them to have sex (yes=1; no=0). Factor loadings for these *sexual pressure* items ranged from 0.61 to 0.73 with a reliability coefficient (Cronbach's alpha) of 0.70. Higher values on the scale indicated experience of a larger number of different types of pressures or motivators to engage in sexual intercourse.

Peer role modeling of sexual activity is also considered a motivator for sexual debut. It was measured by asking how many same-sex classmates the respondent thought had had sex. Responses were dummy coded as 'nobody' (reference) 'a few', 'some' and 'I don't know'.

Two motivators to <u>avoid</u> sexual intercourse included personal perception of risk and perception of AIDS as serious. Students were asked whether they thought they could get HIV from having sex. Five ordered response categories were dummy coded: no, definitely not (reference category); probably not; not sure' probably I can; and yes, definitely I can. Perception of the seriousness of AIDS was measured by participants' reports of personally knowing someone who had died of AIDS with 'yes' and 'don't know' dummy coded against the reference category, 'no.'

Behavioral self efficacy was measured with abstinence and condom use self efficacy. A *condom use self efficacy* scale was created from questions that asked youth

whether they can talk to their boyfriend/girlfriend about using a condom, they have enough money to buy condoms, girls have the right to insist boys wear a condom and whether they can make sure condoms are used during sexual intercourse (yes=1; no or don't know=0). Factor loadings for these items ranged from 0.554 to 0.795 with a reliability coefficient (Cronbach's Alpha) of 0.683. Higher values on the scale indicate stronger condom use self-efficacy. Abstinence self-efficacy was measured with a question that asked respondents whether they can say no to sexual intercourse dummy coded with 'no' and 'don't know' as the reference category compared to 'yes'.

Religion, ethnicity and family structure were measured by personal identification and dummy coded. Respondents self identified as Christian (reference group), Muslim, Traditionalists or some other religious group. Given the patriarchal structure of all ethnic groups in this region, where children are identified as and raised within the cultural framework of their father's ethnic group, respondents identified their father's ethnic group as Bini (reference group), Esan, Owan-Ora, Akoko Edo, Estako, Yoruba, Urhobo and a generic 'other'. Family structure was measured with a question of whether respondents lived with both parents (reference group), their mother, father or neither parent.

Data Analysis

A discrete time hazard model is used to examine the impact of selected covariates on the dependent variable, 'age at first sexual intercourse'. The discrete time hazard model is usually preferred over a continuous time model when the time units on the dependent variable are very large and where the problem of ties is imminent, as in our case where age at first sexual intercourse is measured in years (see Allison, 2003; Brown,

1975). Specifically, youth reported their age at first sexual intercourse in one of four year groupings '12 years or less', '13-14' years, '15-16 years' and '17 years or more'. Clearly, we cannot ignore the discreteness and treat time as if it were continuous, hence the application of this technique. Like all event history techniques, the discrete time hazard models also allow respondents who had not experienced the event (first sexual intercourse) at the time of the survey to be right censored. The use of a discrete time hazard model requires that our data be transformed from a person-level, where each individual in the study has only one line of data, to a person-period, where each individual in the study has multiple lines of data such that the data set contained records for each individual with information on each predictor at each time period the data were recorded (Willett and Singer, 1993; Guillory, 1997). After transforming the data from person-level to person-period, a total of 8776 observations were recorded, 4899 for boys and 3877 for girls.

To accommodate the nested structure of the data (pupils nested within schools) we used the GLLAMM program available in STATA to build a random intercept model (multi-level models). We therefore consider two sub-models, an empty or null model (Model 1 in Tables 3a and 3b) to determine whether there are any variations across schools with respect to the timing of experiencing first sex and from which we proceed to build a random intercept model where variables are incorporated to capture the variance. We thus specify the null as:

$$\log it\left(P_{itj}\right) = \alpha_0 + \mu_{0j} \quad \text{.....(1)}$$

When variables are introduced into equation 1, it reduces to:

$$\log it\left(P_{itj}\right) = \alpha_0 + \sum_{h=1}^{r} \beta_h X_{hitj} + \mu_{0j} \quad \text{.....(2)}$$

where $\log it(P_{itj})$ in equation 2 is the log odds of pupil i of school j experiencing first sexual intercourse at period t; α_0 in this paper is the population mean; x_{hitj} are independent variables at either the individual or school level and $\beta_h\ (h = 1,.....,\ r)$ the corresponding regression coefficients with *r* as the total number of covariates; μ_{0j} is the random deviation from the population average for school *j* or school-level random effect which is normally distributed with a mean of zero and variance, σ_u^2 (Raudenbush & Bryk, 2002; Goldstein, 1995; Callens & Croux, 2005). The regression coefficient β can be exponentiated and interpreted as a relative risk in which case if the relative risk of a particular covariate is greater than one it will mean that respondents with such characteristics have a higher risk of experiencing sexual intercourse or will experience the event of first sex at an earlier age compared to those in the reference category. A relative risk lower than one, on the contrary, indicates lower risks of experiencing first sexual intercourse or a later age of sexual initiation.

The extent of clustering across schools is estimated using the intra class correlation. For binary logit models this is calculated as the ratio of the variance at the school level to the sum of the variances at the individual and school levels, $\rho = \mu_u^2 \Big/ \mu_u^2 + \frac{\pi^2}{3}$ where μ_u^2 is the school-level variance and $\pi^2/3$ the variance at level 1 (individual-level) which is that of a standard logistic regression (Pebley et al.1996).

Results

Table 1 provides information about the students in the *HP4RY* program who participated in the research. Students are relatively evenly distributed across the three JSS grades (not reported in table) and clustered between 13 and 16 years of age, although ages range from under 11 years to over 17. While the majority of boys, 50.2%, indicated they were sexually experienced, only 38% of girls did so. Considering only those who have engaged in sexual intercourse, we see a younger age profile for first sexual intercourse for boys than for girls. About 40.9% of boys reported first sex at 12 years or less compared to 27.5% of girls. Results also show that boys have both a higher mean knowledge score and greater endorsement of myths than girls. Girls, however, have higher scores on communication about HIV-related issues with peers and teachers than their male counterparts.

The mean sexual pressure score was higher for females than males, meaning that females come under pressure to have sex from more sources than do males. However, peer role modeling of sexual activity was more similar across genders with 22% of boys and 16% of girls identifying most of their same-sex classmates as sexually experienced. When asked whether they think having sex puts them at risk of HIV, 37.1% of boys thought they were definitely not at risk compared to 27.7% of girls. Of note is that 32% of girls and 21% of boys were unsure. Most boys (57.2%) and over a third of girls (37.2%) did not know anyone who had died of AIDS. Here again, girls were more likely to be unsure (42.5%) than were boys (20.6%). Boys had higher condom use self efficacy than girls and girls were less likely to feel they couldn't say no to sex (25.4% for girls and 38.4% for boys), although they were more likely than boys to be unsure whether they could 'say no.'

The cultural profile shows that the majority of respondents are Christians, followed by Muslims, with just a few identifying with the Traditional and other religious groups. Also, the majority of boys and girls belonged to the Esan ethnic group followed by Bini, Akoko Edo and Owan-Ora, all of which are indigenous to this state. About 72% of both boys and girls lived with both parents with only 4% reporting that they do not live with either parent. Among youth who live with only one parent, the mother was most common (19.8% of girls and 18% of boys).

Bivariate Analysis

Table 2 presents results of bivariate relationships between the dependent variable, age at first sex, and the select independent variables. Results indicate strong significant relationships between all components of the IMB model and age at first sexual intercourse for boys and most components for girls. While an increase in knowledge about HIV/AIDS delays age of first sexual intercourse for boys, endorsing transmission myths hastens the event, i.e. they engage in sexual intercourse at an earlier age. It is noteworthy that knowledge only approaches statistical significance for girls and endorsement of transmission myths has no association with timing of first intercourse. For both boys and girls, communicating more about HIV/AIDS related topics with peer educators and teachers delays first sexual intercourse (relative risks for boys and girls are 15.6% and 20% respectively).

It is also clear from Table 2 that sexual pressure hastens timing of first sexual intercourse. For each standard deviation unit increase in sexual pressure, boys and girls respectively have 24% and 10.3% higher risks of experiencing first sex at a younger age.

Compared to respondents who thought they had no same-sex classmates who had had sex, those who reported they did not know if any had had sex delayed first sexual intercourse (i.e. boys are at 37.4% and girls at 38.6% lower risk of earlier sexual debut). Respondents who thought they stood a chance of contracting HIV through sexual intercourse experienced their sexual debut later (34.4% and 39.7% lower risks of experiencing first sex for boys and girls respectively). Knowing whether someone has died of HIV/AIDS is also significantly related to the risks of experiencing first sexual intercourse. Compared to those who did not know someone who has died of AIDS, boys who were not sure delayed first sex (24.3% lower risks). Both boys and girls with higher condom self-efficacy experienced their sexual debut at an earlier age (RR=21% for boys and 22% for girls). For abstinence self-efficacy, boys who reported that they could not say 'no' to sex debut earlier (risk of experiencing first sex is 39% higher).

With only one exception, the socio-cultural variables did not demonstrate any statistically significant associations with timing of first intercourse. Girls who reported their religion as other than Christian, Muslim or Traditional engaged in sexual intercourse at a younger age (RR=85.8%). For ethnicity however, the results for Estako girls approached significance at a *p-value* of .10. Girls from this ethnic group experienced first intercourse earlier compared to Bini girls. Also, the association for boys who lived with only their fathers approached significance ($p < .10$) and delayed first sex, compared to those who lived with both parents.

Multivariate Analysis

The multivariate tables have three models each for boys and girls (see Tables 3a and 3b). The null model (Model 1) in both tables determines if clustering within schools is significant, and shows the extent of heterogeneity existing at the school level. The Null model for boys and girls shows significant variance at the school level. The intra-class correlations, which show the extent of variance to be captured across schools, are about 5% and 11% for boys and girls respectively (see random effects component of Tables 3a and 3b).

Models two of Tables 3a and 3b estimate the effects of primary independent variables from the IMB model on age at first sexual intercourse. In model three, we add socio-cultural variables. The variance existing at the school level is estimated in all the models.

When the IMB indicators are entered we find that most bivariate results are robust for boys. Prevention knowledge, perceiving oneself at risk of contracting HIV from sexual activity, being uncertain as to whether someone has died of AIDS, and higher abstinence self efficacy all contribute to delays in first sexual intercourse. On the other hand, myth endorsement, experiencing pressure to engage in sex from a greater number of sources, and condom use self-efficacy contribute to earlier timing of first intercourse. For girls, however, few of the bivariate associations are robust. Only prevention knowledge, communication about HIV and AIDS in the school, and perceiving oneself as definitely at risk for HIV from sexual activity retained an influence of delaying first intercourse while condom use self-efficacy and sexual pressure from a greater number of sources retained their effect on timing by hastening first intercourse.

In the final model where the socio-cultural variables were added we still observe the same pattern of associations between the IMB indicators and age at first sex for boys. In addition, boys who identify as Akoko-Edo have higher risks of experiencing first sexual intercourse at a younger age (RR=46%).

For girls, the addition of socio-cultural variables again detracts from the number of IMB indicators associated with age at first intercourse. In this case, knowledge drops just below significance at a *p-value* of .10 and communication about HIV/AIDS in schools drops well below significance Sexual pressure, risk perception and condom use self efficacy retained their association. Also, religion and ethnicity approached significance at a *p-value* of .10. Compared to Christians, Muslim girls have higher risks (58%) of experiencing first sexual intercourse at a younger age. Estako girls have higher risks (92%) of experiencing first sexual intercourse at a younger age.

Examining the variance at the school level, and the intra-class correlations in all models, we find that for the male model, the variance at the school level reduces to non-significance once the IMB indicators are included. This means that individual-level variables are just enough to explain variance in the dependent variable. For the girls' model however, even after including all individual level variables, the variance across schools still remains significant, implying that there are some unobserved school level factors that may help explain the phenomenon of first sexual intercourse among girls.

Discussion

Results from this study support the conclusion that the IMB framework is useful in understanding the associations between information, motivation and behavioral self efficacy, and timing of first sexual intercourse among boys in Edo State, Nigeria, but is

not as useful for girls. The finding that boys with higher knowledge about HIV/AIDS initiate first sexual intercourse later is consistent with past research that has identified an association between knowledge and sexual behaviors (see Bertrand et al. 1995; Desgrees du Lou, 1999; Tenkorang et al. 2009; Tenkorang and Maticka-Tyndale, 2008). Also, the relevance of communicating about HIV/AIDS in schools to time to first sex in the bivariate models provides evidence that adopting a more open approach to issues of sexuality and HIV/AIDS may delay the onset of sexual intercourse among youth in Edo State, Nigeria. The significance of 'myth endorsement' for boys suggests, however, that misconceptions about the transmission of the virus remain and have a deleterious influence on risk reduction. Bertrand et al. (1999) have argued that such misconceptions, identified as 'transmission myths' in this paper, undermine efforts made at curbing the pandemic. As noted elsewhere, countering local myths is as important as understanding 'the facts' about HIV transmission (Tenkorang and Maticka-Tyndale, 2008).

The literature surrounding the relationship between risk perception and sexual behavior is mixed. Some authors using cross-sectional data found that risk perception is positively related to sexual behaviors, i.e. respondents with high risk perceptions are more likely to engage in risky sexual behaviors (Akwara et al. 2003; Bertrand et al. 1995; Cleland, 1995; Macintyre et al. 2004; Tenkorang and Maticka-Tyndale, 2008). An explanation often acknowledged in the literature is that we are unable to deal with the problem of simultaneity between the two variables given the cross-sectional nature of the data; a problem better handled with longitudinal data (Anderson et al 2007; Tenkorang et al. 2009). Also important, but not frequently mentioned, is that questions asked regarding risk perception are general and not related specifically to sexual activity. But the source

of risk may be important, in particular when youth may also feel at risk due to circumstances not related to sexual activity (e.g. male or female circumcision, sharing needles, witchcraft, and casual contact with others). In this paper, youth were asked specifically about their risks of contracting HIV from sexual activity. Consistent with the theorized relationship between perceived risks and sexual behavior, both boys and girls who thought they were at risk of getting HIV from sex delayed the timing of first sexual intercourse, compared with those who thought they were not at risk. These results provide support for the rational assumption that humans will act to reduce risks from undesirable outcomes (Fisher and Fisher, 2000; Fisher and Fisher, 1999; Macintyre et al. 2004). Contrary to this rational approach however, is the finding that boys (as well as girls if we consider only the bivariate results) who said they were not sure if they knew someone who had died of AIDS delayed first sexual intercourse, compared to those who knew someone who had died of the disease. Similar findings are reported in Kenya and South Africa (see Tenkorang and Maticka-Tyndale, 2008; Tenkorang et al. 2009) and there are plausible reasons for such findings. First, we are unable to clearly disentangle the causal order between the two variables given the cross-sectional nature of the data. It may be that youth first engaged in sex before knowing someone who had died of AIDS or that youth with sexual experience belong to a subgroup or network that encourages early sexual activity and thus includes older members who became infected and died. Additionally, as Macintyre and her colleagues (2004) have theorized, knowing whether someone has died of HIV/AIDS may only have an impact if the infected or deceased person is close to the respondent. Finally, some research suggests that the visibility of many AIDS deaths may lead to fatalism (Foster, 2001; Meyer-Wertz, 2005). Clearly,

more studies are required in this area to enhance our understanding of how people infected with HIV affect those close to them.

There are several studies that show how sexual pressures encourage youth to be sexually active (Maticka-Tyndale et al. 2005; Temin et al. 1999; Zulu et al. 1993) especially in the sub-Saharan African (SSA) context where sexual behaviors are deeply rooted in the gender-specific expectations of cultural groups. In many SSA cultures, boys gain social recognition when they become sexually active, while girls are expected to remain submissive even in sexual bargaining (Maticka-Tyndale et al. 2003; Mensch et al. 1998; Varga, 2003). Of interest is that although girls, on average, reported more pressure than did boys, the strength of the association between amount of pressure and timing of first intercourse was stronger for boys than girls. Much research attention has been focused on the pressures that girls face to engage in sex (e.g. Maticka-Tyndale et al., 2003; Mensch et al., 1998). In our earlier research in Kenya (Tenkorang & Maticka-Tyndale, 2008), we found that pressures had equal effects on the timing of first intercourse for both boys and girls but the magnitude of the coefficients of pressure for boys, compared to girls in this study suggest that the situation may be different for youth in Edo State. They draw our attention to the potentially greater impact of pressure on the sexual behavior of boys in this region and girls' potentially greater ability to resist or counter the pressures that they feel, suggesting that these girls may have greater personal agency over their sexuality than has been found elsewhere for a similar age group. Peer influences on youths' sexual behavior have also received research attention. Adolescence is considered a time when youth shift their reference group from parents to peers. In some SSA cultures this is formalized during rites of passage out of childhood as young people

form bonds with agemates that are expected to last throughout their lives. Although coefficients are in the expected direction, our study suggests no association between peer influences and time to first sexual intercourse among youth in Edo State, Nigeria.

HIV prevention initiatives in SSA have been consistently plagued by debates as to whether the focus should be on delaying sexual intercourse or promoting condom use. In his book, *Rethinking AIDS prevention: Learning from successes in developing countries*, Green (2003) argued that premarital abstinence was the strategy that was more consistent with the cultures of SSA and was also the strategy that was responsible for Uganda's success story. Gallant and Maticka-Tyndale (2004), in their review of school-based prevention programming in SSA, noted that several programs that included condoms had been forced to remove the condom content. Of note is that the prevention program delivered in all of Kenya's primary schools does not address condoms, and that information on condoms was only made available to students if they asked questions about them (Maticka-Tyndale et al., 2004; 2007). Similarly, the Family Life and HIV Education curriculum targeting Junior Secondary Schools in Nigeria does not directly address condoms (NERDC, 2003).

Compared to boys who felt they could not say 'no' to sex, those who felt they could say 'no' and those who answered they 'don't know' if they could say 'no' delayed first sex. These findings support the idea.that raising youths' confidence that they can abstain is crucial in HIV preventive behaviors among youth in Edo State, Nigeria. These findings corroborate other studies among Kenyan and Nigerian youth (Adesegun and Blum, 2008; Tenkorang and Maticka-Tyndale, 2008) and have important policy implications in that it is important to build youths' confidence that they are able to

abstain from sex and say 'no' when the situation demands. Results show that higher condom use self efficacy is associated with earlier timing to first sex. This finding is consistent with results among female youth in Kenya (Tenkorang and Maticka-Tyndale, 2008). But, as in the report of the Kenya findings, it is important to acknowledge the complex causal connections between condom use self efficacy and the timing of first sexual initiation. It is possible that having experienced sexual activity encourages youth to learn more about and develop greater confidence in their ability to use condoms.We are unable to explore the direction of the association between condom use self efficacy and timing of first intercourse at this time because of the cross-sectional nature of the data.

The introduction of socio-cultural variables such as ethnicity, religion and family structure did not weaken the effects of the IMB indicators, but they did demonstrate the importance of the cultural context, especially for girls. We found that, in this population, Muslim girls start sex earlier compared to Christian girls. Other studies in Nigeria as well as in South Africa and Kenya have documented contrary findings where Muslim girls have delayed their sexual debut (see Agha, 2009; Adepegba, 2001; Tenkorang and Maticka-Tyndale, 2009; Tenkorang et al. 2009). There is evidence however, that early marriage is common in Muslim communities. A study by Agha (2009) indicated that about 50% of Muslim girls had married by age 16. In a related study Uthman (2008) found that women living in neighborhoods in Nigeria with low median age at marriage had increased odds of initiating sexual intercourse at an earlier age than those in neighborhoods with high median age at marriage. The explanation of the earlier age of sexual debut among young Muslims girls in Edo State, Nigeria may thus be attributed to

early age at marriage, although they may still be in school. Unfortunately, we have no data on the marital status of our respondents that would allow us to tease this out.

Regarding ethnicity, Akoko Edo boys and Estako girls initiated sexual activity at an earlier age than the comparison group. Much has been written about the higher levels of sexual promiscuity, commercial sex and sexual trafficking among youth in Edo State (Ojieabu et al. 2008; Policy Project, 2004). However, our results suggest that there are differentials in the timing of first sexual intercourse among the ethnic groups in the state. There may likewise be differences in other areas of sexuality.

We also take particular note of the unobserved school-level factors that influence the timing of first sexual intercourse among young adults in Edo State, in particular, female youth. Clearly more research is needed to identify the specific school-level factors that are active here.

Study limitations

Although this study produced important results there are several issues that limit its generalizability. Like most surveys, results from the study are based on self-reports which when collected on sensitive issues such as HIV/AIDS and sexual behaviors tend to be less reliable (Hewett et al. 2004; Mensch et al. 2003; Cleland et al. 2004). Several measures were taken to enhance the reliability of our measures. First, the survey format and questions used came from previously tested instruments (WHO, 1999) combined with locally appropriate terminology. Second, the data collection instruments and procedures were refined based on a piloting of the survey instrument and focus group discussions among youth. It is important to acknowledge also that in spite of the difficulties that self-reported surveys present, those that are carefully collected continue

to provide useful insights on issues of HIV/AIDS and adolescent sexual behaviors (see Cleland et al. 1995).

We exercise great caution in interpreting findings of this study given that our results are based on cross-sectional data. Although we can identify statistically significant associations between dependent and independent variables, we cannot draw causal inferences. Using longitudinal data would have better placed us in terms of drawing 'causal' inferences. This will be made possible with the collection of the second and third waves of data for the *HP4RY* program in 2010 and 2011.

Conclusion

Like most countries in Africa, Nigeria is confronted with youth reproductive health problems such as HIV/AIDS which policy makers have set as priority areas as they strive to achieve the Millennium Development Goals (MDG's). Recent policy developments in Nigeria have been described as positive given the launching of the National Reproductive Health Policy in 2001, the implementation of a national sexuality education curriculum and the National Reproductive Health Strategic Framework in 2002 (Policy Project, 2004).

Edo State, our study site, is considered one of the few states in Nigeria that took a frontrunner role in formulating policies related toto sex trafficking and commercial sex work. In contrast, , the state counts as one that lacks a comprehensive framework on issues that seek to improve the sexual reproductive health of young adults (Policy Project, 2004). This paper sought to add to the literature in the area of youth sexuality in SSA by investigating factors that influence the timing of first sexual intercourse among young people in Edo State, Nigeria. Results demonstrate both similarities and differences

with other such research in SSA. In particular, the IMB model appears to do well in accounting for the variance in the timing of first sex among boys. This suggests that boys may be especially influenced by pressures from others to initiate sex at an early age and by endorsement of myths about the transmission of HIV. On the contrary, having knowledge about HIV transmission, a perception that they are at risk of contracting HIV from sex and a sense of self efficacy that they can resist sexual activity contribute to a delay in sexual initiation.. Of the IMB variables for girls, sexual pressure hastens time to first sexual intercourse but risk perception contributes to delays in the timing of first sex. The cultural context, however, appears particularly salient for girls – both religion and ethnicity producing differences in timing of first sex, and with some portion of the variance in this timing associated only with unobserved factors at the school level. These results suggest greater cultural diversity among girls than boys but greater immediate social influences (especially given the impact of pressure on time to first sex) on boys. Our results support continued focus on improving the knowledge of youth while also creating awareness among youth regarding their risks of contracting HIV. But knowledge is not enough, confidence or self efficacy also proved important here. Of particular interest was that youths' confidence in their ability to abstain, or abstinence self efficacy, contributed to delaying sexual initiation among both boys and girls. This illustrates the importance of building not only knowledge, but also confidence and skills in being able to abstain from sex in contributing to delays in sexual initiation.

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Table 1: Percentage or mean scores of pupils participating in HP4RY exhibiting selected characteristics by gender. Nigeria, 2009.

Variables		Males	Females
	N=	1918	1429
Age**	≤ 11 years	4.4	6.4
	12 years	9.5	11.4
	13 years	16.9	16.9
	14 years	24.9	22.6
	15 years	18.4	20.2
	16 years	15.0	13.6
	≥17 years	10.9	9.0
Religion	Christian (ref)	96.2	85.6
	Muslim	10.2	10.6
	Traditional	1.5	2.0
	Other	2.1	1.8
Ethnicity**	Bini (ref)	16.3	17.3
	Esan	29.0	23.0
	Owan-Ora	13.2	5.8
	Akoko Edo	15.2	19.6
	Estako	6.1	5.2
	Yoruba	2.9	3.6
	Ibo	3.2	2.9
	Urhobo	2.9	4.8
	Other	9.1	17.8
Family Structure*	Both parents (ref)	71.9	71.9
	Mother only	18.0	19.8
	Father only	6.0	4.4
	Neither parent	4.0	4.0
Ever engaged in sex**:	Yes	50.2	37.6
	No	49.8	67.4
Age of first sex**[a]	[N of those with sexual experience]	[963]	[537]
	≤12 years	40.9	27.5
	13-14 years	24.8	27.3
	15-16 years	22.8	28.1
	≥17 years	11.5	17.1
Information			
Knowledge**	Mean score (range -1.90 – 1.94)	0.29	-0.38
Myth Endorsement**	Mean score (range -2.79 – 0.87)	-0.24	0.30
HIV/AIDS communication in school	Mean score (range -3.12 – .964)	-0.01	0.01
Motivation			
Sexual pressure**	Mean score (range -0.70 – 3.20)	-0.09	0.10
Are you at risk for	No, definitely not (ref)	37.1	27.7
HIV from sex**	Probably not	5.9	5.8
	Not sure	21.0	32.0
	Probably	7.6	9.3
	Yes, definitely can	28.4	25.2
Know some who**	No (ref)	57.2	37.4

died of AIDS	Yes	22.3	20.0
	Not sure	20.6	42.5
How many boys/girls**	Nobody (ref)	11.5	12.6
in your class have	A few	27.8	21.3
had sex	Most	22.1	16.2
	Don't know	38.6	49.9
Self Efficacy			
Condom use**	Mean score (range -.845 – 2.32)	0.26	-0.33
Abstinence (I cannot	No (ref)	31.7	30.3
say 'no' to sex)**	Yes	38.4	25.4
	Don't know	29.9	44.3

Notes: a. Percentages for age of first sex are based on the N of students with sexual experience.
+ $p < .10$; * $p < .05$; ** $p < .01$; Standard errors reported in brackets

Table 2: A bivariate analysis of age at first sex and select independent variables

Variables		Males	Females
	N=	1918	1429
Information			
Knowledge		0.909 (.039)**	0.899 (.056)+
Myth Endorsement		1.089 (.036)**	1.085 (.058)
HIV/AIDS communication in school		0.844 (.037)**	.803 (.051)**
Motivation			
Sexual pressure		1.242 (.044)**	1.103 (.041)*
Are you at risk for	No, definitely not (ref)	1.00	1.00
HIV from sex	Probably not	1.092 (.151)	.998 (.210)
	Not sure	0.606 (.103)**	0.862 (.129)
	Probably	0.825 (.146)	0.875 (.182)
	Yes, definitely can	0.656 (.090)**	0.603 (.146)**
Know some who	No (ref)	1.00	1.00
died of AIDS	Yes	1.141 (.089)	1.073 (.123)
	Not sure	0.757 (.098)**	0.831 (.133)
How many boys/girls	Nobody (ref)	1.00	1.00
in your class have	A few	1.108 (.124)	.978 (.151)
had sex	Most	1.176 (.128)	0.787 (.161)
	Don't know	0.626 (.126)**	0.614 (.140)**
Self Efficacy			
Condom use		1.21 (.035)**	1.22 (.053)**
Abstinence (I cannot	No (ref)	1.00	1.00
say 'no' to sex)	Yes	1.388 (.084)**	1.096 (.126)
	Don't know	0.886 (.099)	1.171(.112)
Socio-cultural Variables			
Religion	Christian (ref)	1.00	1.00
	Muslim	1.099 (.131)	1.304 (.160)
	Traditional	1.040 (.312)	1.149 (.286)
	Other	0.842 (.264)	1.858 (.295)*
Ethnicity	Bini (ref)	1.00	1.00
	Esan	0.952 (.157)	1.030 (.201)
	Owan-Ora	0.956 (.184)	1.108 (.235)
	Akoko Edo	1.192 (.160)	1.313 (.186)
	Estako	1.070 (.217)	1.527 (.243)+
	Yoruba	1.489 (.230)	.962 (.318)
	Ibo	0.807(.234)	1.015 (.320)
	Urhobo	1.080 (.195)	1.195 (.281)
	Other	.822 (.163)	1.131 (.180)
Family structure	Both parents (ref)	1.00	1.00
	Mother only	1.069 (.092)	1.004 (.116)
	Father only	0.752 (.154)+	0.948 (.227)
	Neither parent	.770 (.181)	0.866 (.254)

Notes: + $p < .10$; * $p < .05$; ** $p < .01$

Standard errors reported in brackets

Table 3a: A multi-level discrete time hazard model of age at first sexual intercourse for boys in Edo State, Nigeria

Variables		Model 1	Model 2	Model 3
Information				
Knowledge			.836 (.051)**	.822 (.055) **
Myth Endorsement			1.139 (.045)**	1.139 (.045)**
HIV/AIDS communication in school			.956 (.042)	.967 (.044)
Motivation				
Sexual pressure			1.173 (.047)**	1.216 (.047)**
Are you at risk for	No, definitely not (ref)		1.00	1.00
HIV from sex	Probably not		.965 (.170)	.920 (.175)
	Not sure		.657 (.119)**	.639 (.122)**
	Probably I can		.909 (.173)	.930 (.179)
	Yes, definitely can		.657 (.103)**	.643 (.105)**
Know some who	No (ref)		1.00	1.00
died of AIDS	Yes		1.012 (.102)	1.020 (.103)
	Not sure		.699 (.122)**	.696 (.124)**
How many boys/girls	Nobody (ref)		1.00	1.00
in your class have	A few		1.040 (.146)	1.030 (.150)
had sex	Most		1.275 (.160)	1.278 (.155)
	Don't know		.812 (.150)	.773 (.153)
Self Efficacy				
Condom use			1.12 (.045)**	1.14 (.046)**
Abstinence (I cannot	No (ref)		1.00	1.00
say 'no' to sex)	Yes		1.287 (.098)**	1.283 (.118)**
	Don't know		.904 (.115)**	.890 (.118)
Socio-cultural Variables				
Religion	Christian (ref)			1.00
	Muslim			1.218 (.154)
	Traditional			1.012 (.363)
	Other			.596 (.327)
Ethnicity	Bini (ref)			1.00
	Esan			.924 (.155)
	Owan-Ora			1.120 (.178)
	Akoko Edo			1.461 (.173)*
	Estako			1.055 (.221)
	Yoruba			1.659 (.265)
	Ibo			.889 (.274)
	Urhobo			.959 (.221)
	Other			.989 (.189)
Family Structure	Both parents (ref)			1.00
	Mother only			1.105 (.111)
	Father only			.726 (.179)
	Neither parent			.888 (.222)
Constant		-1.313(.083)**	-.929(.161)**	-.939(.191)**
Random effects				
Variance at level 2		.159(.058)*	.081(.041)	.030(.031)

Intra-class correlation	.046	.024	.001
Log likelihood	-2534.999	-1832.931	-1764.88

Notes: + ***p*** **< .10 * *p* <.05 ** *p* <.01 *** *p* < .001**
Standard errors are reported in brackets

Table 3b: A multi-level discrete time hazard model of age at first sexual intercourse for girls in Edo State, Nigeria

Variables		Model 1	Model 2	Model 3
Information				
Knowledge			.847(.072)*	.874(.075)+
Myth Endorsement			1.043(.068)	1.030(.071)
HIV/AIDS communication in school			.881(.057)*	.895(.059)
Motivation				
Sexual pressure			1.124(.048)**	1.143(.050)**
Are you at risk for	No, definitely not (ref)		1.00	1.00
HIV from sex	Probably not		.952(.233)	.936(.249)
	Not sure		.955(.147)	.999(.155)
	Probably		.904(.203)	.964(.209)
	Yes, definitely can		.620(.164)**	.668(.170)**
Know some who	No (ref)		1.00	1.00
died of AIDS	Yes		.986(.141)	.931(.146)
	Not sure		.851(.147)	.857(.154)
How many boys/girls	Nobody (ref)		1.00	1.00
in your class have	A few		1.143(.182)	1.254(.193)
had sex	Most		1.016(.194)	1.127(.206)
	Don't know		.782(.171)	.836(.183)
Self Efficacy				
Condom use			1.230(.067)**	1.231(.069)**
Abstinence (I cannot	No (ref)		1.00	1.00
say 'no' to sex)	Yes		1.089(.150)	1.113(.157)
	Don't know		1.274(.140)	1.275(.147)
Socio-cultural Variables				
Religion	Christian (ref)			1.00
	Muslim			1.455(.203)+
	Traditional			.996(.344)
	Other			1.584(.387)
Ethnicity	Bini (ref)			1.00
	Esan			.988(.263)
	Owan-Ora			1.301(.292
	Akoko Edo			1.442(.229)
	Estako			1.924(.294)*
	Yoruba			.835(.382)
	Ibo			.937(.474)
	Urhobo			1.224(.351)
	Other			1.225(.230)
Family structure	Both parents (ref)			1.00
	Mother only			.992 (.145)
	Father only			1.123(.258)
	Neither parent			1.005(.303)
Constant		-1.819(.133)**	-1.555(.253)**	-1.867(.283)**

Random effects			
Variance at level 2	.421(.142)**	.365(.136)**	.352(.139)**
Intra-class correlation	.113	.099	.097
Log likelihood	-1621.8958	-1110.0569	-1041.9117

Notes: **+ *p* < .10 * *p* <.05 ** *p* <.01 *** *p* < .001**

Standard errors are reported in brackets