

Rural-Urban Migration and Sexual Debut in Thailand

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Abstract

Transitions to adulthood are often characterized by (1) sexual debut and (2) migration from a parents' home. Although many studies have described the health consequences of early sexual debut and migration independently, it has been far less common to examine the association between migration and sexual debut, as we do here for young adults in Thailand. Using a longitudinal dataset from 2005 and 2007 that includes a subsample who migrated to urban areas during that period, we identify characteristics and behaviors associated with sexual debut, and examine the role of migration on debut. In doing so, we lessen several common sources of bias that hamper existing work on both migration and sexual debut: (1) the longitudinal nature of the data enables us to distinguish the ordering of sexual debut and other key characteristics and behaviors, and (2) the survey on sexual behavior employed a technique that reduces response, and (3) we examine differences in debut by marital status.

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Introduction

Young adulthood is often characterized by important life transitions, including sexual debut and migration from parents' home. Due the magnitude of these events, research has often focused on these "transitions to adulthood" and the associated health risks. It is less common, however, that research has examined the effect of migration on sexual debut, despite the likely connections between these events.

The risks associated with early sexual debut have been well documented. Early age at first sex has important negative consequences for youth, including the risk of unwanted pregnancy and sexually transmitted infections (Celentano et al. 2008; Institute of Medicine 2005; Kahn et al. 2002; Weinstock et al. 2000). Recent societal trends have increased the concern about early sexual debut: the age at marriage is increasing in a range of settings, while age at sexual debut remains stable or is decreasing (Mensch, Singh, & Casterline 2005; Mensch, Grant, and Blanc 2006; Tangmunkongvorakul et al. 2010; Zaba et al. 2004). Taken together, these trends provide the opportunity for greater turnover of sexual partners- a factor that has consistently been linked to HIV infection (World Bank 1997). As a result it is not surprising that some have found an association between early sexual debut and HIV infection (Bioleau et al. 2009; Bongaarts 2007; Clark 2004; Harrison et al. 2005; Pettifor et al. 2004). Furthermore, earlier sexual debut has also been linked to another HIV risk behavior: extramarital partnerships later in life (White, Cleland & Carael 2000).

Although research on the relationship between migration and health is extensive, an examination of how migration might affect sexual debut is far less common. A recent study using Demographic and Health Surveys in Nigeria showed that migration was associated with earlier sexual debut (Mberu & White 2011). A study of unmarried female migrants in China found that the level of educational attainment was not associated with likelihood of premarital sex but rather the working/living environment, attitudes, opportunity and motivation were significant (Zheng et al., 2001). Another in China found that adolescents whose parents are migrant workers were more likely to be sexually active than those whose parents are not migrants, and they were also found to be more likely to have unsafe sex and more exposure to HIV risk (Li et al. 2009). Due primarily to challenges in collecting data on migration, however, studies on migration and sexual debut suffer from important limitations.

Despite the lack of research, a connection between migration and sexual debut seems likely. Changes in health status, both physical and emotional, constitute an important set of potential consequences of a rural-to-urban move; and research has shown that migration affects overall mental

and physical health of Thai young adults (Nauman et al. 2011). For young adults in the prime ages of migration, one key dimension of health status that can be profoundly affected by migration is sexual and reproductive health. Urban environments and migrant networks provide opportunities for formerly rural dwellers to engage in sexual relationships with a wider range of partners in a more anonymous setting. They also provide exposure to new – and often much more permissive - ideas about appropriate sexual behaviors. Previous research has shown that, in some cases, migrants move to cities where social constraints on sexual behavior are weaker than in rural areas of origin (Anarfi 1993; Grmek 1990; Setel 1999).

In this study, we focus on the relationship between migration and the timing of sexual initiation for a population-based sample of young adults in Thailand. With relatively high rates of internal migration, a moderate HIV epidemic, and a declining average age of sexual debut, Thailand presents an instructive environment in which to examine migration and sexual debut- as many other countries are experiencing these same processes. To investigate these issues we use a unique longitudinal dataset and compare the sexual initiation timing for young adults (aged 15-31) who remain in a rural area of Thailand with others who migrated to an urban center. Several features of these data distinguish this study, including (1) utilizing the longitudinal nature of the data to address several common sources of bias in analysis of sexual debut, and (2) limiting threats to data quality through use of a survey technique that has been demonstrated to yield more reliable reports of sensitive behaviors, and (3) taking a different approach to sexual debut by comparing sexual debut within marriage with those who debuted with a non-marital partner.

To proceed with our analysis we first identify characteristics of men and women aged 15-31 who have initiated their sexual lives. In doing so, we focus on the relationship between sexual debut and migration, education, and several other characteristics and behaviors of Thai young adults. Next, we compare differences in sexual debut between young adults who sexually debut within marriage with those who debut outside of marriage. In all analysis we take advantage of our longitudinal data to reduce biases that often affect studies on the timing of sexual debut.

Background

Sexual Initiation in Thailand

Research suggests that the nature of sexual initiation in Thailand has changed in recent years. Commercial sex patronage (both protected and unprotected by condom use) among young men has declined dramatically in recent years, while non-commercial premarital sexual relations among

young couples appears to be on the increase (Morrison 2004; Tangmunkongvorakul et al. 2010; World Bank 2000).

Recent changes in the nature of sexual initiation in Thailand result in part to the HIV/AIDS epidemic. With about 1.4% of all 15-49 year-olds infected (UNAIDS 2008), current prevalence levels are much higher than those found in the United States and western Europe, but much lower than those found in the hardest hit countries of southern Africa. While the national AIDS program has experienced much success in driving down HIV transmission resulting from unprotected sex between male clients and female brothel-based sex workers, it has been less successful in combating HIV transmission resulting from non-commercial encounters.

Differences between men and women are typically found in research on sexual debut, and analysis indicates that this is also true in Thailand, but such differences appear to be decreasing over time. The average age of sexual intercourse was approximately 18.4 years old for males and 20.6 for females in 1994 (Singh et al, 2000). However, if analysis is based only on the 18-24 age group, the average age of first sexual intercourse for males is 17.1, for females it is 18.2 while in total, the average age is 17.6 (Chamrathirong et al. 2007). One study of 1,700 students aged 15-21 from two vocational schools in Chiang Rai city found 43% of the female students reporting previous sexual experience with a mean of 2.8 partners.

Many studies have examined the relationship between schooling and sexual debut. A low level of education was found to be related to sexual initiation at a young age among South African women (Cooper et al. 2007). Similarly, another study in eight Sub-Saharan African countries found that women with at least some secondary education were significantly less likely to have had sex before age 18 than women with no education (Gupta and Mahy, 2001), and a similar study found the same for Thai men (VanLandingham et al. 1993).

Many studies have focused on the relationship between familial characteristics and sexual debut-particularly family connectedness and living arrangements. Household structure has been shown to be related to sexual activity in Thailand and elsewhere (Chamrathirong et al. 2010; Liu et al. 2006; Longmore, Manning & Giordano 2001; Mberu & White 2011). Other family characteristics are also importantly related to sexual behavior, including family connectedness (Mazengia & Worku 2009); family expression (Rosenthal et al. 2001); and parental characteristics such as number of parents in

the household, mother-child relationships quality, and the level of and time spent in parent-child interaction (Davis and Friel, 2001; Ramirez et al. 2002).

Peer pressure has also been found to have a significant impact on adolescents, in Thailand in particular (VanLandingham et al. 1995). Kinsman et al. (2010) found that perceptions about the prevalence of peers' sexual behaviors were the most important peer normative predictor of intention and initiation of intercourse. Cooksey and others (2002) examined the association of friendships pattern and dating patterns with sexual initiation of youth aged 11 to 16 years old. The study suggested that having mostly opposite-sex friends increased the odds of sexual initiation for males and decreased them for females.

Substance use, and alcohol consumption was found associated with early sexual initiation of male adolescents in many studies (Tavares et al. 2009; Mazengia and Worku, 2009), including Thailand (VanLandingham et al. 1995). Alcohol consumption has been tested if there is any effect on sexual initiation, and a number of these studies found significant linkages. Tavares et al. (2009) found positive association of alcohol consumption and sexual initiation of male adolescents. Opportunities for premarital sexual experimentation, both heterosexual and homosexual, as well as IV drug use experimentation are likely to be substantially greater in urban communities than in rural ones, due to increased opportunities to experiment with such behaviors, increased exposure to new ideas about what constitutes appropriate behavior, and decreased supervision and less exposure to negative sanctions by significant others for perceived violations of community norms regarding such behaviors.

Rural-Urban Migration in Thailand

As with many countries in Asia, Thailand is rapidly urbanizing. As of 2010, 31% of the Thai population resides in urban areas (Population Reference Bureau, 2010), and the UN projects that this figure will reach 60% by 2050 (UN 2010).

Research shows that migration contributes substantially to urbanization in Thailand. The National Migration Survey of Thailand (NMS), conducted in 1992, shows high levels of internal movement of the Thai population. Approximately one-fourth of the population were migrants within the five-year period before the NMS and 15 percent had moved in the two-year period before the NMS (Chamrathirong et al. 1995). NMS data indicate that temporary migration, both seasonal and circular, constitutes approximately one-third of all internal migration in Thailand. Most of the

temporary migration is directed towards Bangkok and surrounding areas in the Central region, and originates from the Northeast. Inflows occur during the dry season and outflows occur during the wet season (Guest et al 1994; Richter et al. 1997). Longer term migrants, compared to temporary migrants, are more likely to be younger, female and better educated (Guest et al. 1994).

For the last three decades the policy of the Thai government has been directed towards reducing migration flows into Bangkok. Migration is seen as a factor exacerbating longstanding environmental and social problems Bangkok. Nevertheless, data from a number of sources show that Bangkok remains a major destination for migrants, particularly young adults. While the economic crisis of the late 1990s dampened the flow of rural residents to urban centers, this was apparently a temporary lull (De Jong et al. 2002).

As a key life course event, rural-to-urban migration is conventionally thought to accelerate trends in delayed marriage among young adults in Thailand (Cheung 1984) by providing opportunities for career development and asset accumulation and via exposure to urban norms. Empirically, it does not turn out to be so simple. A longitudinal analysis revealed that rural-to-urban migration in Thailand actually increases the odds of marriage for young female and male migrants (Jampaklay 2006). Although some similarities in migration patterns are found for men and women in Thailand, recent research has also emphasized found gendered patterns related to the influence of social networks and social capital on migration in Thailand (Curran et al. 2005).

Research suggests that migration plays a role in sexual behavior. Migrants are often shown to be more sexually active, particularly those who move from rural to urban areas (Brokerhoff & Biddlecom 1999; Collinson et al 2006; Hu et al 2006). Yet data limitations often preclude in-depth examinations of the relationship between migration and sexual behaviors.

Data

The Health Impacts of Rural to Urban Migration in Thailand Study (HIRUM)

We use data from the Health Impacts of Rural to Urban Migration (HIRUM) Study in Thailand, a longitudinal study that has been conducted in 100 villages of Kanchanaburi province of Thailand since the year 2005. HIRUM builds on the Kanchanaburi Demographic Surveillance System (KDSS), which completed five rounds of data collection, starting from 2000 to 2004 with one year intervals between rounds. The HIRUM Study followed the fifth round of KDSS, and utilizes the same population as did the surveillance system. HIRUM is a collaborative venture between the

Institute for Population and Social Research, Mahidol University, Thailand and the School of Public Health and Tropical Medicine, Tulane University.

The first round of HIRUM took place in Kanchanaburi province in 2005. In 2007, HIRUM re-interviewed all original respondents who remained in their original rural village of 2005 along with those who migrated out to the provincial capital (*Amphur Muang*, or the “city district”), to the other urbanized district within the province (*Tamaka*), or to metropolitan Bangkok. Regarding the latter, HIRUM attempted to trace and re-interview all migrants who were believed to move either to the city of Bangkok (technically, Bangkok Province) or to the closest adjacent province in the Metro areas (Nakorn Pathom). Metropolitan Bangkok has consistently been the most popular destination for rural to urban migrants in Thailand, and therefore is the principal focus of our study. Since the two urban districts of Kanchanaburi were the other most frequent urban destinations for migrants, HIRUM also included these sites. A total of 3,148 HURM respondents were interviewed in both 2005 and 2007, including 234 migrants who were re-interviewed at the urban destinations.

Variables of Interest

Two measures are typically used to assess sexual debut, as we do here. First, individuals are asked whether they have ever had sex (the “current status” measure), and if so, the age at which they first had sex (the “age-at-debut” measure). Each of these measures has characteristics that are important to consider in any analysis of sexual debut (Zaba et al. 2002). For example, measures of central tendency for the current status measure are heavily dependent upon the age structure of the respondents. Also, age of debut can suffer from recall bias. However, since the majority of the HIRUM population is less than 23 years old, this source of bias should be minimized in this population. Using these two measures, we construct a variable to indicate whether the respondent has sexually debuted, and if so, at what age. This variable is used for discreet-time event history analysis of sexual debut, as described below.

Our central independent variable of interest is migration status, which is measured by two variables: (1) migration between 2005 and 2007 (from the follow-up study of HIRUM migrants), and (2) prior migration experience (i.e. from self-reported migration before 2005). Research has shown that migrants are often more likely to engage in sexual risk activity than non-migrants (Brockheroff and Biddlecom 1999; Chirwa 1997; Lurie et al. 2003; Welz et al. 2007; Pison et al. 1993), and opportunities to engage in sexual relationships are greater in urban areas of Thailand than rural ones (Knodel et al. 1996). As a result, we expect that those with migration experience prior to 2005 and

who migrate between 2005 and 2007 will be more likely to have initiated sex than permanent rural residents.

We select other variables of interest based on their relevance to sexual debut in Thailand and other settings. Since previous research has shown that household structure influences sexual behavior in Thailand and elsewhere (Chamrathirong et al. 2010; Liu et al. 2006; Longmore, Manning & Giordano 2001; Mberu & White 2011), we include a measure of whether the respondent co-resides with at least one parent.⁴ Since substance abuse has been linked to sexual debut (Liu et al. 2006; Mazengia and Worku, 2009; Tavares et al. 2009; VanLandingham et al. 1995), we also include indicators of whether the respondent drinks alcohol. Other behaviors we include are indicators of whether the respondent gets regular exercise, and perceived risk of HIV infection.⁵ Finally, we include a set of control variables including age, level of education, marital status, and an asset-based measure of economic status using principal components analysis (Filmer and Pritchett 2001).⁶

Self-Reports of Sexual Behavior

Another strength of this study is the data quality of self-reported sexual behavior. Research has consistently found that the traditional face-to-face survey method yields self-reports of sexual behavior that are of questionable validity (Curtis & Sutherland, 2004; de Boer et al. 1998; Eggleston, Leitch and Jackson, 2000; Gregson, et al. 2002; Lagarde, Enel, & Pison 1995; Nnko et al. 2004; van de Wijgert et al. 2000). Many studies suggest that part of the reason for the lack of reliability of self-reports is due to social desirability bias, or the desire on the part of individuals to portray themselves in the best possible manner to interviewers, which precludes reporting behaviors that they consider to be questionable.

Recent studies have also shown that self-completed surveys yield better quality data than the traditional interviewer-respondent method (Anglewicz et al. 2010; Gregson et al. 2002). HIRUM used this approach to collect data on sexual behavior. Upon completion of the modules conducted face-to-face, all respondents were asked to answer a separate self-administered module on sexual

⁴ We used several variations on parental co-residence variable before settling on the indicator of living with at least one parent, including living with father only, mother only, and both parents. None of the other versions of this measure were significant in our regression models, or affected the significance of other variables.

⁵ We also include other variables in the regressions above, including employment status and job type, and other lifestyle measures (cigarette smoking, dietary measures, free-time activities, etc...). None of these variables were significant, and their inclusion did not substantially alter the results of our models.

⁶ The asset indicator is a principal components analysis measure of 12 household amenities, including a TV, VCR, satellite, stereo, radio, cell phone, telephone, computer, generator, air conditioning, refrigerator, and a vehicle.

attitudes and behavior. For these self-completed questionnaires, the interviewer reminded the respondent that they may omit any question or any module that they did not wish to answer. Those who agreed to continue completed the sexual behavior module themselves in a private place. Once completed, this module was placed into an envelope and returned to the interviewer, who was not permitted to open it. The self-completed questionnaires were then taken directly to the field office and stored in a secure place for later data entry. Refusal rates for the self-completed sexual behavior questionnaire were low: in 2005, 97% of HIRUM respondents agreed to answer the self-administered questionnaire on sexual behavior.

Methods

Important features of this study are the longitudinal panel design and migration follow-up, which enables us to address common biases in other studies on migration and/or sexual debut. Below we describe several methodological problems confronting research on migration and sexual debut and how we address these issues in this research.

The use of cross-sectional data leads to two important potential problems in research on sexual debut. First, cross-sectional data face the problem of the ordering of events. Using various statistical methods (including the discrete-time event history approach described below) one can identify factors associated with sexual debut, but it is not possible to determine which happened first, the factor associated with sexual debut (such as mental health problems) or the debut itself. Because this ordering cannot be determined in cross-sectional data, one cannot determine whether early sexual debut leads to poor mental health or whether poor mental health causes early sexual debut.

Secondly, cross-sectional data increase the likelihood of misreporting of events. Cross-sectional data typically relies upon self-reports of age of sexual debut by respondents, and such responses are often inaccurate due to problems of recalling exact ages of sexual debut. It is possible that those who cannot easily remember their age of sexual debut are different from those who can easily remember, and that these differences correspond with other behaviors or characteristics relevant to sexual behavior (*e.g.*, number of partners), which can lead to systematic biases in analysis of early sexual behavior. Instead of using potentially biased post-hoc reports of age of sexual debut, we instead use real time self-reports of having had sexual experience (yes or no), and calculate the number and percentage of respondents who debut sexually between 2005 and 2007.

The use of cross-sectional data also presents challenges for research on migration. For example, research on migration compares characteristics of non-migrants with migrants *after* migration. Although such analysis can detect differences between migrants and non-migrants at destination, this style of study design does not allow one to determine whether the differences in characteristics between migrants and non-migrants occurred as a result of the migration process, or whether migrants were different from non-migrants in certain characteristics *prior to* migration. In other words, cross-sectional studies on migration preclude disentangling selection effects from the effect of migration on various outcomes. Since we have data both from before and after migration in this study, we are able to address this issue.

Timing of Sexual Initiation

Event history analysis is an appropriate approach for identifying variables associated with the timing of a particular outcome while dealing with censored observations (in this instance respondents who hadn't sexually initiated by 2007). In the case of sexual debut, however, since timing is measured in years (from age 14 to age 32), this leads to a relatively large number of respondents who share the exact same coded timing of sexual debut. Multiple observations sharing the same exact timing of an event often leads to biased coefficients in a Cox regression model (Allison 1995). To address this issue we instead use a discrete-time hazard models (Allison 1982), a common approach for analyzing age of sexual debut (Brewster 1994; Whitbeck et al. 1999; Dupéré et al. 2008). This model allows hazard rates to be estimated when multiple respondents experience an event in the same time interval.

We conduct the analysis in several steps. First, we limit the analysis to men and women who had not sexually debuted by the 2005 HIRUM wave, in order to identify characteristics and behaviors associated with sexual debut between 2005 and 2007. This sample restriction allows us to eliminate the possible bias from being unable to establish the order of sexual debut, migration, and other covariates prior to the 2005 HIRUM survey. Furthermore, this approach allows us to employ the values of key covariates from 2005, which enables us to establish the ordering of behaviors and characteristics associated with future sexual debut⁷. Limiting the sample to those who have not sexually debuted by 2005 yields a sample of 926 women and 617 men, of whom 41% of men and 25% of women sexually debuted by 2007 (Table 1). Next, to construct these discrete time hazard

⁷ An exception is migration between 2005 and 2007: because we do not have the exact timing of sexual debut (day and month), we cannot determine whether sexual debut takes place before or after migration. So we do not make any causal claims in this analysis, and only examine the association between migration and sexual debut.

models (run separately by sex), we convert the data to a person-years format, where each observation represents one year per respondent in which they were exposed to the risk of sexual debut. In these regressions, the dependent variable is an indicator of whether the individual experienced sexual debut within the particular one year period.

In the first stage of our analysis we identify the contribution of different sets of factors on sexual debut for all men and women. We begin by running stepwise discrete time event history regressions. First, we include only age and the two migration measures: migration history prior to 2005, and an indicator of migrating between 2005 and 2007. Next, we add more background characteristics, including level of education, economic status, the relationship of the respondent to the head of household, and marital status. We then add health measures (SF-36 measures of physical and mental health), and finally behaviors related to sexual health (HIV risk perception, drinks alcohol, regularly exercises).

For many, sexual debut takes place within first marriage. Among respondents who were interviewed in 2005 and 2007 and had not sexually debuted by 2005, 12.6% (173) got married for the first time, all of whom sexually debuted between 2005 and 2007. There is reason to think that individuals who debut within marriage (or with a partner that they marry shortly afterwards) are different from those who debut with a partner who they do not intend to or do not know if they will marry. Research has shown that sexual partner “type” (typically measured by degree of intimacy and/or duration known) is associated with condom use (Macaluso et al. 2000; Westercamp et al. 2010); and other HIV and STI risk behaviors (Saggurti et al. 2011).

Therefore, we expect that characteristics and behaviors associated with sexual debut will differ by partner type, and we proceed by modeling sexual debut separately by marital status. After running our discrete time regressions with all respondents who were interviewed in 2005 and 2007 and had not debuted by 2005 (i.e. regardless of marital status in 2007), we next run separate models by marital status. We next limit the sample to respondents who remained never-married by 2007, and finally run regressions for the respondents who married between 2005 and 2007. Doing so allows us to examine whether the determinants of sexually debut outside of marriage differ from the determinants of debut associated with first marriage.

Results

We estimate several multivariate discrete time event history regressions in which the independent variable of interest is migration behavior and the dependent variable is age of sexual debut (for those who debuted between 2005 and 2007), and the censored category is not experiencing sexual debut. These models benefit from several key control variables assessed in the 2005 wave, *i.e.*, before either migration or sexual debut occurred, which addresses the issue of ordering between independent variables of interest and sexual debut. Tables 2 (for men) and 3 (women) report the results of the discrete time event history analyses for all respondents regardless of marital status (*i.e.* including never and ever-married by 2007); Tables 4 and 5 show results for sexual debut outside of marriage; and Tables 6 and 7 are results for young adults who debuted in marriage.

Beginning with the full models (including all marital statuses), it is evident that some factors associated with sexual debut are similar for men and women. Most importantly, migration between 2005 and 2007 was associated with a greater hazard rate of sexual debut, for both men and women. This result was also consistent across all versions of the stepwise model. Prior migration, however, was not significantly associated with sexual debut. This result is perhaps not unexpected, as the age at which the migration before 2005 took place is unknown, and likely includes many who migrated before ages of sexual maturity. Overall, this result confirms our expectations that migration is associated with a greater likelihood of sexual debut.

Perhaps surprisingly, secondary education has a higher hazard of debut than primary/no schooling. Since research often shows that schooling protects from early sexual debut, this result is unexpected. Furthermore, women with university education had a lower hazard of sexual debut than women with primary or no education, which is more expected. Upon further thought, however, it seems not unlikely that secondary school facilitates interactions between Thai young adults, which can increase the likelihood of sexual debut. Since university education is less common for women in Thailand, perhaps sexual relations are discouraged as a potential risk of completion or performance. Another potentially unexpected result is that co-residence with a parent is not significantly associated with sexual debut.

Other results conform better to expectations: the age pattern of sexual debut is non-linear for men and women, in which likelihood of sexual debut first increases during the early ages within our age range of interest (15-31), and then decreases. This indicates that the likelihood of debut increases with age at younger ages, but there is an age after which sexual debut becomes less likely. Not

surprisingly, those who marry between 2005 and 2007 have a significantly higher hazard of sexual debut. Finally, greater mental health in 2005 was associated with a lower hazard of sexual debut.

Comparing the event history results that include ever-married men and women (by 2007) with results for the never married by 2007 also show both consistent results and interesting differences. Of particular interest to this analysis, the results for migration are consistent between never-married and all young adults: never-married men and women who migrated between 2005 and 2007 had a higher hazard rate of sexually debut than non-migrants- a result that is highly significant (at the $p < 0.01$ level) for both men and women. Interestingly, while migration prior to 2005 is not significant in previous models, never-married men who migrated prior to 2005 had a higher hazard of sexual debut than those who did not migrate before 2005. Therefore, our results continue to show that there is a very strong relationship between migration and sexual debut.

Some results for never-married respondents are interestingly different from all respondents. For example, this set of analyses reveals an additional relationship between health and sexual debut: never married women with greater physical health in 2005 have a higher hazard of sexually debut than their counterparts with poorer physical health. Never married men who drink alcohol also have a higher hazard of debut than those who don't.

Other results are similar for never-married respondent to all respondents. For example, the results are consistent for education (greater hazard for men and women with secondary compared to primary or no education), and the non-linear relationship between age and sexual debut. For women, the same significant relationship between mental health and debut is seen.

Turning to the respondents who marry between 2005 and 2007, we again find a relationship between migration and sexual debut, but this time only for women: Thai young adult women who migrated between 2005 and 2007 had a higher hazard of sexual debut than non-migrant counterparts. There is also an association with perceived HIV risk, in which women who married between waves and had higher perceived HIV risk in 2005 had a higher hazard of sexually debut. Finally, women who lived with their parents in 2005 had a lower hazard of sexually debut. In contrast, the results for men show relatively few significant variables- likely due to the small sample size for men.

Discussion

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Tables and Figures

Table 1: Background characteristics for HIRUM male and female respondents who had not sexually debuted in 2005

	Men	Women
Sexually debuted by 2007	40.9%	24.9%
2005 mean age	17.7	18.4
2005 highest level of education attained		
No education/primary/religious school	35.9%	39.4%
Secondary	55.1%	50.5%
University or higher	9.0%	10.1%
2005 mean PCA assets index	0.23	0.54
2007 marital status		
Unmarried in 2007	91.9%	83.1%
Married by 2007	7.7%	15.8%
Divorced/separated in 2007	0.4%	1.1%
2005 mean SF36 mental health score	50.3	49.5
2005 mean SF36 physical health score	53.0	52.0
2005 drinks alcohol	30.0%	7.0%
2005 gets regular exercise	70.6%	43.4%
2005 medium or high perceived HIV risk	2.7%	1.8%
2005 living with one or more parent	80.6%	79.4%
Migrated prior to 2005	50.0%	52.6%
Migrated between 2005 and 2007	15.3%	17.7%
N=	540	829

Note: Because less than 2% of HIRUM respondents had no education, we grouped no education with primary education.

Table 2: 2005 characteristics and behaviors associated with sexual debut between 2005 and 2007 for HIRUM men

	Coef	RSE	Coef	RSE	Coef	RSE	Coef	RSE
Age	0.93***	0.10	0.97***	0.10	0.97***	0.10	0.97***	0.10
Age ²	-0.04***	0.01	-0.04***	0.01	-0.04***	0.01	-0.04***	0.01
Migrated prior to 2005	0.22	0.15	0.15	0.16	0.14	0.16	0.23	0.16
Migrated between 2005 and 2007	0.67***	0.18	0.55***	0.20	0.55***	0.20	0.58***	0.20
Level of education								
None/primary/religious school (ref)								
Secondary			0.87***	0.20	0.83***	0.20	0.82***	0.21
University/post-secondary			-0.17	0.35	-0.22	0.36	-0.29	0.36
Assets index			-0.04	0.05	-0.03	0.05	-0.03	0.05
2007 marital status								
Unmarried in 2007 (ref)								
Married by 2007			0.96***	0.20	0.94***	0.20	0.86***	0.21
Divorced/separated in 2007			-0.15	0.42	-0.13	0.42	0.01	0.34
Lives with at least one parent			0.00	0.20	-0.02	0.21	-0.01	0.21
Mental health					-0.01	0.01	0.00	0.01
Physical health					0.00	0.01	0.00	0.01
Drinks alcohol							0.30*	0.16
Gets exercise							0.13	0.17
Perceived HIV risk							0.17	0.44
Pseudo R2	0.135		0.168		0.169		0.171	
N=								

4,975 observations for 549 male respondents

Notes: We also include other variables in the regressions above, including employment status and job type, more detailed household structure (living with one or both parents, number of siblings, etc...), and other lifestyle measures (cigarette smoking, dietary measures, free-time activities, etc...). None of these variables were significant, and their inclusion does not substantially alter the results above.

RSE=Robust standard errors
*p ≤ 0.10 **p ≤ 0.05; ***p ≤ 0.01.

Table 3: 2005 characteristics and behaviors associated with sexual debut between 2005 and 2007 for HIRUM women

	Coef	RSE	Coef	RSE	Coef	RSE	Coef	RSE
Age	0.86***	0.10	0.92***	0.09	0.94***	0.10	0.94***	0.10
Age ²	-0.04***	0.01	-0.03***	0.00	-0.03***	0.00	-0.04***	0.00
Migrated prior to 2005	-0.04	0.15	0.16	0.16	0.11	0.16	0.07	0.16
Migrated between 2005 and 2007	0.39**	0.18	0.88***	0.18	0.81***	0.19	0.85***	0.19
Level of education								
No edu/primary/religious school (ref)			----	----	----	----	----	----
Secondary			0.68***	0.20	0.74***	0.22	0.69***	0.23
University/post-secondary			-0.67*	0.24	-0.59**	0.27	-0.66***	0.28
Assets index			-0.12**	0.06	-0.13*	0.06	-0.12*	0.06
2007 marital status								
Unmarried in 2007 (ref)			----	----	----	----	----	----
Married by 2007			2.79***	0.17	2.74***	0.17	2.78***	0.18
Divorced/separated in 2007			2.17***	0.45	2.35***	0.46	2.35***	0.47
Lives with at least one parent			-0.12	0.17	-0.14	0.18	-0.13	0.18
Mental health					-0.03***	0.01	-0.03***	0.01
Physical health					0.02	0.02	0.02	0.01
Drinks alcohol					-0.48*	0.26	-0.48*	0.26
Gets exercise					0.10	0.15	0.10	0.15
Perceived HIV risk					0.69*	0.39	0.69*	0.39
Pseudo R2	0.103		0.283		0.288		0.290	
N=								

8,330 observations for 829 female respondents

Notes: We also include other variables in the regressions above, including employment status and job type, more detailed household structure (living with one or both parents, number of siblings, etc...), and other lifestyle measures (cigarette smoking, dietary measures, free-time activities, etc...). None of these variables were significant, and their inclusion does not substantially alter the results above.
RSE=Robust standard errors
*ps 0.10 **p ≤ 0.05, ***p ≤ 0.01.

Table 4: 2005 characteristics and behaviors associated with sexual debut between 2005 and 2007 for HIRUM men who remain never married between 2005 and 2007

	Coef	RSE	Coef	RSE	Coef	RSE	Coef	RSE
Age	0.94***	0.12	0.98***	0.12	0.98***	0.12	0.97***	0.12
Age2	-0.04***	0.01	-0.04***	0.01	-0.04***	0.01	-0.04***	0.01
Migrated prior to 2005	0.27*	0.16	0.19	0.17	0.17	0.17	0.30*	0.18
Migrated between 2005 and 2007	0.72***	0.20	0.58***	0.21	0.58***	0.21	0.62***	0.22
Level of education								
No edu/primary/religious school (ref)								
Secondary			0.97***	0.24	0.92***	0.24	0.87***	0.24
University/post-secondary			-0.10	0.40	-0.18	0.41	-0.36	0.41
Assets index			-0.02	0.05	-0.02	0.05	-0.01	0.05
Lives with at least one parent			-0.14	0.22	-0.18	0.22	-0.21	0.23
Mental health					-0.01	0.01	-0.01	0.01
Physical health					0.00	0.02	0.00	0.02
Drinks alcohol							0.46**	0.18
Gets exercise							0.21	0.20
Perceived HIV risk							0.17	0.45
Pseudo R2	0.126		0.151		0.152		0.157	
N=								

Notes: We also include other variables in the regressions above, including employment status and job type, more detailed household structure (living with one or both parents, number of siblings, etc...), and other lifestyle measures (cigarette smoking, dietary measures, free-time activities, etc...). None of these variables were significant, and their inclusion does not substantially alter the results above.

RSE=Robust standard errors
*p ≤ 0.10 **p ≤ 0.05; ***p ≤ 0.01.

Table 5: 2005 characteristics and behaviors associated with sexual debut between 2005 and 2007 for HIRUM women who remain never married between 2005 and 2007

	Coef	RSE	Coef	RSE	Coef	RSE	Coef	RSE
Age	1.28***	0.32	1.30***	0.32	1.30***	0.31	1.30***	0.31
Age2	-0.06***	0.02	-0.06***	0.02	-0.06***	0.02	-0.06***	0.02
Migrated prior to 2005	0.00	0.25	-0.10	0.25	-0.24	0.24	-0.23	0.25
Migrated between 2005 and 2007	1.09***	0.26	0.96***	0.27	0.96***	0.27	0.97***	0.28
Level of education								
No edu/primary/religious school (ref)								
Secondary			0.78*	0.43	0.55	0.43	0.59	0.44
University/post-secondary			0.10	0.53	0.01	0.51	0.06	0.52
Assets index			-0.12	0.08	-0.13*	0.08	-0.13	0.08
Lives with at least one parent			0.03	0.31	0.07	0.32	0.08	0.32
Mental health					-0.07***	0.02	-0.07***	0.02
Physical health					0.06***	0.02	0.06***	0.02
Drinks alcohol					-0.35	0.54	-0.35	0.54
Gets exercise					-0.21	0.27	-0.21	0.27
Perceived HIV risk					0.00	0.58	0.00	0.58
Pseudo R2	0.119		0.133		0.171		0.172	
N=								

Notes: We also include other variables in the regressions above, including employment status and job type, more detailed household structure (living with one or both parents, number of siblings, etc...), and other lifestyle measures (cigarette smoking, dietary measures, free-time activities, etc...). None of these variables were significant, and their inclusion does not substantially alter the results above.

RSE=Robust standard errors
*p ≤ 0.10 **p ≤ 0.05; ***p ≤ 0.01.

Table 6: 2005 characteristics and behaviors associated with sexual debut between 2005 and 2007 for HIRUM men who marry between 2005 and 2007

	Coef	RSE	Coef	RSE	Coef	RSE	Coef	RSE
Age	0.96***	0.23	0.99***	0.25	0.99***	0.25	0.98***	0.26
Age2	-0.04***	0.01	-0.04***	0.01	-0.04***	0.01	-0.04***	0.01
Migrated prior to 2005	-0.01	0.38	0.16	0.36	0.12	0.36	0.14	0.39
Migrated between 2005 and 2007	0.26	0.40	0.11	0.51	0.03	0.59	-0.02	0.59
Level of education								
No edu/primary/religious school (ref)								
Secondary			0.46	0.42	0.48	0.45	0.40	0.51
University/post-secondary			-0.51	0.42	-0.40	0.50	-0.57	0.74
Assets index			-0.11	0.16	-0.09	0.17	-0.09	0.16
Lives with at least one parent			0.62	0.49	0.63	0.49	0.60	0.56
Mental health					0.00	0.02	0.00	0.02
Physical health					0.01	0.04	0.01	0.04
Drinks alcohol							-0.10	0.44
Gets exercise							0.15	0.44
Perceived HIV risk								
Pseudo R2	0.184		0.206		0.208		0.212	
N=								

Notes: We also include other variables in the regressions above, including employment status and job type, more detailed household structure (living with one or both parents, number of siblings, etc...), and other lifestyle measures (cigarette smoking, dietary measures, free-time activities, etc...). None of these variables were significant, and their inclusion does not substantially alter the results above.

RSE=Robust standard errors
 *p<0.10 **p<0.05; ***p<0.01;

a=dropped from models due to complete separation

Table 7: 2005 characteristics and behaviors associated with sexual debut between 2005 and 2007 for HIRUM women who marry between 2005 and 2007

	Coef	RSE	Coef	RSE	Coef	RSE	Coef	RSE
Age	0.77***	0.10	0.84***	0.10	0.85***	0.11	0.87***	0.11
Age2	-0.03***	0.00	-0.03***	0.00	-0.03***	0.00	-0.03***	0.00
Migrated prior to 2005	0.51**	0.22	0.35	0.25	0.35	0.26	0.30	0.24
Migrated between 2005 and 2007	0.27	0.28	0.65***	0.19	0.63***	0.20	0.70***	0.21
Level of education								
No edu/primary/religious school (ref)								
Secondary			0.63**	0.32	0.67**	0.33	0.67**	0.34
University/post-secondary			-0.94***	0.30	-0.92***	0.32	-0.98***	0.34
Assets index			-0.13	0.09	-0.12	0.09	-0.10	0.09
Lives with at least one parent			-0.44**	0.21	-0.47**	0.21	-0.51**	0.21
Mental health			0.00	0.01	0.00	0.01	-0.01	0.01
Physical health			0.01	0.02	0.01	0.02	0.01	0.02
Drinks alcohol							-0.26	0.28
Gets exercise							0.14	0.22
Perceived HIV risk							1.51***	0.43
Pseudo R2	0.172		0.203		0.214		0.218	
N=								

Notes: We also include other variables in the regressions above, including employment status and job type, more detailed household structure (living with one or both parents, number of siblings, etc...), and other lifestyle measures (cigarette smoking, dietary measures, free-time activities, etc...). None of these variables were significant, and their inclusion does not substantially alter the results above.

RSE=Robust standard errors
*p ≤ 0.10 **p ≤ 0.05; ***p ≤ 0.01;