Sexual Initiation, Marriage, and First Birth in Central America:

Trends in Timing and Context

Emily Vala-Haynes, MA, MPH[1], Claudia Valeggia, PhD[1,2]

[1]Graduate Group in Demography, Population Studies Center, University of Pennsylvania

[2]Department of Anthropology, University of Pennsylvania

Corresponding author
Emily Vala-Haynes
Population Studies Center
University of Pennsylvania
239 McNeil Building
3718 Locust Walk
Philadelphia, PA 19104-6298
Tel: 502 437 2414
Email: evala@sas.upenn.edu

Abstract

Initiation of sexual intercourse and subsequent transitions to first marriage and first birth are events that impact individuals' health, social, and economic well-being throughout the life course. This study uses survival analysis to examine trends in the timing and context of these events in Central America. Using data from Demographic and Reproductive Health Surveys for women ages 15-24 in El Salvador, Guatemala, Honduras and Nicaragua, we find that the median age of these events is relatively constant throughout the past 20 years. However, timing between these events is changing for individuals, and marriage diverges from sexual initiation in recent cohorts for three countries. In addition, we find that timing of these events is delayed for those who are Catholic, live in urban areas, and are enrolled in school. This study shows dynamic shifts in the relationships among events that have implications for both demographic trends and family planning policies.

Introduction

The initiation of sexual intercourse and subsequent transitions to first marriage and first birth are important events that impact individuals' health, social, and economic well-being throughout the life course. In much of the developing world, sexual initiation is occurring at increasingly younger ages while median age at marriage is either stagnant or rising (Ali and Cleland 2005; Blanc and Way 1998; Dixon-Mueller 2008; Remez et al. 2008). The decline in age at sexual initiation has taken place within a context of low contraceptive prevalence, increased risk of sexually transmitted infections (STIs), and high rates of unintended pregnancy. The international community has therefore deemed adolescent sexual activity a priority for both research and policy outreach. In 1994, the International Conference on Population and Development declared that "the reproductive health needs of adolescents as a group have been largely ignored to date by existing reproductive health services" and expressed concern over the adverse effects of adolescent pregnancy—both unintended childbearing and unsafe abortion (Ali and Cleland 2005).

In addition to the emphasis placed on these events from life course and public health perspectives, they also play an important role in demographic transition patterns. As developing countries go through the fertility transition, timing of events such as sexual initiation and first birth shifts and affects total fertility rates (TFRs), among other life history parameters. Sexual activity during adolescence—and especially prior to marriage—has increasingly been recognized as an important determinant of changing fertility rates (Stover 1998).

As interventions target adolescents in order to improve their sexual and reproductive health, and as demographers seek to monitor fertility trends in the developing world, determining the timing and context of sexual initiation, marriage and first birth has become increasingly

important. Although the adverse consequences of early sexual initiation are well-known, empirical knowledge of adolescent sexual behavior and reproductive health in the developing world is rare. Most studies either focus on a small population, primarily in sub-Saharan Africa, or on broad comparative and primarily descriptive examinations of median age at sexual debut throughout the world. This study contributes to the existing literature by analyzing trends in both the timing and the context within which sexual initiation, marriage and first birth occur in Central America—a region with the highest adolescent fertility rates in Latin America (Guttmacher Institute 2008a-d).

Background

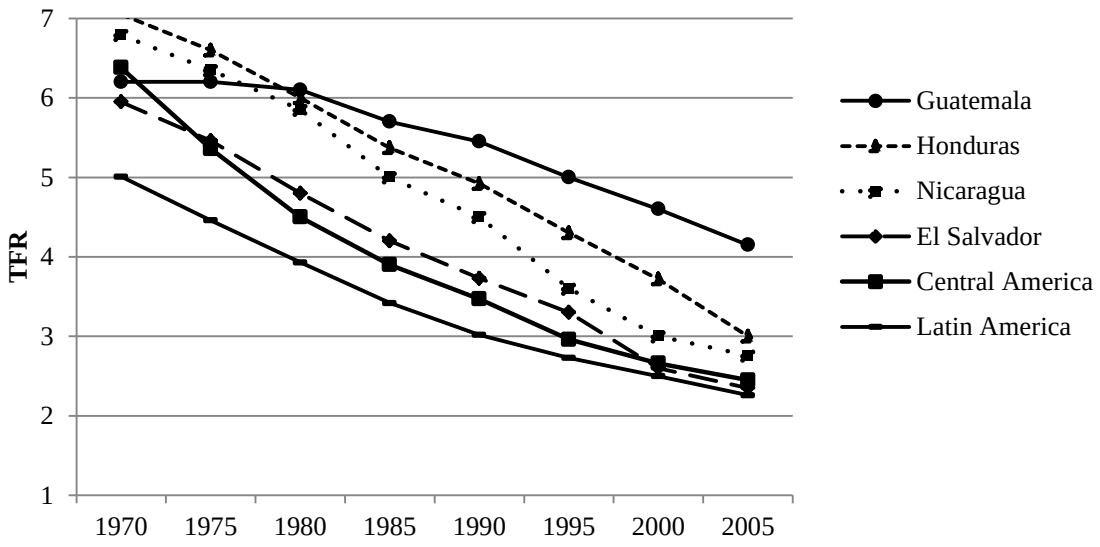
Sexual Initiation and the Fertility Transition in Central America

Age at sexual debut is a concern for reproductive health programs worldwide both because of its implications for adolescent health and because of its connection with unhealthy behaviors later in life. Adolescents whose sexual initiation begins at young ages—defined primarily as under the age of 14—are at greater risk for contracting HIV and other sexually transmitted infections (STIs), as well as for unintended pregnancy (Cavazos-Rehg et al. 2010; Cleland and Ferry 1995; Eaton et al. 2003; Ferry et al. 2001; Juarez 1997). In addition, early sexual initiation has long-term consequences for individuals. Several longitudinal studies find it to be associated with various high-risk sexual behaviors—having multiple partners, not using contraception, engaging in commercial sex—later in life (Davis and Lay-Yee 1999; Sandfort et al. 2008; Spriggs and Halpern 2008; Teitler 2002). Added to these individual consequences, unintended and young pregnancies are associated with low rates of skilled prenatal and delivery care, which then affects the health of later generations (Sabonge et al. 2006).

Given the immediate and long-term consequences of adolescent sexual behavior, as well as the current emphasis on the subject by the international public health community, a thorough examination of this topic is warranted in a region characterized by high adolescent and unintended fertility. This study takes a comparative approach by focusing on the timing and context of sexual initiation, marriage and first birth in four Central American countries: El Salvador, Guatemala, Honduras and Nicaragua. While these countries are by no means homogeneous, they have followed similar trajectories and face similar challenges—in varying degrees—in terms of fertility outcomes in the past two decades. Although rates have fallen in recent years, current levels of adolescent fertility in this region remain higher than for Latin America as a whole (Guttmacher Institute 2008a, 2008b, 2008c, 2008d). Adolescent fertility rates in the four countries included in this analysis range from 102 per 1,000 women to 119 per 1,000 women in Honduras and Nicaragua, respectively. In contrast, the adolescent fertility rate for the entire Latin American region is 80 per 1,000 women (Guttmacher Institute 2008a-d).

Total fertility rates (TFRs) have also declined as the region goes through the fertility transition and currently range from 2.6 children per woman in El Salvador to 4.4 in Guatemala (UN Data 2008). Yet, they remain higher than those of more developed Central American countries—Costa Rica and Panama have TFRs of 1.9 and 2.5, respectively—and most South American countries (UN Data 2008). Figure 1 shows the trajectories of the fertility decline in El Salvador, Guatemala, Honduras and Nicaragua.

Figure 1: Total Fertility Rates 1970-2005 Central American Countries and Latin America



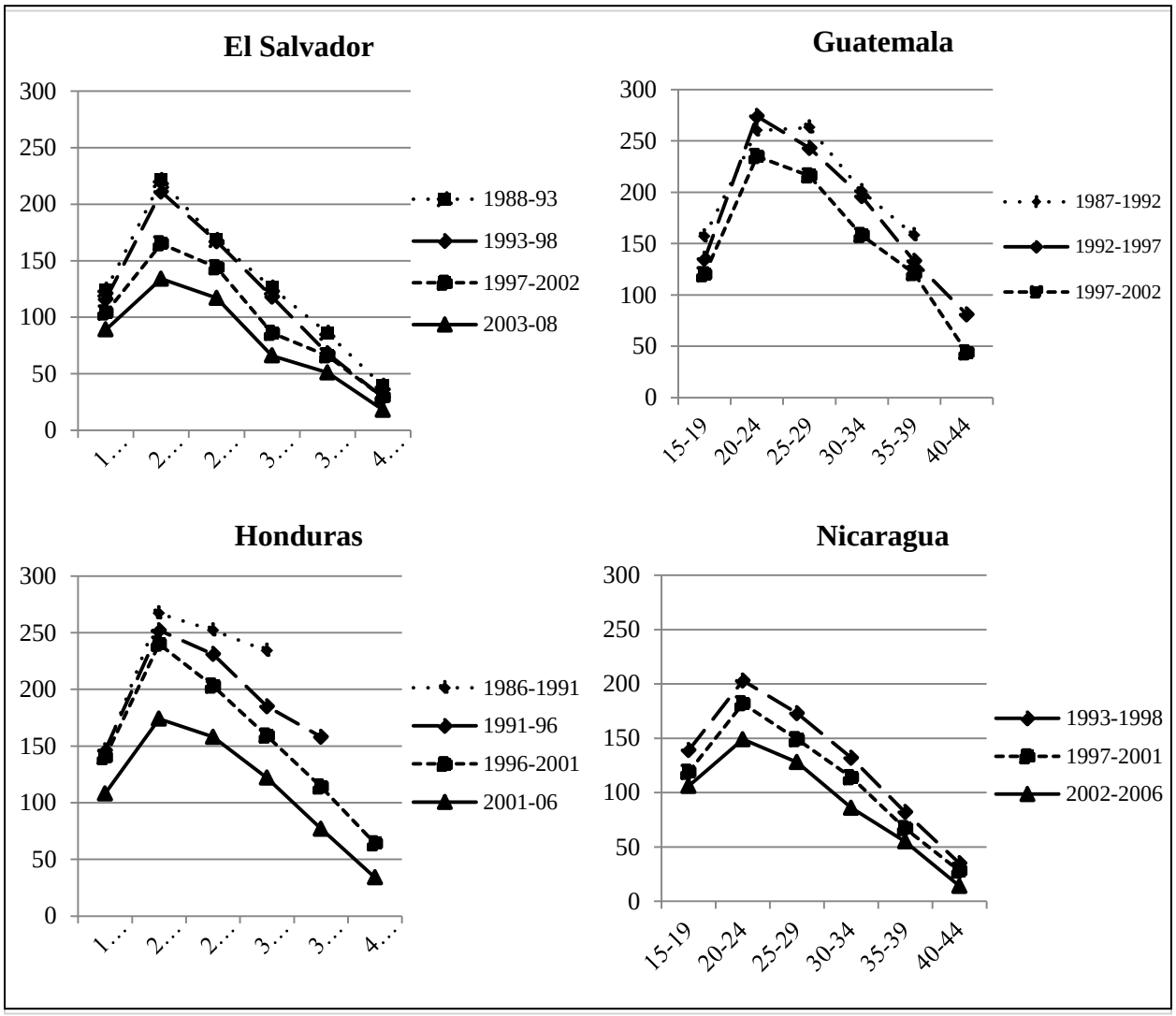
Source: UN Data 2008. "World Population Prospects: 2008: Accessed 27 January 2011. http://data.un.org/Data.aspx?d=PopDiv&f=variableID:54.

While the TFRs in Figure 1 indicate that most of these countries are approaching the end of the fertility transition, it is important to consider the path by which most countries have undergone this transition. Rather than postponement of marriage or first birth, stopping behavior drives the beginning of fertility decline (Bozon et al. 2009; Chackiel and Scholnick 1996). Women continue to give birth to their children at early ages, after which they employ various forms of fertility control to prevent future pregnancies. Thus, the "left end" of the reproductive lifespan—adolescence—appears to have undergone little to no change. This seems to be the case in Latin America, where age at first sex, age at first marriage, and age at first birth appear to have remained constant throughout the fertility transition (Bozon et al. 2009; Chackiel and Scholnick 1996).

The age-specific fertility rates in Figure 2 show evidence for both stopping behaviors, the lack of change in age at first birth, and some evidence pointing to a shift toward a more dynamic "left end" of fertility in the four countries in our study. The figures also shows cross country

differences that appear as countries go through the fertility transition at different paces. Guatemala, with the highest TFR, shows approximately proportional decline in fertility at post-adolescent ages, and almost no decline during ages 15-19. In contrast, El Salvador and Nicaragua, with their relatively low TFRs, show declines in fertility at increasingly younger ages, which may point to a transition toward postponing behaviors. In Honduras, substantial changes appear at all ages and, in the past five years, adolescent fertility appears to have decreased.

Figure 2: Age-Specific Fertility Rates (per 1,000 women): 1986-2008



Sources: El Salvador FESAL 2008; Guatemala ENSMI 2002; Honduras ENDESA 2005; Nicaragua ENDESA 2006

Previous analyses of the age at sexual initiation in Latin America tend to focus on single survey years of primarily South American countries with little focus on either Central America or close examination of how the relationship between sexual, marital, and fertility behaviors during adolescence may have changed over time. In addition, other variables that have been shown to mediate these behaviors—education, region, and contraceptive use—have rarely been considered. Moreover, many studies of sexual initiation employ statistical analyses that do not adjust for age structure and rely either on current status or recall data alone instead of using survival analysis, which is the most appropriate method for analyzing these data for 15-25 year olds due to censoring (Mensch et al. 2006; Zaba et al. 2004).

The present study fills existing gaps in the literature by using survival analysis to examine trends in timing of early reproduction-related events in Central America over the past two decades. Overall, the fertility transition in this region has been characterized by little change in marriage rates or age at first birth and by large regional variation both across and within countries, and has occurred alongside rising female education levels (Bozon et al. 2009). This leads us to the following research questions: What are the relationships among sexual initiation, marriage and first birth? Have those relationships changed across countries or across cohorts? How is the timing of these events related to birth cohort, region, religion and schooling? Answers to these questions may illuminate the context of fertility transitions in Central America, and provide socially relevant information for programs aimed at improving adolescent sexual and reproductive health in that region.

Life Course Events Under Study: Sexual Initiation, Marriage, and Age at First Birth

In the developing world, the strength of the link between marriage and sexual debut varies. However, it remains relatively strong in Latin America. Approximately 50% of women in Latin America enter into a union during adolescence; however, this percentage appears to be declining compared to older cohorts (Remez et al. 2008). In Central America, between 77% and 95% of sexually active women aged 15-24 are in a union[1] (Blandón et al. 2006; Figueroa et al. 2006; Guttmacher Institute 2008b; Sabonge et al. 2006). Thus, both sexual initiation and union are highly prevalent among adolescents. While most of the literature in Latin America supports the consensus that marriage rates are not changing, there is some evidence that marriage among adolescents is declining compared to older cohorts (Guttmacher 2008a-d). This is consistent with evidence from throughout sub-Saharan Africa, where age at marriage is increasing and public health officials are concerned about the rise of premarital sex and its association with increased risk for STIs (Harrison et al. 2008; Mensch et al. 2006). The relationship between sexual initiation and marriage in Central America may not be as clear as described in summaries of the fertility transition throughout Latin America. Given that delayed marriage is a sign of later stages of fertility decline, we hypothesize that this change will be characteristic of countries with lower TFRs—in this case, El Salvador and Nicaragua—while the median age at marriage in Guatemala and Honduras will remain constant.

Age at sexual initiation and age at marriage are also strongly connected with age at first birth in the literature on Latin America (Bozon et al. 2009; Chackiel and Schkolnik 1996).

[1] Because of the question wording in the surveys used for this study, the terms "marriage" and "union" will be used interchangeably. However, marriages and consensual unions are in fact different, and the type of union has emerged as an important variable to consider in this region. Consensual unions as opposed to legal marriages are on the rise throughout Latin America and now account for 69% to 79% of all unions (Ali and Cleland 2005; Remez et al. 2008). Many argue that these types of unions must be differentiated from one another. Consensual unions are more prevalent among lower educated and poor women in Venezuela (Parrado and Tienda 1997). Moreover, female autonomy is lower in such unions, and they have been found to be less stable and more likely to end in dissolution (Ali and Cleland 2005; Remez et al. 2008).

However, similar to the mixed evidence regarding marriage timing, the relationships among these variables may not be as straightforward as previously argued. Bozon et al. suggest that as countries experience modernization there may be a "decoupling" of these events (2009). Traditional norms of early marriage or taboos against premarital sex have been found to weaken over time due to increased modernization and urbanization (Heaton et al. 2002; Schwab Zabin et al. 2009). As Central American countries undergo both of these changes, along with secularization and increased access to contraceptives, we hypothesize that age at first birth may separate from age at sexual initiation over time.

Mediators: Sociocultural and Behavioral Variables

While several analyses have focused on the relationships among age at sexual initiation, age at marriage and age at first birth, numerous studies also attempt to look at socioeconomic factors that may mediate these variables. Among these factors, schooling is most often found to be associated with age at sexual initiation, marriage and first birth. While the relationship between schooling and marriage and first birth is fairly clear—educational disadvantage is strongly associated with adolescent occurrences of both events—the relationship between schooling and sexual initiation is more complicated (Singh 1998). In Europe, for example, schooling was once strongly associated with delayed age at sexual debut, but that relationship has now become much weaker (Teitler 2002). In sub-Saharan Africa, studies have found that higher levels of schooling among females are associated with later sexual debut due to greater awareness of and tendency to change risky sexual behaviors (Clark et al. 2009; Cleland and Ferry 1995; Marteleto et al. 2008; Sauvain-Dugerdil et al. 2008). Biddlecom et al. (2008) and Spriggs and Halpern (2008) found that female students in sub-Saharan Africa and the United

States, respectively, were more likely to leave school once they had initiated sexual activity. Childbearing was a significant mediator in both analyses (Biddlecom et al. 2008; Spriggs and Halpern 2008). Due to considerable expansion in Central American education systems throughout the past decade, women's levels of schooling are increasing in the four countries included in this analysis. Despite the mixed evidence in the literature for the nature of the association between school and age at sexual initiation, considering the overall tendencies, we hypothesize that schooling will be associated with later ages of sexual debut, marriage and first birth.

Sexual and marital behaviors are also highly correlated with region. Age at first sex is consistently lower in rural areas compared to urban areas in Central America (Blandón et al. 2006; Figueroa et al. 2006; Remez et al. 2008; Sabonge et al. 2006). However, Dodoo et al. (2006) found that urban poor in Kenya were significantly more likely to have early sexual debut and a greater number of sexual partners than their rural counterparts, indicating that factors in both urban and rural areas could contribute to earlier sexual initiation. In Central America, adolescents from both urban and rural areas may have similar ages at sexual initiation for entirely different reasons. Young women in urban areas may be more susceptible to modernization and the resulting loss of traditional norms and taboos discussed by Bozon et al. (2009), and therefore experience early sexual initiation "decoupled" from the institution of marriage. In contrast, young women in rural areas may be more likely to experience sexual initiation during adolescence because they are more likely to marry during adolescence (Guttmacher Institute 2008a-d). We therefore expect to see little change in the relationship between sexual initiation and marriage among cohorts of rural women, while we expect to see a gradual increase in the gap between sexual initiation and marriage among cohorts of urban

women. We hypothesize that, while region is an important factor in early ages of sexual initiation and marriage, it will be mediated by socio-economic status—in this case measured by schooling—similar to the outcomes in Dodoo et al. (2006).

While Latin America continues to be a predominantly Catholic region, the number of people affiliated with Protestant faiths has increased in recent years. The extent to which this has occurred varies across country, as does the extent of the conservatism among Catholics and different Protestant denominations. The most conservative leaders in these religions advocate adherence to strict moral standards that condemn sexual activity and childbirth prior to marriage (McKinnon et al. 2008; Ogland et al. 2010). Two studies in Brazil found that both Catholic and Protestant women were less likely to experience a first birth during adolescence compared to women with no religious affiliation (McKinnon et al. 2008; Ogland et al. 2010). Building on this literature, we expect Catholics and Protestants to be more conservative than women with no religious affiliation. However, we hypothesize that this conservatism is more associated with relationships among events—i.e. sexual debut and marriage will be more connected, and first birth soon to follow due to discouragement of sexual activity prior to marriage and lack of contraceptive use. The more Catholic a country is—Guatemala has the highest percentage of Catholics, and they are in general more conservative than Catholics in other countries—the closer the connection we expect to see between the events of sexual initiation and marriage.

Early sexual debut has been associated with various risky sexual behaviors—primarily lack of contraceptive use (Blanc and Way 1998; Cavazos-Rehg et al. 2010; Eaton et al. 2003; Ferry et al. 2001; Harrison et al. 2008; Klavs et al. 2006; Luke 2005; Shafii et al. 2007). Condom use in particular has been a focus for policies aiming to prevent both STIs and adolescent pregnancy. In Latin America, however, a majority of adolescents do not use contraception the

first time they have sex (Blanc and Way 1998). Moreover, condom use only makes up 20% of contraceptive use in Latin America, indicating that exposure to STIs remains high (Ali and Cleland 2005). Contraceptive use has the clear potential to modify the relationships among sexual initiation, marriage, and first birth. It is associated with marital status in particular and differs in Latin America compared to sub-Saharan Africa, where the majority of studies examining the relationship between sexual initiation and marriage have been conducted. A study by Blanc and Way (1998) found that levels of contraceptive use were higher among married teens in Africa than among their sexually active, unmarried counterparts in Latin America. Because contraceptive prevalence remains quite low among adolescents in Central America, there is reason to expect that this variable significantly impacts reproductive and marital behavior at the aggregate level. However, due to the select group of women who do use contraception at sexual initiation, this variable may show a strong negative relationship with each event simply because those women are likely to delay these events for other, unobserved reasons. Nevertheless, due to its importance as a determinant of fertility and the steady increase of contraceptive prevalence throughout Latin America, this analysis will examine contraceptive use as a factor that impacts our primary events of interest.

Age of sexual initiation, first marriage and first birth, clearly have consequences for individuals throughout the life course. However, previous research in this area focuses on developed countries and sub-Saharan Africa. Research in Latin America is limited, and in the case of Central America very little is known about the trends and factors associated with these events. The objective of this study is to examine patterns and determinants of ages at sexual initiation, marriage and first birth in a comparative analysis of four countries in Central America. First, we will describe how age at sexual initiation, age at first marriage, and age at first birth

vary by cohort and across countries. Second, we will determine the relationship between sexual initiation and age at first marriage and between sexual initiation and age at first birth using sequencing analysis. Finally, we will employ Cox proportional hazard models to examine how the events of interest vary by birth cohort, contraceptive use, region, religion and schooling.

Data and Methods

Data

This study uses published data from both Demographic and Health Surveys (DHS) and Reproductive Health Surveys (RHS) in El Salvador, Guatemala, Honduras and Nicaragua. These surveys are the leading sources of information about reproductive health in developing countries, and in many countries are the only sources of nationally representative data. Surveys are financed by either the United States Agency for International Development or the Centers for Disease Control in partnership with ministries of health and national statistics institutes within the countries of study.

Data from both the DHS and RHS are based on samples of randomly selected households throughout a country. Data collection typically takes place every five years. After a sampling frame has been determined, field staff collect housing characteristics using a household questionnaire, and they identify all the individuals living within the household. In addition, a women's questionnaire is conducted with each female in the household between the ages of 15 and 49. Sample sizes range from 5,000 to 30,000 women and have steadily increased in recent years (Vaessen et al. 2005). For this study, we restrict the sample to women ages 15-24 at time of interview.

Of the seven countries in Central America, four—El Salvador, Guatemala, Honduras and Nicaragua—have DHS or RHS data from four surveys, at least one of which is from the past six years. National surveys of Belize and Costa Rica were discounted because their most recent data collection occurred in 1999. Panama does not have a publicly available nationally representative survey with demographic and health information. Information about the surveys for each country included in this analysis is presented in Table 1.

Table 1: RHS/DHS survey years and population size used for analysis

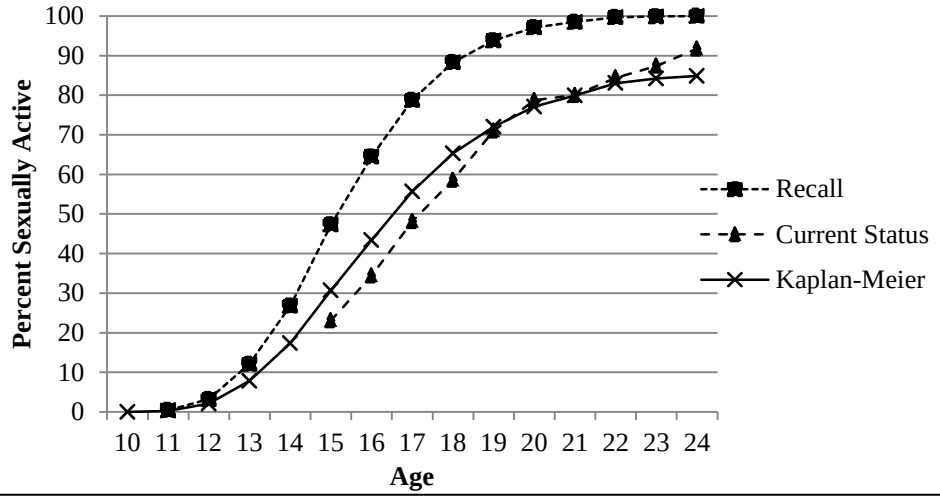
	El Salvador	Guatemala	Honduras	Nicaragua
Survey years				
First	1993	1987	1991/92	1992/93
Second	1998	1995	1996	1998
Third	2003	2002	2001	2001
Fourth	2008	2008	2005	2006
# Women 15-24 years				
First	2,318	2,196	3,416	2,724
Second	4,753	5,221	2,830	5,800
Third	3,753	3,358	3,139	5,548
Fourth	3,775	5,819	8,352	5,370
Birth cohort				
First	1968-78	1962-72	1966-77	1967-78
Second	1973-83	1970-80	1971-81	1973-83
Third	1977-88	1977-87	1973-86	1976-86
Fourth	1983-93	1983-94	1980-91	1981-92

Methods

Because women were asked their age at sexual initiation at the time of interview, this analysis will use a combination of recall data (for those who have been sexually initiated) and current-status data (for those who have not yet begun sexual activity). An analysis that attempts to use recall data alone (i.e. one that calculates median age at an event conditional on women having experienced the event) has the potential to be biased by younger age distributions of the sample because women who have not yet experienced sex at the time of the survey are censored.

This is an especially significant problem when the sample consists of 15-24 year olds—many of whom are not yet sexually active at the time of interview. Figure 3 follows an example set out by Zaba et al. (2004) to illustrate the problem with relying on recall data or current-status data *alone* using the case of Nicaraguan RHS data in 2006. If recall data alone were used to determine the percentage sexually active at each age, a younger distribution would result. Survival analysis—which produces the Kaplan-Meier estimate shown in Figure 3 and takes into account the large portion of women censored at each age—is therefore the most appropriate method for the examination of trends in sexual initiation (Zaba et al. 2004; Mensch et al. 2006).

Figure 3: Example of Different Methods to Assess Age at Sexual Initiation: Nicaragua RHS 2006



Source: Authors' calculations from Nicaragua ENDESA 2006

In order to identify any inconsistencies in the data, age at first birth was cross-checked with age at sexual initiation. First, anyone who reported an age at first birth prior to her 9th birthday was dropped because birth at such young ages is either highly unlikely or physiologically impossible (Wood 1994). Only a negligible number of cases in each country fit this criterion. Second, anyone who reported an age at first birth prior to age at first sex was dropped from the analysis. This inconsistency occurred in 0.8% of the sample in Guatemala to

4.6% of the sample in El Salvador. Women whose responses were inconsistent were more likely to report younger ages of first birth and sexual initiation. They were excluded from analysis due to the concerns addressed above regarding validity of data on sexual behavior.

Regardless of method, the vast majority of papers using multiple DHS surveys present data grouped by survey. In order to determine how ages at sexual initiation, first marriage and first birth have changed over time, this analysis will instead present data grouped by birth cohort. Table 1 showed the different birth cohorts corresponding to various surveys in each country. To facilitate comparison of results across countries, cohorts were created in five to six year increments from 1962 to 1993 for all women ages 15-24 at the time of interview. Table 3 shows birth cohort years and sample sizes for each country. The earliest and latest cohorts both consist of 6 years in order to avoid a final cohort of just two birth years. Due to the small number of women assigned to the 1962-1967 cohort in Nicaragua, analyses exclude this cohort for this country.

Table 2: Birth cohort years and sizes for women 15-24 in El Salvador, Guatemala, Honduras, and Nicaragua

Cohort	Years	El Salvador	Guatemala	Honduras	Nicaragua
1	1962-67	--	1,010	282	19
2	1968-72	1,074	2,139	1,999	1,366
3	1973-77	3,342	2,621	3,390	4,007
4	1978-82	4,315	3,472	3,949	6,429
5	1983-87	3,686	1,487	4,890	5,201
6	1988-93	2,122	3,559	3,090	2,116
Total		14,539	16,548	17,600	19,138

The first aim of this paper is to describe how age at sexual initiation, age at first marriage, and age at first birth vary by cohort and across countries. Using the Kaplan-Meier estimates of the survival function to examine the timing of sexual initiation, we present the ages at which 5%, 25%, 50%, and 75% of female respondents have experienced this particular event.

In addition to the timing of sexual initiation, marriage and first birth, we aim to determine the relationships among these events. We therefore analyze the relationship between sexual initiation and age at marriage and first birth across countries and cohorts. This aim is addressed by graphing smoothed Kaplan-Meier survival curves for sexual initiation, marriage and first birth in two 10-year birth cohorts: 1968-1977 and 1978-1987.

The final aim of this paper is to examine how sexual initiation, age at marriage, and age at first birth vary by contraceptive use at sexual initiation, region, religion and schooling across countries and cohorts. Using age as the analysis time, we employ Cox proportional hazards regression models to estimate the association between each event and the mentioned sociocultural variables.

Dependent Variables

The RHS and DHS are administered by different agencies and in different years, and the questions—and the wording of those questions—are not standardized across surveys and years. Direct questions about age at sexual initiation and age at first marriage or union were asked in every survey. However, the RHS does not include a direct question about age at first birth. In the case of no direct question/response, age at first birth was determined using reproductive histories by matching a mother's age in months to the month of her first live birth.

Independent Variables

The RHS and DHS are utilized to capture information on the current status of each respondent. We are therefore restricted regarding characteristics of respondents at the timing of events. This analysis will include six independent variables—birth cohort, region, religion,

contraceptive use at sexual initiation, and schooling—that either capture the characteristics of a respondent at the time of each event or can be assumed to have remained constant since that event. Current region of residence and religion were asked of respondents in every survey. Region (urban or rural) was coded by the interviewer based on the location of the household in which a woman lived at the time of the survey. Religion was coded as none, Catholic or Protestant. In the most recent surveys, women were asked if they used contraception at sexual initiation. Contraceptive use at sexual initiation was missing for many of the earlier surveys and therefore cannot be determined for those survey years. Finally, a variable for whether or not a respondent was in school at the time of each event was created based on responses to two questions during the interview: Was she currently attending school? If not, how old was she when she quit attending school?[2] This variable is available only for the RHS.

Analytic Strategy

Because independent variables capturing respondents' characteristics at the timing of each event are scarce, this section of the analysis will use only a subset of data. First, controlling for birth cohort, we run a model with only contraceptive use at sexual initiation to determine the relationship between this variable and the events of marriage and first birth.

Second, we run Cox proportional hazard regression models in order to determine how the hazard of experiencing an event (sexual debut, first marriage, or first birth) varies by cohort, region, religion and schooling. Because schooling has proven to be a significant factor in the timing of sexual initiation, marriage and first birth, multivariate regression analysis including religion and region is restricted to data from surveys in which the two schooling questions were

[2] Several education questions are asked on both Demographic and Reproductive Health Surveys. For example, all surveys ask respondents about their highest completed level of schooling. However, because this analysis focuses on women ages 15 to 24 who are censored at the time of interview, completed level of schooling is not appropriate.

asked. For each country and event, we estimate three models: Model 1 includes birth cohort, region, and religion and uses data from the total sample for each country. Model 2 includes birth cohort, region and religion for those respondents for whom we also have information on the schooling variable. Models 1 and 2 test our hypotheses about region and religion prior to their presumed modification by schooling. In Model 3, we add a time-varying dummy variable for whether or not a respondent was in school when she experienced an event. This adjustment allows us to determine whether or not other factors are significantly modified by a respondent being in school.

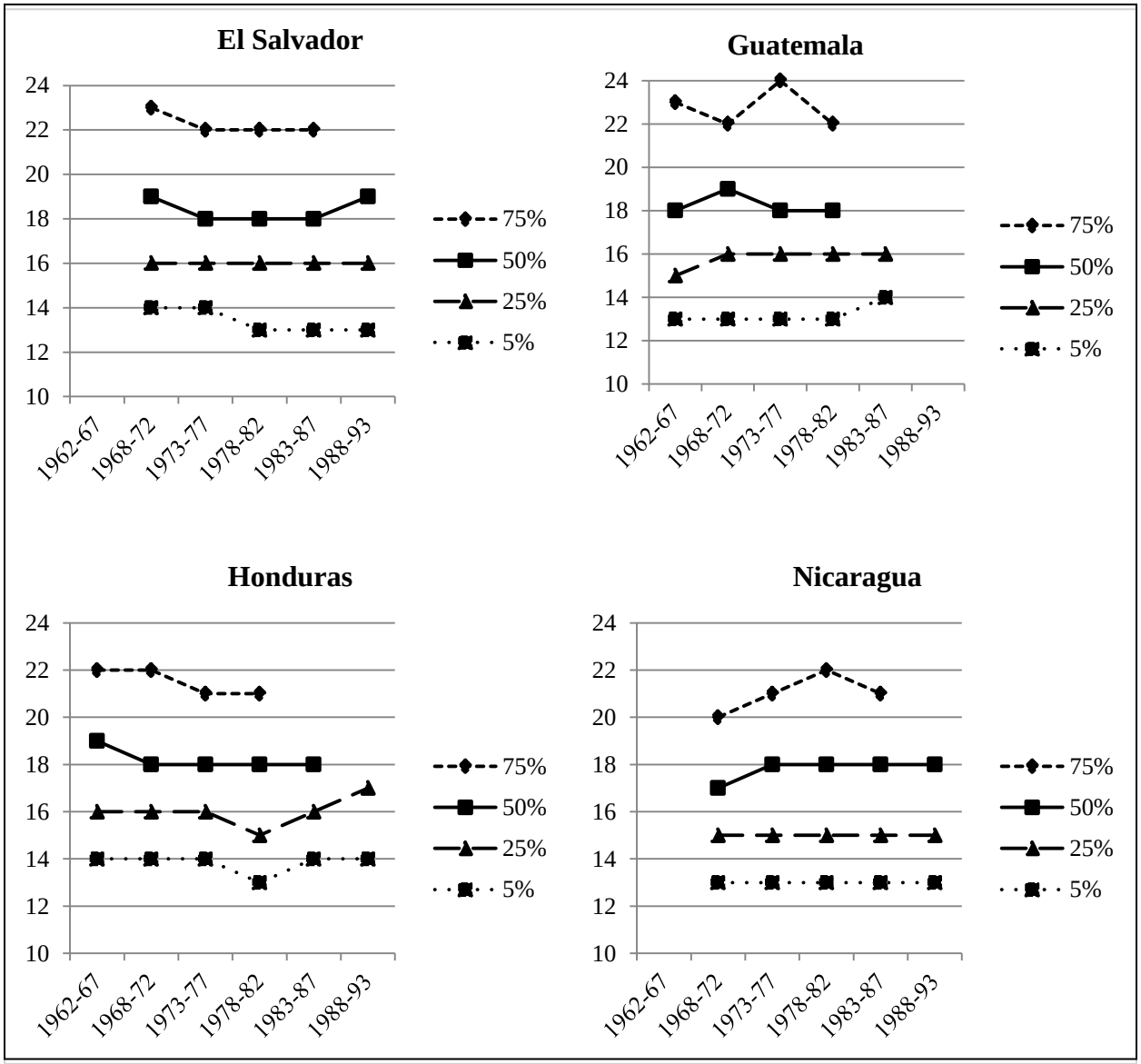
Results

Descriptive Statistics

Figures 4-6 show the ages at which 5%, 25%, 50%, and 75% of respondents experienced sexual initiation, marriage and first birth across countries and cohorts. Missing values either mean no observations (or too few) for that birth cohort or that there was not enough exposure time—for example, we have censored data for the most recent birth cohorts who were ages 15-19 during interviews and therefore cannot yet determine percentages for these women. Figure 4 shows that age at first sex has remained relatively constant in the four countries surveyed, as well as having very little variance by birth cohort. With the exception of Nicaragua, where sexual initiation appears to be one year younger than the other countries, this event occurs around the age of 16 for approximately 25% of the sample. The median age of sexual initiation is between 17 and 18 years for all four countries and generally does not vary by cohort, with the exception of the earliest cohorts in El Salvador and Honduras. By the ages of 21 or 22, 75% of women appear to have experienced sexual initiation. The younger extreme (5% having experienced the

event) appears to have settled at the age of 13 for all countries except Honduras, where it is one year later.

Figure 4: Ages at which 5%, 25%, 50% and 75% of Women Experienced Sexual Initiation in El Salvador, Guatemala, Honduras and Nicaragua, 1962-1993

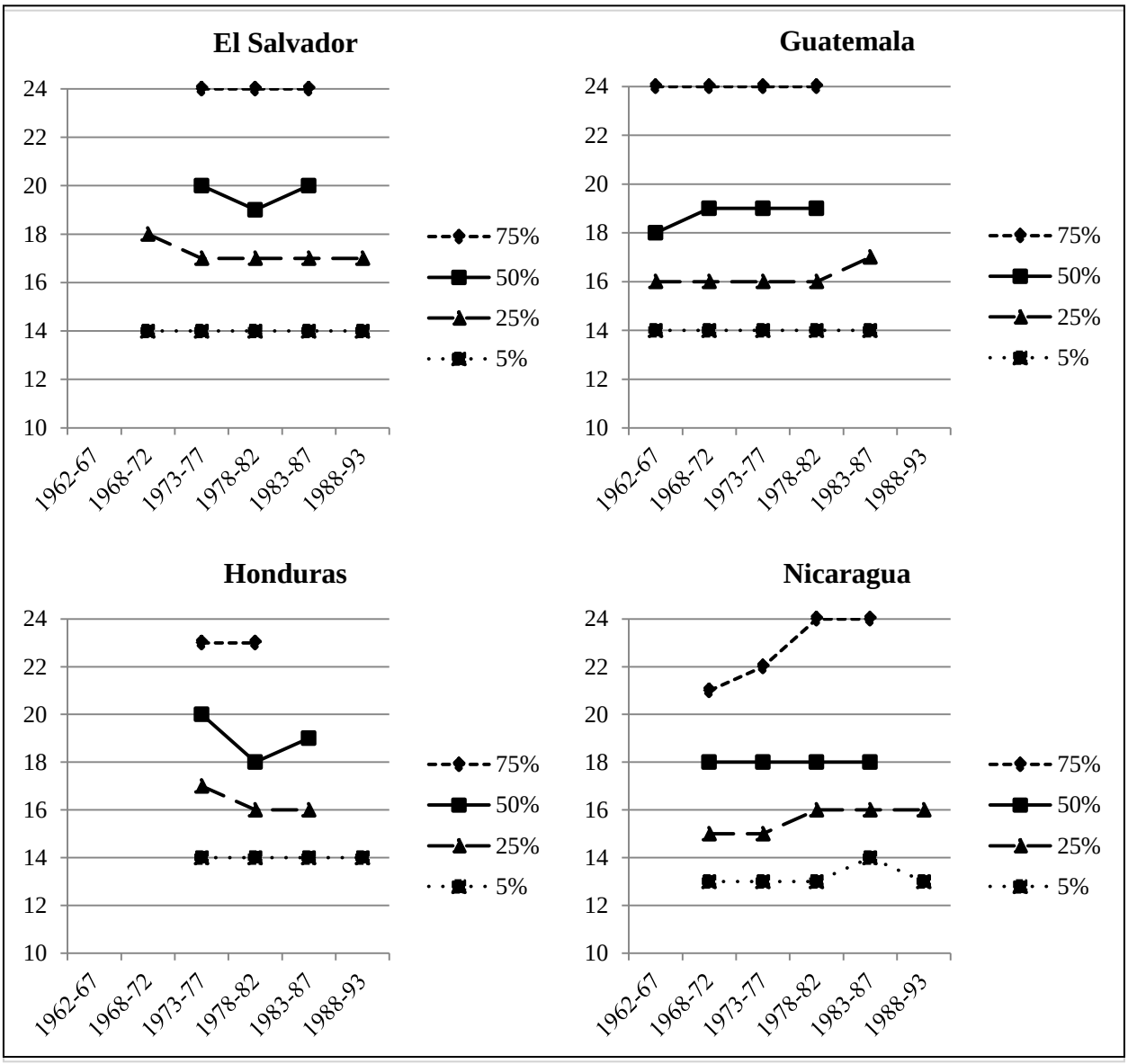


Source: Authors' calculations

In Figure 5, the median age at first marriage ranges from 18 to 20 but again appears to be consistently lower in Nicaragua. In Guatemala and Nicaragua there appears to be a small progression to later ages at first marriage by cohort. Marriage data for Honduras were largely

incomplete, which accounts for the lack of observations in that country. El Salvador and Guatemala consistently have the latest age at which 75% of women report first marriage: 24 years. Looking at the left side of the distribution, Nicaragua is clearly differentiated from the other countries. Compared to Guatemala, for example, 25% of women in Nicaragua experienced first marriage three years earlier across all birth cohorts.

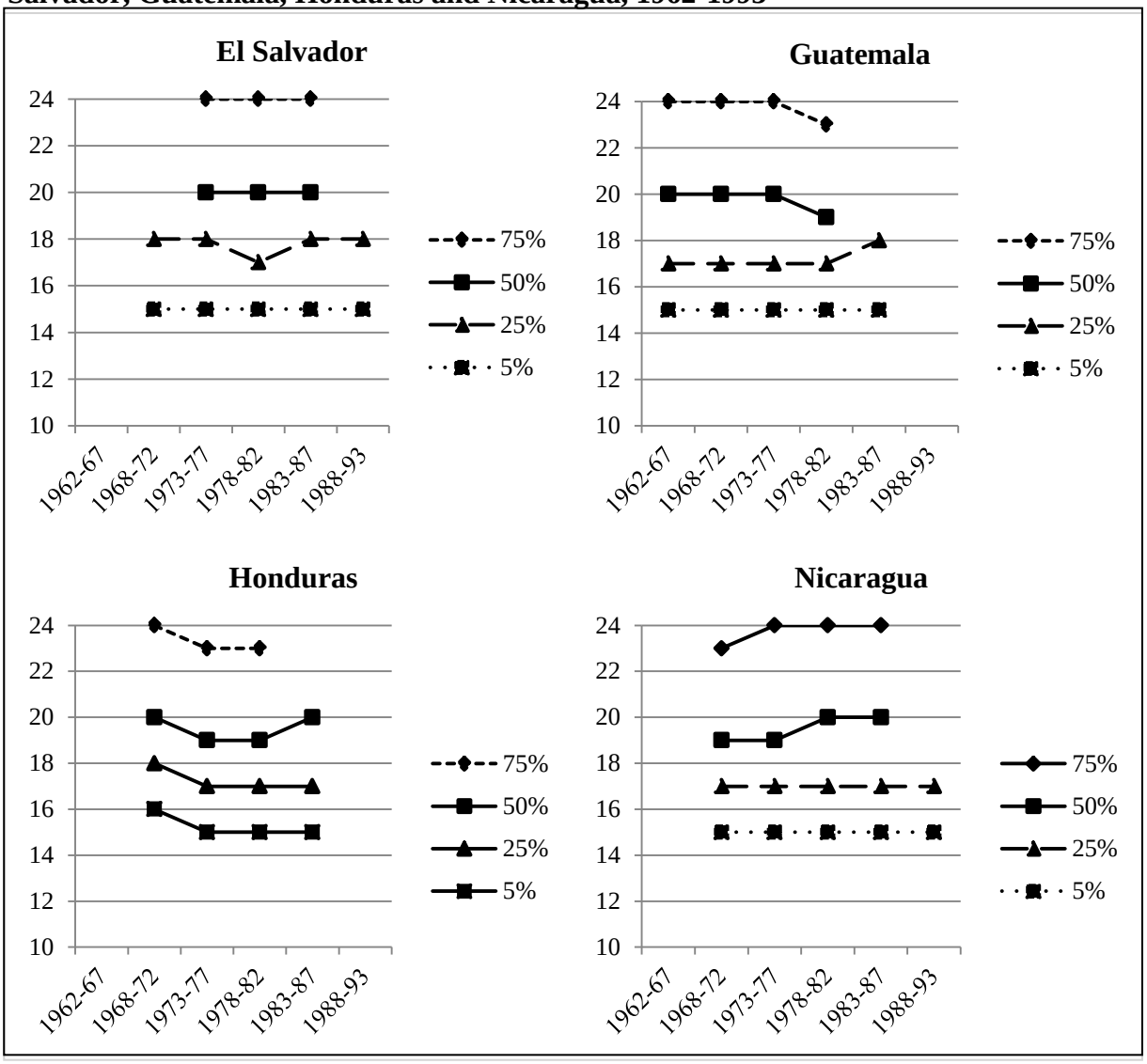
Figure 5: Ages at which 5%, 25%, 50% and 75% of Women Experienced First Marriage in El Salvador, Guatemala, Honduras and Nicaragua, 1962-1993



Source: Authors' calculations

Figure 6 shows the ages at which women experienced their first birth. In contrast to the calculations of age at sexual initiation and age at first marriage, women in Nicaragua appear to experience first birth at the same ages as women in the other three countries. In most cohorts for all the countries, 25% of women had given birth by the time they were 17. There seem to be no strong patterns across cohorts, and the median appears fairly stable at 19 to 20 years. At the right end of the distribution, 75% of Honduran women have experienced a first birth by the ages of 20 or 21 for most cohorts, compared to ages 24 or higher for the other three countries.

Figure 6: Ages at which 5%, 25%, 50% and 75% of Women Experienced First Birth in El Salvador, Guatemala, Honduras and Nicaragua, 1962-1993

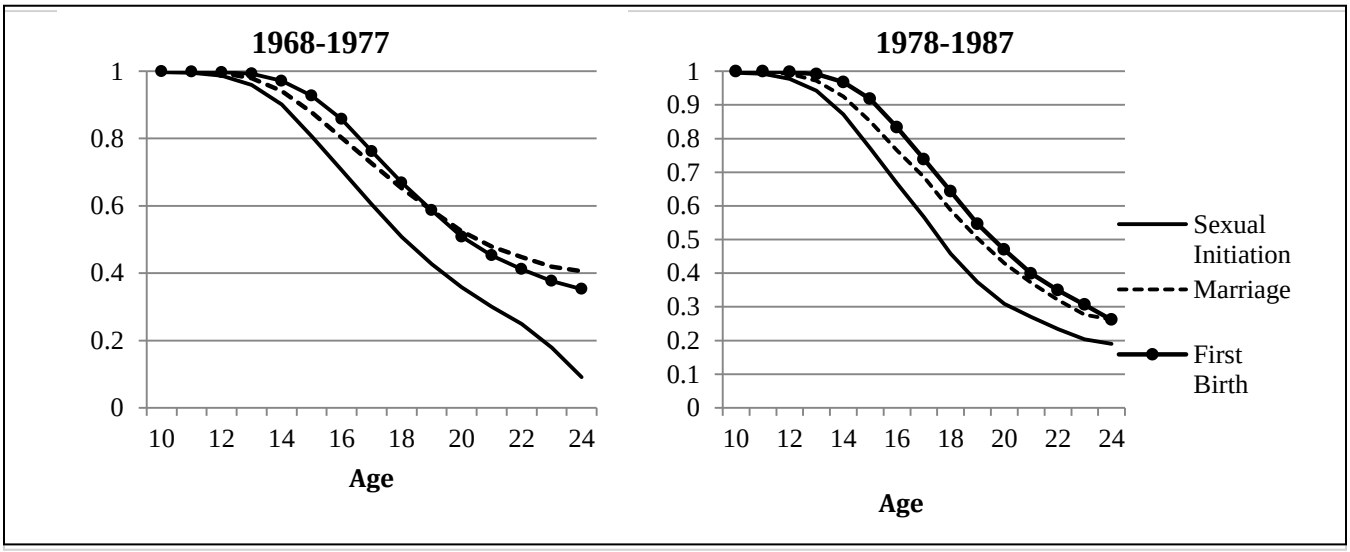


Source: Authors' calculations

Event Sequencing

In addition to determining the proportions of the women who experienced each event at particular ages, the relationships among events are important to consider. Figures 7-10 show the sequence of events for each country. In this case, cohorts 2 and 3 (1968-72 and 1973-77) were combined into one earlier 10-year cohort.[3] Similarly, cohorts 4 and 5 (1978-82 and 1983-87) were combined into one later 10-year cohort.

Figure 7: Sequencing of Events, El Salvador Birth Cohorts



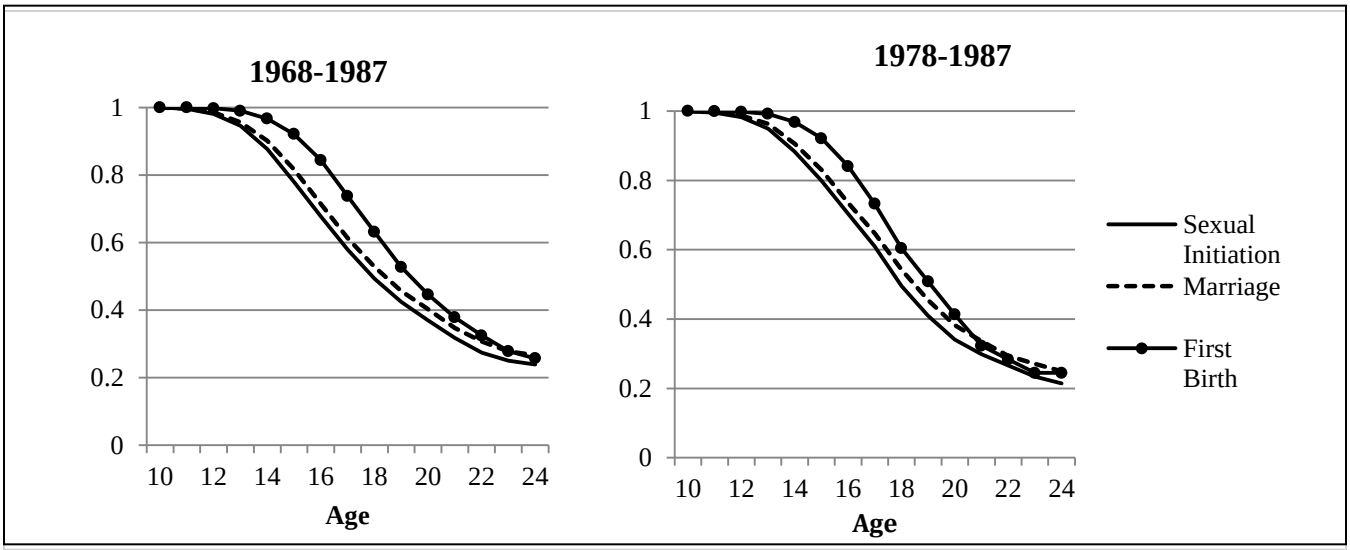
Source: Authors' calculations

Figure 7 shows smoothed survival curves for two 10-year birth cohorts in El Salvador. The earlier birth cohort shows sexual initiation and marriage curves that diverge at older ages. In contrast, these curves appear to converge for the more recent birth cohort. Additionally, curves

[3] Prior to 1973, marriage data are incomplete for Honduras. The marriage curve in this figure therefore represents data from 1973-1977 (Cohort 3). For within-cohort comparability, we only used data from 1973-1977 for the sexual initiation and marriage curves.

for marriage and first birth cross at age 19 in the earlier cohort, indicating that for those who delay these events until ages 20-24, first birth may occur prior to marriage.

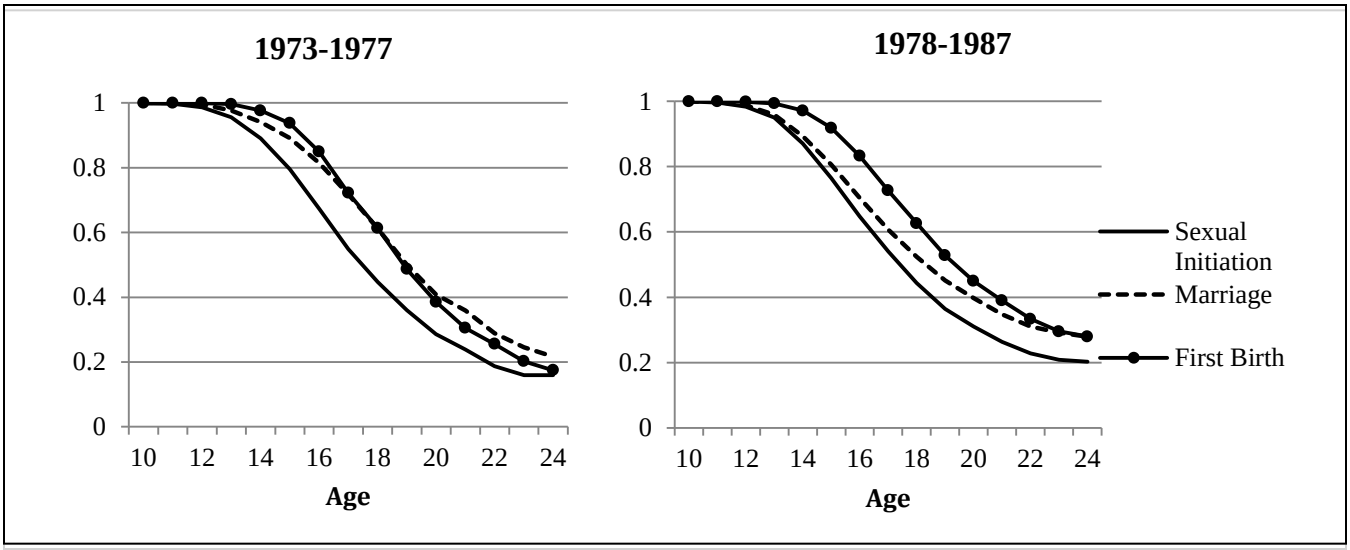
Figure 8: Sequencing of Events, Guatemala Birth Cohorts



Source: Authors' calculations

In contrast to El Salvador survival curves, Guatemala curves show very little difference by birth cohort. Marriage and sexual initiation are very closely associated, with first birth becoming more disconnected from both marriage and sexual initiation at younger ages. In the early 20s, all event curves appear to converge.

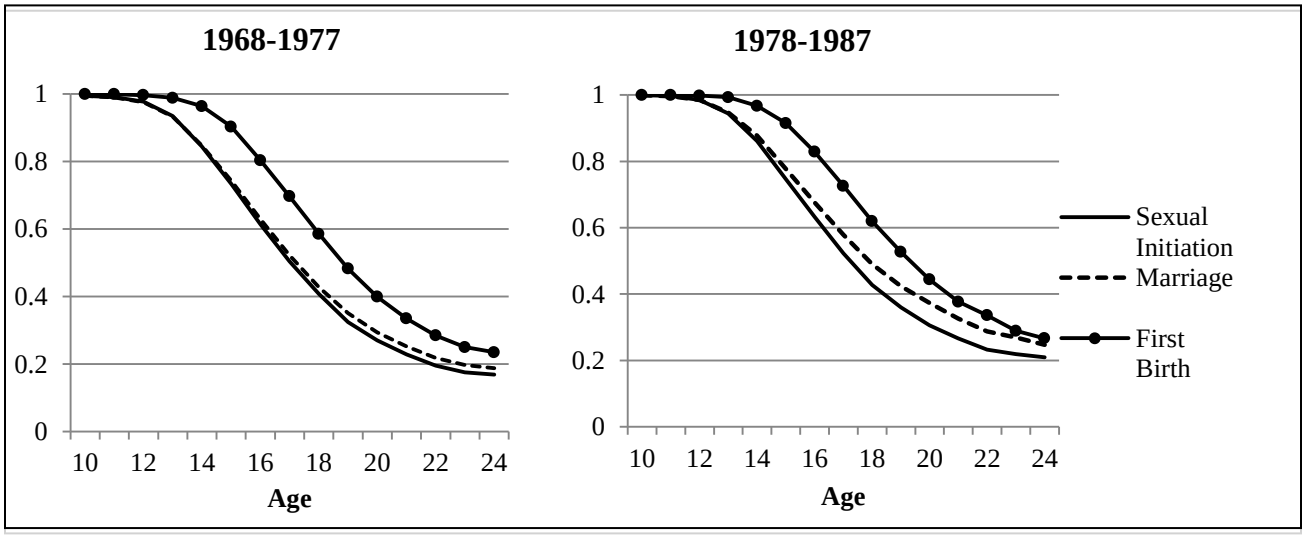
Figure 9: Sequencing of Events, Honduras Birth Cohorts



Source: Authors' calculations

In Honduras, the early cohort shows a pattern similar to that of El Salvador, in which marriage and first birth curves cross in the late teens. Nevertheless, these two lines are closely connected. In contrast, the later birth cohort shows marriage and sexual initiation to be closely connected in the early teens and to diverge at later ages.

Figure 10: Sequencing of Events, Nicaragua Birth Cohorts



Source: Authors' calculations

The earlier Nicaraguan cohort exhibits a close relationship between sexual initiation and marriage at all ages, while the later cohort shows a divergence at later ages similar to Honduras. First birth converges with the other two events at older ages, but appears to be delayed at younger ages.

Cox Proportional Hazards Models

Although timing of sexual initiation, first marriage and first birth appears to be largely unchanged throughout the past two decades, the sequencing models provide evidence—on an aggregate level—that the relationships among these events is far from stagnant. In order to further develop this analysis, and to determine how events vary according to the factors identified by previous studies in other developing countries, we employ Cox proportional hazards models to determine risk of experiencing an event at each age. This section uses two different subsamples of data. First, controlling for birth cohort, we run models for the subsample of women who were asked whether or not they used contraception at sexual initiation. Second, we run models for the subsample of women for whom we have school enrollment data. With this second subsample, we add birth cohort, region and religion variables and run models both for our subsample as well as for the full data.

Cox proportional hazards models were run first for all respondents who were asked whether they used contraception at sexual initiation (Table 3). As expected, when controlling for birth cohort, contraceptive use at sexual initiation is associated with a reduced hazard of getting married or having a first birth at each age. The only case in which this does not hold true is in the Nicaragua marriage model, in which contraceptive use is associated with a 35% higher hazard of marrying. In each country, contraceptive use reduces the hazard of first birth by a greater

magnitude than the hazard of first marriage. While birth cohort hazard ratios vary greatly in their significance, it is important to consider that this sample consists only of those women who are sexually initiated (and were therefore asked about contraceptive use at initiation). Cohort effects are important to control for, especially as contraceptive prevalence has increased over time, but the patterns—or lack thereof—in cohort hazard ratios are only for a select group. These hazards are discussed in greater detail for subsequent models that include all women—whether or not they have experienced sexual initiation.

Table 3: Marriage and First Birth: Cox Proportional Hazard Model (Hazard Ratios)

	El Salvador		Guatemala		Honduras		Nicaragua	
	Marriage	First Birth	Marriage	First Birth	Marriage	First Birth	Marriage	First Birth
Birth cohort								
1962-67	N/A	N/A	.955 (.045)	.904* (.044)	N/A	N/A	N/A	N/A
1968-72	N/A	N/A	1.76*** (.116)	1.37*** (.103)	N/A	.864* (.051)	N/A	N/A
1973-77	.878*** (.029)	.896** (.031)	.823 (.087)	.792* (.085)	1.00 (.034)	1.05 (.037)	N/A	N/A
1978-82	--	--	--	--	--	--	--	--
1983-87	.939 (.031)	.976 (.034)	1.81*** (.105)	1.73*** (.111)	1.03 (.030)	1.03 (.032)	.849** (.043)	.866** (.046)
1988-93	1.45*** (.065)	1.25*** (.022)	N/A	N/A	1.93*** (.093)	1.52*** (.094)	.696*** (.059)	.646*** (.045)
Contraceptive Use at Initiation	.593*** (.024)	.480*** (.022)	.496*** (.055)	.467*** (.056)	.590*** (.030)	.540*** (.030)	1.35*** (.059)	.872** (.045)
Observations	6,973	6,973	2,977	2,977	7,565	7,922	5,347	5,347

* p <.05; ** p <.01; *** p <.001

The second set of models includes all women—sexually initiated or not—for whom we can determine school enrollment at the time of sexual initiation, marriage or first birth. Table 4 shows descriptive statistics for this subsample. Descriptive statistics for the full sample can be found in Appendix A. [4]

[4] While the subsample is consistent with the full sample across region and religion variables, median age at events is slightly different for the Honduras and Nicaragua samples. Cox proportional hazards models are therefore run for

Guatemala has the highest percentage of respondents living in rural areas (66.9% to 70.6%), while the other three countries have a fairly constant 50% of respondents characterized by a rural region of residence. The percentage of women who are Protestants has increased in El

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the full sample (Model 1), as well as for the education subsample (Models 2 and 3) in order to portray any inconsistencies in results that may occur due to these different samples.

Table 4: Descriptive Statistics from Education Sample (percentages)

El Salvador (n=10,782)	1968-72	1973-77	1978-82	1983-87	1988-93
Region					
Urban	-	49.6	51.1	50.9	48.8
Rural	-	50.4	48.9	49.1	51.2
Religion					
None	-	21.7	20.1	19.4	21.4
Catholic	-	58.3	56.7	51.6	47.0
Protestant/ Other	-	20.0	23.2	28.9	31.6
In School					
Age 15	-	68.5	73.1	75.5	80.3
Age 18	-	42.8	46.7	50.9	49.0
Age 20	-	28.7	29.1	33.2	28.9
Age 24	-	12.7	11.2	14.1	-
Events (Median Age)					
Sexual Initiation	-	18	18	18	18
Marriage	-	19	20	20	20
First Birth	-	20	20	20	-

Guatemala (n=6,548)	1968-72	1973-77	1978-82	1983-87	1988-93
Region					
Urban	30.4	30.7	33.1	36.0	-
Rural	69.6	69.3	66.9	70.6	-
Religion					
None	0.0	0.5	6.1	14.7	-
Catholic	63.0	55.9	54	45.6	-
Protestant/ Other	37.0	43.6	39.9	39.7	-
In School					
Age 15	54.1	54.4	49.0	49.3	-
Age 18	43.8	41	28.2	28.7	-
Age 20	37.7	33.4	18.8	-	-
Age 24	5.9	6.7	11.3	-	-
Events (Median Age)					
Sexual Initiation	18	18	18	-	-
Marriage	18	19	19	-	-
First Birth	19	20	20	-	-

Honduras (n=2,872)	1968-72	1973-77	1978-82	1983-87	1988-93
Region					
Urban	-	50.8	50.9	48.2	-
Rural	-	49.2	49.1	51.8	-
Religion					
None	-	15.8	18.8	14.5	-
Catholic	-	50.2	47.8	50.5	-
Protestant/ Other	-	34.0	33.4	35.0	-
In School					
Age 15	-	45.6	54.7	53.0	-
Age 18	-	30.3	27.6	26.0	-
Age 20	-	23.0	19.0	-	-
Age 24	-	9.0	-	-	-
Events (Median Age)					
Sexual Initiation	-	17	17	-	-
Marriage	-	18	18	-	-
First Birth	-	19	19	-	-

Nicaragua (n=4,749)	1968-72	1973-77	1978-82	1983-87	1988-93
Region					
Urban	-	-	70.4	53.5	46.5
Rural	-	-	29.6	46.5	53.5
Religion					
None	-	-	3.8	15.7	17.0
Catholic	-	-	13.4	52.5	50.5
Protestant/ Other	-	-	82.9	31.8	32.6
In School					
Age 15	-	-	90.8	73.8	75.0
Age 18	-	-	69.8	49.4	45.9
Age 20	-	-	36.0	34.7	-
Age 24	-	-	14.1	9.4	-
Events (Median Age)					
Sexual Initiation	-	-	20	17	19
Marriage	-	-	21	18	-
First Birth	-	-	21	19	-

Salvador and has stayed constant in the 30th percentile range for other countries. The 1978-1982 cohort in Nicaragua is an exception, but this could be a result of few observations for this cohort. El Salvador and Nicaragua had the highest percentages of respondents who were not affiliated with any religion, and approximately 50% of respondents in every country identified as Catholic. The percentage of 15 year olds enrolled in school increased in El Salvador but stayed either constant or decreased in Honduras and Guatemala. For the most recent cohorts, Nicaragua and El Salvador had the highest percentages of 15 year olds enrolled in school, at 75% and 80%, respectively. Similar to the descriptive statistics using the full sample, median ages at sexual initiation, first marriage and first birth appear to be relatively unchanging.

Tables 5a-d present the results of Cox proportional hazards regressions by country for the events of sexual initiation, marriage and first birth. All models control for birth cohort, although it is important to note that the age distribution for the first and last birth cohorts in each country is different. The oldest cohort includes women ages 20-24 at interview and therefore, by construction, has a younger distribution of events (see Figure 3). By contrast, the most recent cohort consists of women ages 15-19 at interview and will necessarily have a later distribution of events to due to a greater degree of censoring. Hazard ratios for birth cohorts will therefore be discussed only for those cohorts that include all women ages 15-24. Appendix B shows hazards ratios for birth cohorts using the full sample with no controls.

In El Salvador (Table 5a), Model 3 shows that the impact of rural residence is mediated by the inclusion of the schooling variable. Religion, however, remains significant in all models for all events. Women who report having no religious affiliation have hazards that range between 67% and 72% higher than Catholic women for each event in Model 2. Protestants also have a

higher hazard of experiencing each event in Models 1 and 2, although this variable is rendered insignificant in Model 3. Whether a respondent was in school or not is highly statistically significant in all models. Being in school is associated with very low hazards of experiencing each event. Consistent with descriptive results, there appears to be little pattern in timing of events across birth cohort.

Table 5a: El Salvador Cox Proportional Hazards Model (Hazard Ratios)

	Sexual Initiation			**Marriage**			**First Birth**		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Birth cohort									
1962-67	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
1968-72	.962 (.046)	*N/A*	*N/A*	.566*** (.036)	*N/A*	*N/A*	.561*** (.037)	*N/A*	*N/A*
1973-77	.990 (.030)	1.08 (.041)	1.03 (.039)	.932* (.030)	1.08 (.042)	1.03 (.041)	.907** (.031)	1.07 (.042)	1.02 (.040)
1978-82	--	--	--	--	--	--	--	--	--
1983-87	1.00 (.030)	1.02 (.037)	1.04 (.038)	.922* (.030)	.918* (.035)	.952 (.036)	.951 (.033)	.960 (.044)	1.01 (.039)
1988-93	.918* (.036)	.916 (.044)	.980 (.047)	.890** (.039)	.908 (.047)	.989 (.051)	.798*** (.040)	.796*** (.044)	.886* (.049)
Region									
Urban	--	--	--	--	--	--	--	--	--
Rural	1.31*** (.029)	1.24*** (.036)	1.00 (.030)	1.56*** (.039)	1.45*** (.044)	1.12*** (.035)	1.53*** (.041)	1.46*** (.045)	.990 (.031)
Religion									
None	1.77*** (.051)	1.68*** (.060)	1.51*** (.037)	1.78*** (.055)	1.72*** (.063)	1.48*** (.055)	1.68*** (.054)	1.67*** (.061)	1.32*** (.049)
Catholic	--	--	--	--	--	--	--	--	--
Protestant	1.09** (.030)	1.09* (.038)	1.06 (.037)	.997 (.031)	1.14*** (.042)	1.09* (.040)	.930* (.031)	1.11** (.042)	1.03 (.039)
In School									
No			--			--			--
Yes			.458*** (.014)			.361*** (.012)			.204*** (.008)
Observations	14,243	9,806	9,806	14,243	10,345	10,345	14,243	10,782	10,782

* p <.05; ** p <.01; *** p <.001

Table 5b presents results for Guatemala. Similar to El Salvador, region of residence loses significance with the inclusion of schooling in Model 3. Those with no religious affiliation or

Protestant affiliations have significantly higher hazards of experiencing each event, although the magnitude of those hazards decrease in Model 3. The impact of schooling on one's decreased hazard of experiencing an event is again highly significant and is larger for first birth than for sexual initiation or marriage. Compared to the reference cohort (1978-1982), the 1973-1977 birth cohort has a lower hazard of experiencing first birth at each age in Models 1 and 3.

Table 5b: Guatemala Cox Proportional Hazards Model (Hazard Ratios)

	Sexual Initiation			Marriage			First Birth		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Birth cohort									
1962-67	1.12* (.055)	*N/A*	*N/A*	1.11* (.055)	*N/A*	*N/A*	.953 (.049)	*N/A*	*N/A*
1968-72	1.03 (.041)	1.23*** (.073)	1.17** (.069)	1.02 (.043)	1.26*** (.075)	1.18** (.070)	.956 (.041)	1.11 (.064)	1.03 (.060)
1973-77	1.00 (.036)	1.00 (.048)	.951 (.046)	1.01 (.038)	1.00 (.049)	.944 (.046)	.923* (.037)	.925 (.045)	.859** (.042)
1978-82	--	--	--	--	--	--	--	--	--
1983-87	.759*** (.040)	.752*** (.055)	.774*** (.056)	.756*** (.042)	.767*** (.057)	.797*** (.059)	.817** (.051)	.840* (.065)	.867 (.067)
1988-93	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
Region									
Urban	--	--	--	--	--	--	--	--	--
Rural	1.59*** (.049)	1.42*** (.061)	1.07 (.021)	1.69*** (.054)	1.50*** (.065)	1.09 (.049)	1.57*** (.052)	1.42*** (.062)	1.00 (.045)
Religion									
None	1.77*** (.109)	1.81*** (.152)	1.69*** (.142)	1.74*** (.110)	1.82*** (.153)	1.66*** (.141)	1.61*** (.107)	1.65*** (.138)	1.49*** (.125)
Catholic	--	--	--	--	--	--	--	--	--
Protestant	1.09*** (.033)	1.15** (.048)	1.10* (.046)	1.11** (.035)	1.18*** (.050)	1.13** (.048)	1.14*** (.038)	1.20*** (.050)	1.14** (.048)
In School									
No			--			--			--
Yes			.400*** (.021)			.319*** (.018)			.220*** (.015)
Observations	10,729	6,080	6,080	10,729	6,231	6,231	10,729	6,548	6,548

* p <.05; ** p <.01; *** p <.001

In Table 5c, being in school continues to be associated with a very low hazard of experiencing any of the three events in Honduras. Again, the magnitude of the hazard increases

from sexual initiation to marriage to first birth (0.432 to 0.376 to 0.284). Unlike in El Salvador and Guatemala, rural region of residence remains significant after the inclusion of schooling in Model 3. Those who report no religion have higher hazards of experiencing events, as do Protestants, although to a lesser degree. In the full sample, the 1983-1987 birth cohort has a lower hazard of experiencing each of the three events at each compared to the prior cohort.

Table 5c: Honduras Cox Proportional Hazards Model (Hazard Ratios)

	Sexual Initiation			**Marriage**			**First Birth**		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Birth cohort									
1962-67	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
1968-72	.847*** (.029)	*N/A*	*N/A*	.163*** (.010)	*N/A*	*N/A*	.857*** (032)	*N/A*	*N/A*
1973-77	.890 (.029)	1.08 (.068)	1.08 (.068)	.714*** (.026)	1.06 (.068)	1.07 (.069)	.987 (.035)	1.06 (.067)	1.08 (.068)
1978-82	--	--	--	--	--	--	--	--	--
1983-87	.827*** (.026)	.682*** (.077)	.700*** (.059)	.782*** (.024)	.717*** (.063)	.734*** (.065)	.809*** (.026)	.796*** (.075)	.811* (.076)
1988-93	.596*** (.026)	*N/A*	*N/A*	.538*** (.027)	*N/A*	*N/A*	.553*** (.035)	*N/A*	*N/A*
Region									
Urban	--	--	--	--	--	--	--	--	--
Rural	1.44*** (.030)	1.44*** (.077)	1.09 (.061)	1.55*** (.038)	1.58*** (.085)	1.18** (.067)	1.59*** (.038)	1.62*** (.087)	1.18** (.066)
Religion									
None	1.64*** (.058)	1.53*** (.109)	1.49*** (.106)	1.69*** (.073)	1.56*** (.113)	1.48*** (.107)	1.58*** (.063)	1.52*** (.107)	1.41*** (.100)
Catholic	--	--	--	--	--	--	--	--	--
Protestant	1.07* (.031)	1.07 (.064)	1.10 (.066)	1.12** (.039)	1.13 (.068)	1.15* (.070)	1.05 (.035)	1.14* (069)	1.15* (.070)
In School									
No			--			--			--
Yes			.430*** (.027)			.376*** (.026)			.291*** (.023)
Observations	17,314	2,520	2,520	17,314	2,626	2,626	17,314	2,872	2,872

* p <.05; ** p <.01; *** p <.001

In Nicaragua (Table 5d), rural region of residence and non-Catholic religious affiliation are associated with higher hazards of experiencing events and are for the most part significant in

all models. The impact of schooling remains strong, and the magnitude of the hazard again increases across events. Consistent with descriptive results, Model 1 shows a statistically significant progression to delayed timing of marriage and first birth for the 1973-1977, 1978-1982 and 1983-1987 birth cohorts.

Table 5d: Nicaragua Cox Proportional Hazards Model (Hazard Ratios)

	Sexual Initiation			Marriage			First Birth		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Birth cohort									
1962-67	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
1968-72	1.06 (.044)	*N/A*	*N/A*	1.08 (.046)	*N/A*	*N/A*	1.00 (.046)	*N/A*	*N/A*
1973-77	1.09** (.029)	*N/A*	*N/A*	1.14*** (.031)	*N/A*	*N/A*	1.12*** (.033)	*N/A*	*N/A*
1978-82	--	--	--	--	--	--	--	--	--
1983-87	.954 (.027)	.847** (.050)	.898 (.053)	.881*** (.026)	.810*** (.048)	.866* (.051)	.921* (.031)	.811*** (.047)	.878* (.051)
1988-93	.843*** (.036)	.589*** (.042)	.638*** (.046)	.759*** (.035)	.576*** (.043)	.634*** (.047)	.760*** (.043)	.582*** (.047)	.646*** (.052)
Region									
Urban	--	--	--	--	--	--	--	--	--
Rural	1.45*** (.029)	1.50*** (.062)	1.18*** (.053)	1.58*** (.032)	1.79*** (.077)	1.36*** (.063)	1.56*** (.035)	1.70*** (.075)	1.04 (.049)
Religion									
None	1.54*** (.070)	1.48*** (.085)	1.37*** (.079)	1.54*** (.073)	1.50*** (.088)	1.34*** (.079)	1.45*** (.075)	1.43*** (.085)	1.18** (.070)
Catholic	--	--	--	--	--	--	--	--	--
Protestant	.827*** (.027)	1.16** (.055)	1.10* (.052)	.893** (.030)	1.24*** (.060)	1.16** (.056)	.899** (.034)	1.18** (.059)	1.04 (.052)
In School									
No			--			--			--
Yes			.486*** (.022)			.434*** (.020)			.233*** (.012)
Observations	18,256	4,145	4,145	18,256	4,378	4,378	18,256	4,749	4,749

* p <.05; ** p <.01; *** p <.001

Discussion

Contrary to our first hypothesis regarding timing of events, ages at sexual initiation and marriage did not appear to vary by country-level TFR according to descriptive analyses. While El Salvador has the lowest TFR (2.6 children per woman), ages of sexual initiation and marriage in that country were both constant and similar to those of other countries. Nicaragua, which has the second lowest TFR of the four countries, actually had earlier ages of sexual initiation and marriage than the other countries. Guatemala, which has the highest TFR at 4.4 children per woman, had distribution of ages at sexual initiation and marriage that were similar to other countries. Minimal differences in ages at first birth between Guatemala and El Salvador were observed. This suggests that declining fertility in both countries continues to be caused by stopping behaviors.

Our second hypothesis predicted a decoupling of sexual initiation from the other two events over time. This hypothesis was partially supported in El Salvador, Honduras and Nicaragua in Figures 3, 5 and 6. In El Salvador, the decoupling of sexual initiation and marriage had already occurred in the oldest cohort. In Honduras and Nicaragua, results from sequencing indicate the progression of marriage away from sexual initiation at older ages for the more recent cohort. In contrast, this pattern does not exist in Guatemala. This is most likely indicative of conservative social and cultural values in Guatemala, which are proxied in the regressions by religion.

Based on complex results in the literature, a hypothesis was developed for schooling that predicted delayed timing of events for those respondents who were enrolled in school. Indeed, school enrollment significantly decreased the hazard of experiencing each event in all countries. The magnitude of the decreased hazard also strengthened from sexual initiation to marriage to

first birth in each country. In addition, the addition of schooling in Model 3 modified the hazards of all other independent variables. Despite these significant results, it is important to qualify that our measure of schooling is relatively simplistic. A closer analysis of level of schooling ultimately achieved, either by using longitudinal data or by restricting the sample to respondents who have completed their schooling, would enable a better discussion of the impact of schooling. Our variable, although admittedly crude, nevertheless points toward a strong negative relationship between being in school and experiencing sexual initiation, marriage or first birth at each age.

Our hypotheses on both region and religion were supported by this analysis. Rural region of residence consistently resulted in a higher hazard of experiencing events, and hazard ratios decreased when controlling for schooling. Also consistent with our hypothesis of more socially conservative respondents delaying events, models showed that Catholic women had significantly lower hazards of experiencing each event compared to Protestant women and women with no religious affiliation.

Regarding use of contraception during sexual initiation, our hypothesis on contraceptive use was supported in all cases except for Nicaragua, in which contraceptive use at sexual initiation increased one's hazard of experiencing marriage. This result points to a need for more in depth research within countries to understand nuanced patterns. As contraceptive prevalence continues to rise throughout Central America, this variable will be an important factor not only for timing of events, but also for the relationships between events.

Limitations

There is a substantial literature on the validity of sexual behavior data. While marriage and first birth appear to be events that are easily and accurately measured (Mensch et al. 2006), measurement of sexual activity at young ages is subject to inaccuracies for several reasons. First, adolescents and unmarried individuals may be more likely to underreport sexual activity at younger ages and prior to marriage because of conservative social pressures (Singh et al. 2000; Zaba et al. 2004). In addition, misreporting may occur when an individual has experienced nonconsensual sex (Singh et al. 2000). Recall bias is also a concern, although this should have little effect on the results in this analysis because we have restricted the sample to women ages 15 to 24 in each survey. An evaluation of the extent to which misreporting and subsequent biases affect the analysis is difficult, and any interpretation of the results of analyses of sexual behavior must take this into account. [5]

In addition to misreporting, there is also a concern about the exact definition of sexual initiation, and how respondents define having experienced this event. The wording of the question in both the DHS and RHS is the same: How old were you when you had your first sexual relation? The exact type of relation is therefore not known, and this points to the need for either qualitative research or additional survey questions specifying the type in order to assess risk for STIs and pregnancy. Nevertheless, while not all sexual relations put one at risk for pregnancy, we assume that most put one at risk for STIs, and the relevance of this study for family planning programs remains unchanged.

[5] Because the birth cohorts overlap across surveys, we can conduct a consistency check by comparing how the same birth cohort responds to questions in two different surveys. However, because the ages at interview are different—ages 15-19 for the older interview and ages 20-24 for the more recent interview—medians are not directly comparable due to a greater degree of censoring prior to the event among 15-19 year olds. Thus, this consistency check is better suited for data that includes respondents who were interviewed at older ages and will not be performed here.

In our regressions, we are limited by the lack of information on characteristics of the respondent at the time of each event. In order to assess variation we make assumptions that a woman's region of residence and religious affiliation at the time of interview were unchanged from her region and religion at the time of each event. In addition, we utilize a relatively crude measure of school attendance without taking into account level of education due to the fact that approximately 50% of our sample in each country is still attending school. While education level at the time of event may be helpful, we are unable to capture a respondent's completed education. Our measure assumes that all respondents in school at a certain age are at the same level of schooling at that age. However, a 15 year old who is in school but bound for higher education is different from a 15 year old who drops out at age 16. Future studies may address this by selecting a sample of older women who have completed their education, although this would inherently lead to a greater concern for recall bias which not a large concern for our study.

Conclusion

Ages at sexual initiation, first marriage, and first birth indeed appear to have remained relatively constant in El Salvador, Guatemala, Honduras and Nicaragua throughout the past 20 years. The hazards of experiencing each event stratified by birth cohort do not follow any clear patterns. Nevertheless, an assessment of this region as one in which these events are unchanging would be short-sighted. This study shows dynamic shifts in the relationships among events both within and across countries that have implications for both demographic trends and family planning policies. In addition, this study points to the need for future research that examines factors mediating the timing of the events themselves as well as changing relationships among events. This research will be especially relevant as Central American countries approach the end

of their fertility transitions and contraceptive use becomes increasingly prevalent. The relationship between schooling and these events will be of particular interest as education systems continue to expand in this region.

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Appendix A: Descriptive Statistics for Total Sample

El Salvador (n=14,243)	**1968-72**	**1973-77**	**1978-82**	**1983-87**	**1988-93**
Region					
Urban	58.5	50.3	48.8	49.7	48.4
Rural	41.5	49.7	51.2	50.3	51.6
Religion					
None	-	15.5	20.9	20.3	21.9
Catholic	-	36.8	54.7	51.0	46.8
Protestant/ Other	-	47.7	24.4	28.7	31.4
Events (Median Age)					
Sexual Initiation	19	18	18	18	18
Marriage	-	20	19	20	20
First Birth	-	20	20	20	-

Guatemala (n=10,729)	**1968-72**	**1973-77**	**1978-82**	**1983-87**	**1988-93**
Region					
Urban	33.9	30.6	31.3	33.4	-
Rural	66.1	69.4	68.8	66.6	-
Religion					
None	0/0	0.7	7.4	13.0	-
Catholic	28.7	56.1	53.0	49.1	-
Protestant/ Other	71.3	43.3	39.6	37.9	-
Events (Median Age)					
Sexual Initiation	19	18	18	-	-
Marriage	19	19	19	-	-
First Birth	20	20	19	-	-

Honduras (n=17,600)	**1968-72**	**1973-77**	**1978-82**	**1983-87**	**1988-93**
Region					
Urban	48.1	47.0	45.1	43.6	41.2
Rural	52.0	53.0	55.0	56.4	58.8
Religion					
None	15.1	18.6	13.2	3.0	-
Catholic	61.7	57.6	32.6	10.0	-
Protestant/ Other	23.2	23.9	54.2	87.0	-
Events (Median Age)					
Sexual Initiation	18	18	18	18	-
Marriage	-	20	18	19	-
First Birth	20	19	19	20	-

Nicaragua (n=19,119)	**1968-72**	**1973-77**	**1978-82**	**1983-87**	**1988-93**
Region					
Urban	53.3	55.2	55.9	52.4	44.7
Rural	46.7	44.8	44.1	48.6	55.3
Religion					
None	-	-	1.4	8.8	17.3
Catholic	-	-	4.5	26.9	50.4
Protestant/ Other	-	-	94.1	64.4	32.2
Events (Median Age)					
Sexual Initiation	17	18	18	18	18
Marriage	18	18	18	18	-
First Birth	19	19	20	20	-

Appendix B: Cox Proportional Hazards Model—Total Sample

El Salvador

Birth cohort	Sexual Initiation	Marriage	First Birth
1962-67	N/A	N/A	N/A
1968-72	.888**	.480***	.455***
	(.039)	(.028)	(.028)
1973-77	.979	.914**	.891**
	(.029)	(.030)	(.030)
1978-82	--	--	--
1983-87	.997	.922*	.946
	(.030)	(.030)	(.032)
1988-93	.936	.910*	.808***
	(.037)	(.040)	(.041)
Observations	14,243	14,243	14,243

Guatemala

Birth Cohort	Sexual Initiation	Marriage	1988-93
1962-67	1.07	1.06	.939
	(.048)	(.049)	(.044)
1968-72	.982	.992	.924
	(.038)	(.040)	(.039)
1973-77	.958	.964	.888**
	(.034)	(.035)	(.034)
1978-82	--	--	--
1983-87	.778***	.777***	.825**
	(.041)	(.043)	(.051)
1988-93	N/A	N/A	N/A
Observations	10,729	10,729	10,729

Honduras

Birth Cohort	Sexual Initiation	Marriage	First Birth
1962-67	.824**	N/A	.647***
	(.056)		(.047)
1968-72	.829***	N/A	.851***
	(.027)		(.030)
1973-77	.892***	.708***	1.00
	(.027)	(.024)	(.034)
1978-82	--	--	--
1983-87	.815***	.777***	.804***
	(.022)	(.023)	(.025)
1988-93	.588***	.538***	.554***
	(.025)	(.026)	(.034)
Observations	17,600	15,319	17,600

Nicaragua

Birth Cohort	Sexual Initiation	Marriage	First Birth
1962-67	N/A	N/A	N/A
1968-72	1.20***	1.27***	1.18***
	(.042)	(.044)	(.044)
1973-77	1.09**	1.16***	1.12***
	(.028)	(.030)	(.032)
1978-82	--	--	--
1983-87	1.09**	.982	1.03
	(.027)	(.026)	(.030)
1988-93	1.07	.923	.912
	(.041)	(.038)	(.048)
Observations	19,119	19,119	19,119

* p <.05; ** p <.01; *** p <.001