

## Age at menarche and the timing of first sexual intercourse

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### Abstract

Using data from the 2011-2015 National Survey of Family Growth, I examine the relationship between age at menarche and timing of first sexual intercourse. I calculate Kaplan-Meier survival estimates to construct box-plots of the distribution of age at menarche and the probability of menarche by each age. Then I calculate estimates of the probability of first sexual intercourse by age at menarche. These data suggest that in 2011-2015 there was a correlation between age at first sexual intercourse and age at menarche. This analysis will shed light on the current distribution of age at menarche in the U.S., the relationship between age at menarche and timing of first sexual intercourse, and whether this has changed over time.

### **\*\* NOTE FOR THE PAA SESSION ORGANIZER \*\***

The analyses in this submission use data from the 2011–2015 National Survey of Family Growth (NSFG). The next two-year file of the NSFG (2015–2017) will be released this fall. I will present data from the combined 6-year file (2011-2017) for the poster if it is accepted.

Age at first menstrual period, also known as age at menarche, varies by different population groups and changes over time. Studying menarche is important because studies find that early menarche is associated with greater risk for breast cancer, obesity, diabetes, liver disease, etc. (Krieger, et al., 2015; Ryu, et al., 2015; Dossus, et al. 2012; Walvoord, 2010). From a demographic perspective, menarche marks the start of the timespan in which females ovulate and can potentially get pregnant (Culpin, et al, 2014; Mishra, et al., 2010; Presser, 1978). Early menarche has been associated with earlier age at first sexual intercourse but findings have varied (Marino, et al., 2013; Talashek, et al., 2000; Mott, et al., 1996; Flannery, 1993). This paper extends this research by exploring current distribution of age at menarche in the United States and revisiting the relationship between age at menarche and age at first sexual intercourse.

One possible mechanism in which early age at menarche may result in early sexual intercourse may be that girls who experience menarche at younger ages may appear older, have older friends, and are more likely to engage in negative behaviors such as missing school, smoking, and drinking (Flannery, et al., 1993). The younger the age at first menstrual period and first sexual intercourse, the longer the interval young women may spend at risk of pregnancy. Differences in age at menarche across population subgroups may help to explain differences in timing of first birth. The relationship between age at menarche and the timing of first sexual intercourse in the United States has not been studied in the past few decades. It is important to update previous trends in age at menarche (Krieger, et al., 2015) and to understand the current relationship between age at menarche and first sexual intercourse.

Using the newly released data from the National Survey of Family Growth, we will analyze the distribution of age at menarche for all women and differentials by Hispanic origin and race. We will also explore the current relationship between age at menarche and timing of first sexual intercourse. In addition,

because few studies have explored whether this association has changed over time we will compare whether these relationships differ from that for women in a similar age range in 1995.

### Research Questions

This paper will address the following research questions:

- 1) What is the distribution of age at menarche in the United States? How does this vary by Hispanic origin and race?
- 2) What is the probability of experiencing menarche by age? How does this vary by Hispanic origin and race?
- 3) What is the association between age at menarche and age at first sexual intercourse?
- 4) How have these relationships changed over time?

### Data

The data used in this analysis come from the 1995 National Survey of Family Growth (NSFG) and the pooled 2011-2015 NSFG conducted by the National Center for Health Statistics. Data for the 1995 NSFG were collected through in-person interviews with 10,847 women aged 15-44 and are representative of the non-institutionalized female population of the U.S aged 15-44. The 2011-2015 NSFG data are a nationally representative sample of 11,300 women aged 15-44 in the household population in the United States. The overall survey response rates for females 15-44 were 78.7% for the 1995 NSFG and 71.0% for the 2011-2015 NSFG.

The NSFG collects data on age at menarche and information on the proximate determinants of fertility that makes it appropriate for analyzing the relationship between education and different measures of fertility.

Our analysis will focus on women aged 15-44. The 2015-2017 NSFG will be released later in 2018, which will allow us to pool with the 2011-2015 NSFG data to have the most recent data and larger sample sizes.

Our analysis will first explore the distribution of age at menarche for all women and by Hispanic origin and race and will compare 1995 to 2011-2015. We then calculate Kaplan-Meier (KM) survival curves to estimate the probability of experiencing menarche by each age. Kaplan-Meier survival analysis allows us to take into account the complex design of the NSFG and to estimate the cumulative probability of having had menarche by each age and also by Hispanic origin and race. Finally, we calculate KM survival curves to estimate the probability of experiencing first sexual intercourse by each age, separately by age at menarche. We show 1-probability of survival to show the failure rate (that is, likelihood of experiencing the event). This will allow us to see if there any differences in timing of first sexual intercourse by age at menarche.

### Preliminary Findings

Figure 1 illustrates the distribution of age at menarche by Hispanic origin and race for women aged 15-44 in 2011-2015 using box plots. The median age at menarche for women in 2011-2015 was 11.9 years. Hispanic (11.7) and black women (11.8) had lower median age at menarche than white women (12.0). Thus, Hispanic women and black women are potentially at risk of pregnancy months earlier than are white women. Table 1 shows the percentiles that went into making the box-plots. The pattern for the distribution of age at menarche by Hispanic origin and race will also be analyzed for 1995.

Figure 1. Distribution of age at menarche for women aged 15-44, by Hispanic origin and race: U.S. 2011-2015

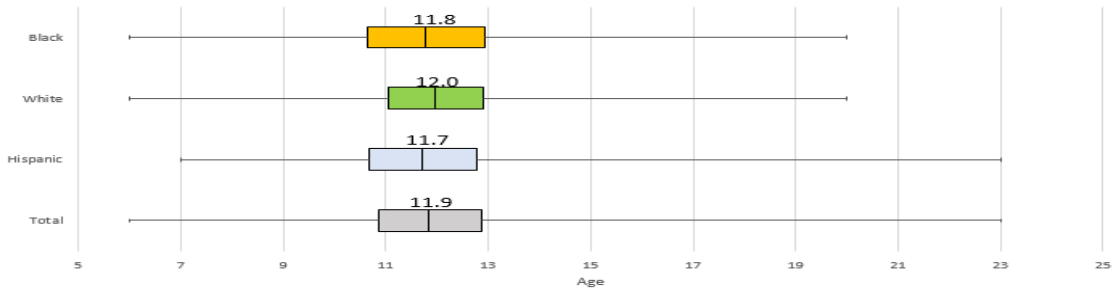


Table 1. Percentiles of age at menarche by Hispanic origin and race.

| Age at menarche | 25 Percentile | 50% Percentile (median) | 75% Percentile |
|-----------------|---------------|-------------------------|----------------|
| Total           | 10.9          | 11.9                    | 12.9           |
| Hispanic        | 10.7          | 11.7                    | 12.8           |
| NH White        | 11.1          | 12.0                    | 12.9           |
| NH Black        | 10.6          | 11.8                    | 13.0           |

Within each percentile differences by Hispanic origin and race are significantly different at  $P < .05$  using two-tailed t test.

Figure 2 shows the cumulative probability of menarche by each age. By age 10, about 9% of women in the U.S. had menarche. By age 12, about 52% of women had menarche; this is the median age of menarche in the U.S. By age 15, about 95% of women had already had menarche. The poster will show how this pattern differs from 1995.

Figure 2. Cumulative probability of menarche by each age among women aged 15-44: United States, 2011-2015.

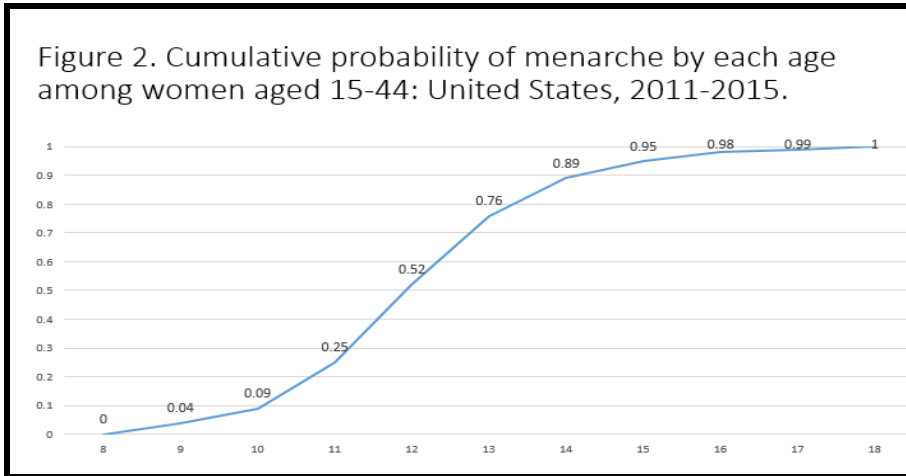
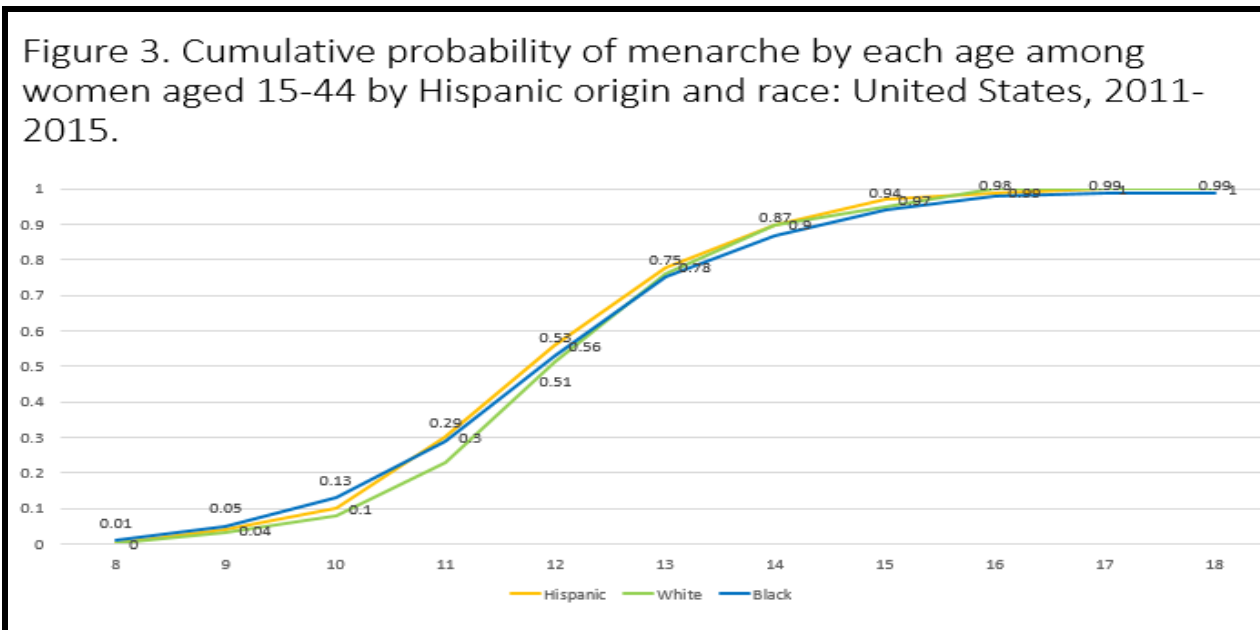


Figure 3 shows the cumulative probability of menarche by each age and by Hispanic origin and race.

Black women (13%) were more likely than Hispanic (10%) or white (8%) women to experience menarche by age 10. By age 11, Hispanic women (30%) are slightly more likely to have had menarche than black women (29%) and white women continue to have the lowest percentage who had menarche. By age 12, as expected by the median age of menarche, half of women, regardless of race, had had menarche.

Figure 3. Cumulative probability of menarche by each age among women aged 15-44 by Hispanic origin and race: United States, 2011-2015.



Using NSFG data, there appears to be a correlation between age at first sexual intercourse and age at menarche. Figure 4 shows the cumulative probability of first sexual intercourse by each age by the age at menarche. The younger the age at menarche the higher the probability of first sexual intercourse by each age. For example, the median age at first sexual intercourse for women whose age at menarche was 10 or younger, was 15 years and 5 months (15.4) compared with 15 years and 10 months (15.8) for those whose median age at menarche was 12, and 16 years and 6 months (16.5) for those whose age at menarche was 14 or older. These data suggest that there is a correlation between age at menarche and age at first sexual intercourse. The poster will explore further the relationship between age at menarche and timing of first sexual intercourse.

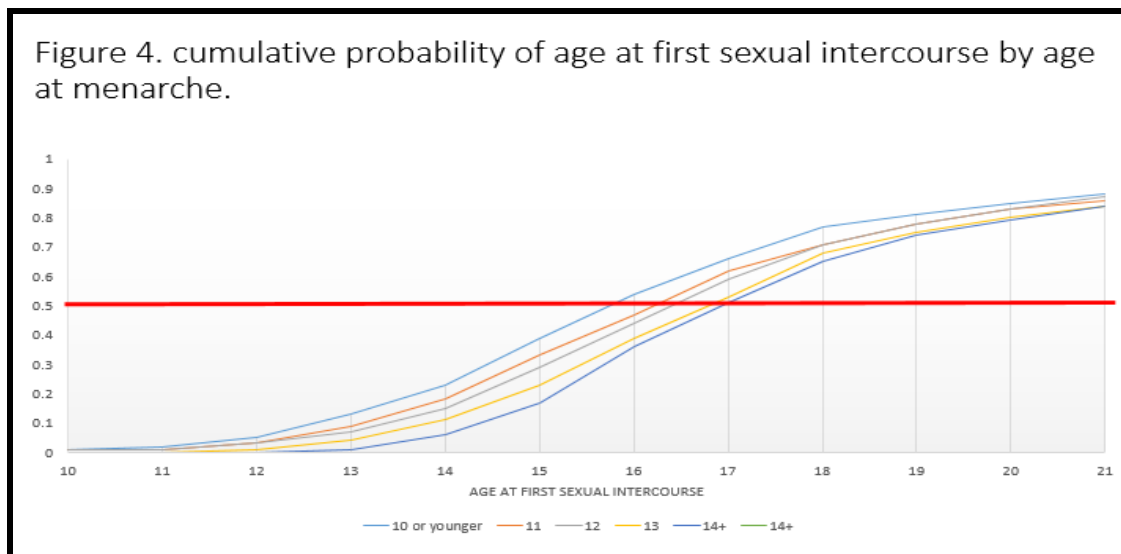
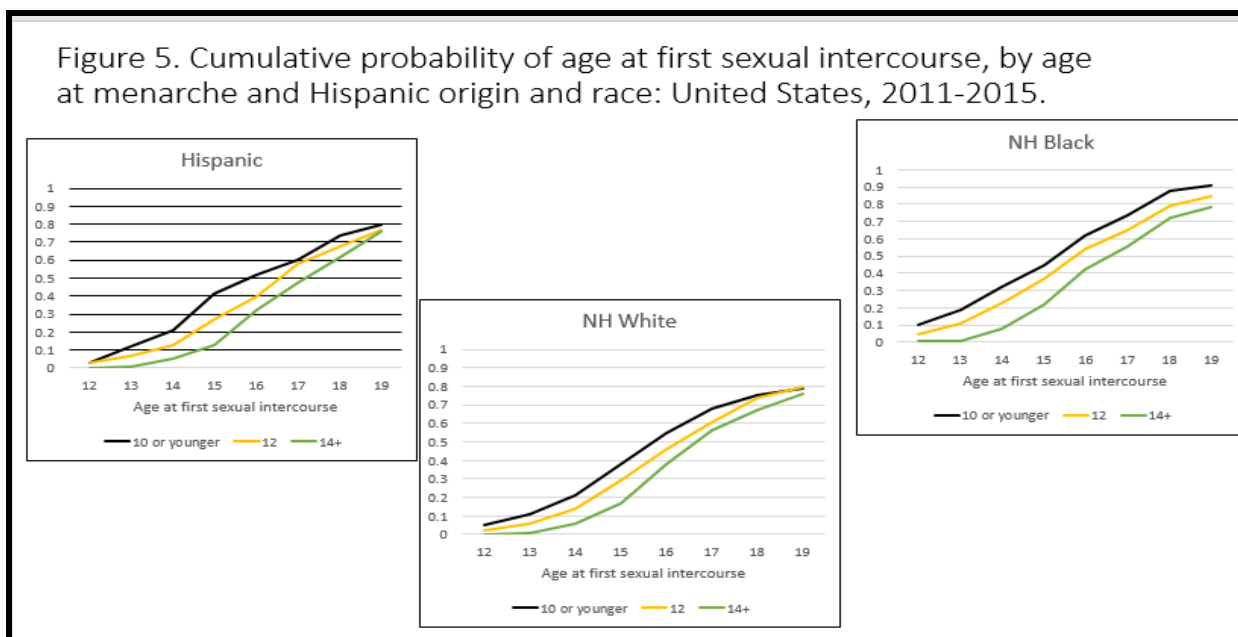


Figure 5 shows the cumulative probability of first sex by age at menarche and Hispanic origin and race. These data also show support for a correlation between age at menarche and age at first sexual intercourse even within the Hispanic origin and race groups. Regardless of Hispanic origin and race, women with the earlier age at menarche have the highest probability of age at first sexual intercourse than those whose age at menarche occurred at older ages. This results in about 2 years earlier median age at first sexual intercourse for women who reached menarche at the earlier ages compared to those who reached menarche at the oldest ages.





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