

RISK FACTORS ASSOCIATED WITH CONTRACEPTION NON-USE
BETWEEN 1995 AND 2002:
AN ANALYSIS OF THE NATIONAL SURVEY OF FAMILY GROWTH,
CYCLE 5 AND CYCLE 6 DATASETS

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LIST OF ABBREVIATIONS

ANOVA – Analysis of Variance

CAPI – Computer Assisted Personal Interview

CDC – Centers for Disease Control

EEOC – Equal Employment Opportunities Commission

EPICC – Equity in Prescription Insurance and Contraceptive Coverage Act

FPL – Federal Poverty Level

GED – General Education Degree

HMO – Health Maintenance Organization

IRB – Institutional Review Board

MSA – Metropolitan Statistical Area

NCHS – National Center for Health Statistics

NIH – National Institutes of Health

NSFG – National Survey of Family Growth

OHSU – Oregon Health & Science University

PSU – Primary Sampling Units

SAS – Statistical Software Package

STI – Sexually transmitted infection

SUDAAN – Survey Data Analysis Program

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“The typical American woman has intercourse for the first time at age 17 and reaches menopause at age 51. If she wants only two children, as most American women do, she will spend three decades being sexually active but trying to avoid unintended pregnancy.

This is not an easy goal for an individual woman to meet.”

- Adam Sonfield
The Guttmacher Report on Public Policy
December, 2003(1)

ABSTRACT

Objective: To identify risk factors for contraception non-use and identify any new populations or changes in risk factors over time that explain the observed increase in sexually active, reproductive age (15-44 years) women who do not use contraception and do not desire pregnancy.

Methods: Data collected by the National Survey of Family Growth in 1995 and 2002 are used to determine if demographic, socioeconomic, or family history predictors influence contraception non-use. Significant risk factors for non-use between survey periods are determined using multivariate logistic regression that is adjusted for the complex survey design.

Results: An increase in contraception non-use among at risk women is observed, from 5.2% in 1995 to 7.4% in 2002 ($p < 0.001$). The proportion of women living in a suburban environment increased between 1995 and 2002 (30.8% to 49.0%). The significant risk factors associated with increased odds of contraception non-use, in a multivariate model controlling for the year, were identified as age 15-19 (OR 1.79 [1.39-2.30], $p < 0.001$), non-Hispanic black ethnicity (OR 1.33 [1.04-1.71], $p = 0.03$), high school education (OR 1.31 [1.03-1.65], $p = 0.03$), unemployment (OR 1.18 [1.02-1.37], $p = 0.03$), uninsurance (OR 1.26 [1.02-1.56], $p = 0.03$), and Catholic faith (OR 1.29 [1.04-1.60], $p = 0.02$). Three predictors were also identified in this same model as being significantly protective against non-use: cohabitating with a male partner (OR 0.57 [0.48-0.69], $p < 0.001$), mother's age 20-24 at first birth (OR 0.79 [0.66-0.95], $p = 0.01$), and living in a rural setting (OR 0.78 [0.62-0.98], $p = 0.03$). Interestingly, income was not a significant predictor of non-use in the model ($p = 0.75$). Controlling for significant predictors, at risk

women are 47% more likely to be non-users in 2002 than in 1995 (OR 1.47 [1.26-1.72], $p < 0.001$). Of the year*predictor interaction terms entered in the model, the greatest change in deviance was observed with the insurance predictor, showing that the odds of non-use was 55% greater among uninsured women in 2002 compared to 1995 (OR 1.55 [1.2-2.0], $p < 0.05$).

Conclusion: Despite the fact that a greater proportion of women in the United States are using highly-effective, female-controlled methods of contraception, there continues to be a concerning, paradoxical increase in contraception non-use among sexually active women not desiring pregnancy. This study confirmed known high-risk characteristics for women not using contraception: teens, non-Hispanic black ethnicity, high school equivalent educations only, uninsured, unemployed, and self-identifying as Catholic. Funding and legislative barriers to contraceptive access exist for women seeking care at public clinics as well as women with private insurance. The funding deficit for public clinics is represented in the greater non-use among uninsured women in 2002. A fluctuation in the geographic distribution of reproductive age women from rural to suburban areas may be a barrier to access for family planning if there are not sufficient services available in these areas. Abstinence-only education also threatens informed decision-making by women about contraceptive choice and the consequences of unprotected sex. Greater understanding of the behavioral, structural, and socio-cultural factors influencing contraception non-use is ongoing and needs to be considered along with known socio-demographic risk factors in formulating future public health and policy interventions.

CHAPTER 1 - BACKGROUND AND LITERATURE REVIEW

Unintended pregnancy presents a complicated, emotional, and expensive issue that remains a serious public health problem in the United States. Of all pregnancies in the U.S. every year, half are unintended, amounting to millions of unplanned births annually. It is estimated that 48% of women age 15-44 have at least one unplanned pregnancy sometime in their lives.(2) Unintended pregnancy is inextricably linked with contraceptive use and can be attributed to failure to use any contraceptive method, ineffective use of a method, or method failure. Currently, half of all unintended pregnancies are attributable to a small number of women who do not use contraception. Contraceptive method failure or user failure are responsible for the other half.(1-4)

A CDC analysis of NSFG data from the 2002 NSFG cycle identifies a concerning increase in contraception non-use; “The percentage of all women 15–44 who were sexually active and not using contraception increased from 5.2% in 1995 to 7.4% in 2002. This represents an apparent increase of 1.43 million women between 1995 and 2002 and could raise the rate of unintended pregnancy, particularly among women 20-years of age and older, and Non-Hispanic black women.”(5, 6) Additionally, Hispanic women have been found to be disproportionately at risk for unintended pregnancy compared to non-Hispanic white women, with nearly twice the rate of unintended pregnancy.(2) While non-white women are a minority of the population of reproductive aged women, they account for half of all unintended pregnancies that occur in the United States.(7) Additionally, unintended pregnancies due to lack of contraception use are most common among non-Hispanic black and Hispanic women.(8) The aforementioned NSFG report from the 2002 survey was the first publication from the NSFG explicitly

stating that, “there is much more to be learned about such topics as...trends in [contraceptive] use among subgroups of the population.”(9) No single factor has been identified to explain the concerning rise in sexually active women not using contraception.

Compared to the 1995 survey period, contraceptive use behavior appears increasingly bimodal in the 2002 NSFG survey. On one hand, there were more sexually active women not using contraception; but conversely, the women that were using contraception were increasingly utilizing highly use-effective, female-controlled methods.(10) The proportion of women using an oral contraceptive pill increased from 26.9% to 30.6%, injectable Depo-Provera increased from 3.0% to 5.3%, and intrauterine device (IUD) use increased from 0.8% to 2.0%.(9) While the number of unintended pregnancies plateaued between 1995 and 2002, fewer of the unintended pregnancies were a product of contraception failure and more were a result of contraception non-use.(5)

The literature on unintended pregnancy and contraception use suggests that a diverse set of factors influence women’s reproductive health behavior and contraceptive use. Use or non-use of contraception is a behavioral issue that is mediated by both structural barriers to access as well as socio-cultural and attitudinal factors.(11) Various communities in the United States have been studied with regards to contraception use and the risk of unintended pregnancy. Foster et al demonstrates that in a study of the 8,900 women surveyed by the California Women’s Health Survey between 1998 and 2001, 9% of those surveyed are at risk of unintended pregnancy because they are not using any method of contraception.(12) Within the population of contraception non-users, the main reasons reported for not using a contraception method were: reasons related to

contraception use (45%), not considering themselves to be at risk for unintended pregnancy (33%), unconcerned about contraception use or pregnancy (10%), problems accessing contraceptive methods (5%), and other reasons such as religion (7%).(12) Similar factors are important to recognize within the subpopulation of women surveyed by the NSFG reporting to be contraception non-users in 1995 and 2002.

The behavioral aspects contributing to contraception non-use are more complex than factors dictating use of specific contraceptive methods or use efficacy of certain contraceptive technologies compared to others. Many studies have been published identifying factors that affect a woman's choice of one contraceptive technique over another. Definitive results from the 1995 NSFG data exist, showing the ethnicities, social classes, and ages that are more likely to utilize a contraceptive technique when sexually active.(5) Additionally, several studies have been published addressing contraceptive failure and the association with unintended pregnancy. However, current research incorporating theories from public health, health psychology, social psychology, and sociology is currently being performed to better understand the concerning, increasingly prevalent behavior of contraception non-use among sexually active women. In an unpublished document, Harvey et al proposed that four sets of factors, based on components of several health behavior theories, synergistically affect whether or not a woman uses contraception: individual characteristics, method characteristics, relationship and/or partner factors, and contextual factors.

Unintended pregnancy literature is largely based on data collected at point-of-care. The NSFG survey data are unique for studying contraception non-use because they are capturing behavioral data before a pregnancy has occurred. It is likely that

unintended pregnancies are underreported due to some women electively terminating the pregnancy or “having a change of heart” at the time of the survey. Therefore, by gathering behavioral information on contraception non-use through a broad survey like the NSFG, one can better understand the characteristics of the entire population at risk for unintended pregnancy before the outcome of unintended pregnancy has occurred. However, one limitation of the breadth of the NSFG is that the survey is not specifically designed to answer the question of contraception non-use. Consequently, there are limitations to the behavioral and attitudinal data available within the NSFG survey responses with regards to contraception non-use.

With more women reporting use of more-effective methods of contraception, the question emerges, “Why are there more sexually active women not using a contraceptive method?” The primary objective of this study is to identify the factors present in the 1995 and 2002 NSFG survey data that are associated with non-use. The secondary objective is to determine any temporality to these factors accounting for the increase in non-use between survey periods.

The first hypothesis for the increase in contraception non-use is that there was a change in descriptive characteristics of the women not using contraception between 1995 and 2002. A recent study of the NSFG data from 1995 and 2002 demonstrates that one in twenty American women has an unintended pregnancy per year and that these women are more likely to be between the ages of 18-24, predominantly non-Hispanic black, low-income, and cohabitating with a partner.(3) Preliminary analyses of the women not using contraception in the 2002 NSFG data shows that their demographics are similar in age and ethnicity to descriptive statistics about unintended pregnancy. Nevertheless, it

cannot be assumed that the same cohort of women necessarily account for the recent 2% increase in contraception non-use detected by the NSFG. It is entirely possible that the populations of women not using contraception in 1995 and 2002 are demographically similar. However, it is equally possible that a new or different population of women account for the additional 1.43 million contraception non-users. If so, this novel population contributing to rising contraceptive non-use patterns between 1995 and 2002 requires attention from public health policy makers and clinicians.

The second hypothesis is that the social environment has changed access to and/or attitudes about contraception and that non-use of contraception is growing within the cohort of women previously identified as high-risk. A study of contraceptive trends in women in Missouri in 1997 addressed some of the barriers that are cited by women when asked why they do not use a method of contraception. The barriers include: problems with accessing clinic services, transportation problems, embarrassment over buying condoms, concerns with side effects of injectable methods of contraception, and perceived influence of family and/or partner attitudes about contraception on their decision.(4)

Social and political climates can strongly influence contraceptive acceptance, availability, and accessibility. First, religious factors can effect decisions about contraception and intercourse based on the teachings of the faith. However, according to a study by Jones et al, using the 1995 NSFG data, any differences seen in adolescent sexual behavior between those who attend regular religious services versus those who do not virtually disappear when controlling for socio-demographics, ethnicity, and maternal education.(13) Nevertheless, a shift in religious beliefs and/or social norms over the

study period may provide clinically-relevant insight into how social factors influence contraception non-use the United States. Second, the local and/or national political climate can strongly influence contraceptive behavior. Promotion of abstinence-only education in the place of comprehensive sexual education in schools changes the transmission of information about contraceptives to youth and can change attitudes about contraception.

1.1 *Specific Aims*

1. To examine risks associated with contraception non-use in the United States using the National Survey of Family Growth (NSFG) data from 1995 and 2002. The predictors associated with non-use will be compared with those identified in the literature regarding unintended pregnancy.

2. To determine factors associated with the temporal change in contraception non-use observed in the study population of sexually active, reproductive age women (ages 15-44) not desiring pregnancy. The aim is to determine whether the temporal change in contraception non-use is due to one of two reasons.
 - a. A result of differences in sample characteristics between 1995 and 2002 with respect to important determinants of contraception non-use.
 - b. If the explanation for a rise in contraception non-use lies in previously unrecognized changes in risky sexual behavior among the at risk population.

3. To determine whether or not the risk factors for rising contraception non-use are consistent with established literature on unintended pregnancy. The goal of this aim is to identify novel high-risk groups that could benefit from targeted policy and clinical care interventions with an aim to decrease unintended pregnancy.

CHAPTER 2 - MATERIALS AND METHODS

2.1 Overview

This thesis is a cross-sectional study comparing population characteristics and environmental and social risk factors associated with contraception non-use among reproductive aged, sexually active women not desiring pregnancy at the time of the NSFG surveys of 1995 and 2002. The NSFG survey population is voluntary and designed to be representative of a national sample of American, non-institutionalized women of reproductive age (age 15-44). A multivariate logistic regression in SUDAAN is used to determine risk factors for contraception non-use while adjusting the model for complex survey design and weights.

2.2 NSFG Population

The NSFG is a periodic complex survey based on personal interviews with a nationally-representative sample of men and women 15–44 years of age in the household population of the United States¹. Survey participants were selected based on demographic data to create a representative sample of the American reproductive age

¹ Sampling of men began with the 2002 Cycle 6 of the NSFG. For the 5 prior cycles, only women were interviewed, accounting for a slightly smaller number of women surveyed in 2002 (n=7,643) compared to 1995 (n=10,847).

population². Since the first survey cycle of the NSFG in 1973, it has become the principal source of U.S. national estimates of factors affecting reproductive health outcomes.(14) Over 500 studies in academic journals and numerous reports from the National Center for Health Statistics (NCHS) have been published using NSFG data to date. Both Cycle 5 and Cycle 6 of the NSFG were available for public use from the NCHS at no charge.³

Data for Cycle 5 were collected between January and October 1995 and included interviews with 10,847 women age 15-44 at the time of the survey. Data for Cycle 6 were collected between January 2002 and March 2003 and included interviews with 7,643 women and 4,928 men age 15-44 at the time of the survey. All interviews were voluntary and confidentiality was preserved by only interviewing one person per selected household.(15) Additionally, any personal identification information was removed for the public use data files. The surveys were administered by trained personnel from the NCHS and administration of the survey took an average of 70 to 90 minutes. Prior to the 2002 NSFG survey, trained NCHS female personnel administered the interviews. With the advent of male surveys in 2002, males were also trained to administer the surveys.

Questionnaire design work involved pre-testing and cognitive laboratory testing, helping to ensure high-quality data from the NSFG. A computer-assisted personal interview (CAPI) instrument (available in both Spanish and English) documented and converted information on-site and directed the interviewer toward proper follow-up

² Subjects were selected from 121 Primary Sampling Units (PSU's). A PSU is a metropolitan area, a county, or a group of adjacent counties. PSU's were located in nearly every state, and included all of the largest metropolitan areas in the United States. From each PSU, secondary units, called segments, were selected. Segments are, roughly, neighborhoods, or groups of adjacent blocks. In each selected segment, addresses were listed, and a sample of the addresses was taken. The sampled addresses were contacted, and a "screener" interview was attempted. If one or more eligible persons (15-44 years of age) were living at that address, one person was randomly selected and asked for an interview.(15)

³ <http://www.cdc.gov/nchs/nsfg>

questions related to some multi-faceted questions. During administration of the questionnaire, “edit checks” within CAPI alerted the interviewer to inconsistencies and out-of-range entries and required immediate correction before the interview could proceed. To improve response rates and reduce bias, participants received a \$40 stipend. Together, these techniques improved precision through minimizing observer variability, making the collected data more precise and easier to reproduce.

Through logical and regression imputation of data, missing values were minimized⁴. Considerable efforts were made by the NCHS to detect and resolve inconsistencies and unacceptable codes throughout the files. However, given the size and complexity of the data files, they cannot be guaranteed to be free of errors.

2.3 Thesis Study Population

This cross-sectional study examined the subpopulations of contraception non-users in 1995 and 2002 within the context of the entire NSFG survey population of sexually active, reproductive age women not desiring pregnancy but at risk for pregnancy.⁽⁵⁾ Women who did not use contraception but desired pregnancy at the time of the survey were not included in the analysis. Additionally, women who were currently pregnant, women who were sterile or had a partner who was sterile, and women with same-sex partners were not at risk for pregnancy and were excluded from study. Finally, women who were not sexually active within three months of the survey period were excluded from the study population. There were a total of 12,979 women in the at risk

⁴ Logical imputation involves having a subject-matter expert at the NCHS examine variables related to the variable in question, and assign a value that is consistent with those other variables and is an educated guess of the true value when there is ambiguity. Regression imputation (used only for 2002 data) used software within CAPI that impute a missing value using all other variables in the data set as predictors.⁽¹⁵⁾

category that were analyzed for risk factors associated with contraception non-use. The analysis took place in the context of the entire population of women surveyed in the NSFG in 1995 and 2002.

2.4 Weighting Procedures

To permit replication of the nationally representative estimates published in NCHS reports and to allow generalizability of the data to the public, the NSFG utilized a weighting strategy.(15) The sampling weight could be thought of as the number of units in the population represented by each woman surveyed. Sampling weight data were determined using four criteria. First was the base sampling weight that represents the individual's probability of being chosen to participate. There were several components to the probability of selection and base weight that involved selection based on primary sampling unit, segment selection, housing unit selection, and person selection. The second factor was non-response adjustment that included statistical adjustment for eligibility, non-contact, and refusal. Third, post-stratification criteria were employed based on U.S. Census Bureau information on age, gender, and ethnicity. The final step in creating the weights for each participant included trimming excessively large weights that would unduly influence statistical analysis of the data.(15) These weights were designed to produce estimates from the sample that corrected for oversampling, non-response, and non-coverage.(16)

In both Cycle 5 and Cycle 6, each respondent represented several thousand U.S. citizens. Since sampling weights varied widely between respondents based on demographic characteristics, any analysis of NSFG data was done using statistical

methods that accounted for sample weights and the complex survey design. Stratified sampling was comprised of creating strata within the total population and sampling from those assigned sampling units. The sampled areas were called PSUs and were denoted by a cluster variable in addition to the stratification variable. Use of stratification and clustering made analysis of the survey data more complex, however, the resulting population and standard error estimates were more accurate if done correctly. Failure to account for sample weighting and the sampling variables would lead to incorrect outcomes and an underestimation of sampling variance. Sampling variance was the measure of the variation of a statistic caused by having taken a sample instead of interviewing the entire population. The sampling variance was zero in a situation such as the U.S. Census. For NSFG Cycles 5 and 6, there was design-based sampling variance that was a function of the complex survey design and the population parameter being estimated. This was taken into account in the final weight variable that was associated with each respondent.(15)

2.5 Recoded Variables

The NCHS produced a number of recoded variables to promote measurement and analysis of complex concepts. Some recodes were very simple and utilized one questionnaire item with imputation for missing values. Other recodes were more complex and incorporated multiple questionnaire items requiring more intricate logic to understand. The outcome measure of CONSTAT1 used in this study was an example of a complex recoded variable, as it included responses from multiple fields in the survey questionnaire. Cases with missing data on a recode were imputed using a sophisticated

multiple regression procedure. The imputed values were checked for consistency and flags were provided to indicate which of two basic types of imputation were used.(15) Examples of the recoding procedures for the CONSTAT1 variable in 1995 and 2002 are available in Appendix 1 and Appendix 2 respectively.

2.6 Definition of Outcome Measure

The variable CONSTAT1, recoded by the NSFG to represent current contraception status, was used as the outcome of interest in this analysis. CONSTAT1 measured the primary method of contraception or, if the woman is not using a contraceptive method, it determined her status based on several responses embedded in the questionnaires. It utilized questions related to contraceptive method use history, sexual history, fecundity, pregnancy, and family planning intent to construct the recoded variable. While prior contraceptive use history existed in the NSFG survey, only women reporting non-use during the three-months prior to the survey were included to avoid recall bias. The outcome measure used to define the study population of interest for the study was CONSTAT1=42, which is titled, “Other non-user – had intercourse in the three months prior to interview.”

Inclusion criteria were established to create a binary outcome of “yes” or “no” to the question of contraception use in the multivariate logistic regression model. Ineligible populations were considered any woman who was pregnant or unable to become pregnant (CONSTAT1 = 30, 32-38), any woman actively trying to become pregnant (CONSTAT1 = 31), or any woman not currently sexually active (SEX3MO = 2). The remaining eligible population of women (n=12,979) comprised the subpopulation for analysis. The

subpopulation was defined as contraception users (CONSTAT1 = 1-18) (n=11,764) or contraception non-users (CONSTAT1 = 42) (n=1,215). This subpopulation had to be identified in order to properly enumerate the women at risk for contraception non-use. However, since these data are from a complex survey design and have specific weights attached to their values, all responses were included in regression analysis.

2.7 Definition of Predictors

Predictors of contraception non-use were chosen based on current literature regarding risks for unintended pregnancy.(2-4, 7, 12, 13, 17-19) In order for a predictor to be chosen for analysis, it had to be present in both Cycle 5 and Cycle 6. If there were any discrepancies recoding data between cycles, recoding within the study database took place to make all variables consistent. The Cycle 6 data were used as the default for categorical variables, as they are more recent. Any data from Cycle 5 that did not match the categorical coding of the Cycle 6 data were recoded. Additionally, any data collected as continuous in Cycle 5 that were later documented as categorical in Cycle 6 were recoded to match Cycle 6. Complete tables of the recoded variables are included in Appendix 1 and 2.

Demographic Predictors

Age: Age was recorded in the NSFG as a continuous predictor, however, it was recoded into a categorical variable with 5-year cohorts for this study in order to examine any association with contraception non-use. Using categorical variables in the model allows for practical interpretation of the model with regards to the outcome measure.

Ethnicity: Respondents self-identify their ethnicity in the NSFG. The ethnic groups reported were categorized by the NSFG as Hispanic, non-Hispanic white, non-Hispanic black, and non-Hispanic other. The non-Hispanic other category encompassed American Indian/Alaskan Natives, Southeast Asians, and Native Hawaiian/Other Pacific Islanders. This group was combined due to a small number of respondents in some categories.

Education: Both cycles record education level of the respondent as the highest grade level completed. To correspond with current literature in family planning, education was re-categorized in the study as no high school diploma or general education degree (GED), high school diploma or GED, some college without a degree, and college degree or more. Respondents who reported having finished 12th grade were considered as having a high school diploma or GED. Similarly, respondents who reported having completed four years of college were coded as having a college degree or more.

Cohabitation Status: The marital status of the respondent was recorded in the NSFG survey as a categorical variable that included: currently married, cohabitating with a partner, widowed, divorced, separated, and never married. Both Cycle 5 and Cycle 6 are recoded into a variable entitled, “cohabitation status.” A respondent was coded as cohabitating if she was either currently married or not married but cohabitating with a partner. All other respondents were coded as not cohabitating at the time of the survey. It was important to categorize women based on cohabitation status rather than marital status because cohabitating women have been hypothesized as being at greater risk of unintended pregnancy than non-cohabitating women, regardless of marital status.(3)

Religion: The religious affiliation of the respondent was categorized as either: no religion identified, Protestant, Catholic, or other religion. The Cycle 5 data are recoded to mimic the Cycle 6 categorizations in the study, therefore, recoding all respondents who replied Jewish, other, or no specified denomination as, “other religion.”

Geography: Geographic residence was defined by the NSFG based on a Metropolitan Statistical Area (MSA). An MSA is a county or group of contiguous counties that contains an urban area of at least 50,000 people based on U.S. Census Bureau data. Both Cycle 5 and Cycle 6 defined areas of residence as: MSA central city, MSA suburban, or non-MSA rural area.

Socioeconomic Predictors

Income: The income status of the respondent was determined as their stated income as a percentage of the federal poverty level (FPL) at the time of the survey. The NSFG recorded this as a continuous variable in both cycles. This study re-categorized income as a percent of the FPL into a categorical predictor: 0-149 percent, 150-300 percent, and greater than 300 percent in order to determine any statistical association with the change over time of the outcome variable of contraception non-use. Additionally, since the survey cycles were 7 years apart, the percent of FPL is a more objective means of comparison for the respondent’s income status.

Employment: Current employment at the time of the survey was measured in Cycle 5 and Cycle 6 using nearly-identical, extensive categorical models. The Cycle 5 data were standardized in the study to match the Cycle 6 categories. Anyone in Cycle 5 who identified one or more part-time jobs was re-categorized as, “working part-time.”

Furthermore, respondents in Cycle 5 that report being, “on permanent disability” or “doing nothing” were re-categorized in this study as, “unemployed/looking for work.” The re-categorized employment responses from Cycle 5 and Cycle 6 were further simplified in the study as either, “employed” or, “unemployed.” Any amount of part-time employment qualified the respondent as, “employed.”

Insurance: The NSFG recorded the insurance predictor in Cycle 5 as three categorical fields. Respondents answered the question, “Did you have coverage from the following insurance in the past 12 months?” with regards to Medicaid, military, or other insurance coverage. If the respondent answered, “yes” in any of the three fields, they were re-categorized in the study as, “insured.” Any respondent who answered, “no” to all three, “refuses to answer” or, “does not know” for all three fields was re-categorized as, “uninsured.” The NSFG recorded insurance information in Cycle 6 similarly to Cycle 5, but in one field instead of three. The categorical insurance predictor in Cycle 6 was also re-categorized in the study to, “insured” or, “uninsured.” Simplifying the categorical model is appropriate because in a complex multivariate model, the status of the respondent’s health insurance is important, not necessarily the specifics of coverage.

Family History Predictors

Family Composition: Respondents’ answers to the NSFG-recoded variable of, “Intact Status of Childhood Family,” were considered as a potential predictor of the outcome of contraception non-use. In Cycle 5, respondents who were either identified as having, “two biological parents from birth” or, “two adoptive parents from birth” were further re-categorized in the study to match the Cycle 6 categorization of, “Two adoptive

or biological parents from birth.” Cycle 5 respondents identified as having any other living situation in childhood were re-categorized as, “Anything other than two biological or adoptive parents from birth.”

Mother’s Education: The NSFG recorded the highest level of education of the respondent’s mother similarly to respondent’s education, as a large categorical variable. The mother’s education was re-categorized in the study into four categories similar to the “education” predictor for the respondent in the study.

Mother’s Age at First Birth: The NSFG recorded the information as a lengthy categorical variable, including choices for, “not sure, but probably age under age 18,” “not sure, but probably age 18-19,” “not sure, but probably age 20-24,” and “not sure, but probably age 25 or greater.” The information from Cycle 5 and Cycle 6 was re-categorized in the study as a simplified categorical scheme of: under 18 years, 18-19 years, 20-24 years, and 25 years and over. For simplicity of analysis in the study, those who answered that they were not sure, but gave an estimate of age, were re-categorized into the age cohort that they estimated. It is acknowledged that all information reported by the respondent with regards to their family history is subject to more inconsistency than information directly related to the individual. This will be considered in the interpretation of the results.

2.8 Statistical Analysis

The NSFG Cycle 5 and Cycle 6 data were obtained from the NCHS in December 2006 and the study was approved by the OHSU IRB on January 14, 2007. Data management and frequency analysis were performed using SAS Version 9.1.3. Logistic

regression models were performed using subpopulation analysis methods in SUDAAN Version 9.0.1. Codes for the logistic models in SUDAAN are included in Appendix 5.

A SAS library was created containing the predictors of interest, merging the populations of women in Cycles 5 and 6. A unique identifier was present for all participants and there was no duplication of identification codes. A year variable was created in the merged file to establish which respondents were from which cycle. The predictors of interest were then identified in each dataset and included in the merged data file. However, many of the predictors were either coded differently between the cycles or were named differently, not allowing SAS to recognize them as similar. Therefore, all predictors were recoded under a common heading unique to the merged dataset. Some predictors were further re-categorized into simplified categorical variables for use in the study after the merged dataset was formed.

Complex survey design and subpopulation analysis: The complex survey design precludes separation of a subpopulation of respondents from the overall sample before performing analysis because it invalidates the weight variable due to incorrect estimation of standard errors. To ensure accuracy in analysis, the weights, clusters, and strata variables must be constructed based on the entire population of survey respondents. Therefore, sampling information for observations not included in the subpopulation were still used in the calculations, as not to invalidate the sampling weights, clusters, and strata.(20) By using the SUBPOPN statement in SUDAAN, the regression equation was modeled with only the subpopulation of eligible respondents (n=12,979) with respect to contraception non-use, but the critical study weights and stratified sampling variables (strata and cluster) of all respondents (n=18,490) were calculated in the model. By

utilizing the SUBPOPN statement, the subpopulation of eligible respondents was never separated from the full dataset in the analysis⁵.

The contraception non-use statistics of 5.2% in 1995 and 7.4% in 2002, cited by the NSFG Advanced Data report of Cycle 6, were initially replicated utilizing cross-tabulation. Table 1 demonstrates the unweighted frequencies and weighted percentages for cohorts of primary contraceptive methods recorded by CONSTAT1 in 1995 and 2002. In Table 2, descriptive frequencies for all NSFG respondents were performed on all valid predictors by year of response. The changes in weighted percentages are reported to reveal any differences in demographic, socioeconomic, or family history characteristics between the two time periods. Based on the intricate imputation scheme developed by the NSFG to account for non-response, no missing values for respondents were encountered during analysis. It was imperative to rule out large differences in the composition of the respondents that would possibly suggest the effect of a covariate leading to the difference in contraception non-use over time. For instance, if contraception non-use is a covariate with lack of health insurance, then if the weighted proportion of those without insurance demonstrated in the 2002 survey is markedly greater than the 1995 survey (25-30% for instance), it would be possible that the results were due to the inequality in respondents sampled.

Next, a multivariate logistic regression model, comprised of a year variable and all twelve predictors of interest with respect to contraception non-use, was created using

⁵ Using a SUBPOPN statement in SUDAAN is not equivalent to using a data file or data set with observations you wish to exclude deleted beforehand. Differences (usually slight) will be evident in estimates of standard errors, and are not due to the SRS-based variance-covariance matrix, but to the difference in the robust variance-covariance matrix. These differences arise from differences in counts within the strata: using SUBPOPN corresponds to the assumption that even if there are no individuals in the PSU in the sample, there may be some in the universe, and an appropriate contribution to the estimated variance must be calculated.(41)

SUDAAN 9.0.1. Logistic regression was used instead of linear regression because of its ability to incorporate a larger number of predictors into the model. The SUBPOP statement was used to analyze the subpopulation of eligible respondents (n=12,979), either using or not using contraception, within the total population of female respondents in both cycles (n=18,490). Separate multivariate logistic regression models were performed for the 1995 data and the 2002 data in order to examine any discrepancies between the models by survey period. Next, the comprehensive multivariate logistic regression model was constructed using both cycles of survey data. Backward selection was used to remove insignificant ($p>0.05$) predictors from the model in order to create the main effects model. The Taylor Series Method was used in SUDAAN for approximation of the total model variance as a weighted combination of variation across clusters and strata. The results of the multivariate logistic regression for the main effects model are shown in Table 3. Next, interaction terms of each predictor*year were added to the main effects model to test the impact on the year effect. The model chi-square test (Table 4) examines the difference between -2 log likelihood (-2LL) for the main effects model and -2LL for a model incorporating a single predictor*year set of interaction terms.

CHAPTER 3 – RESULTS

There were a total of 10,847 women who participated in the Cycle 5 survey and 7,643 women who participated in the Cycle 6 survey, for a total of 18,490 total respondents. When weighting was taken into account, this translated into a weighted count of 60.2 million women in 1995 and 61.6 million women in 2002. During this time,

the percent of reproductive age, sexually active women not using contraception who do not desire pregnancy increased from 5.2% to 7.4% as seen in Table 1. This translates into 3.13 million women not using contraception in 1995 compared to 4.57 million women not using contraception in 2002 – an increase of approximately 1.44 million more women at risk for unintended pregnancy. As expected, there was a nearly reciprocal decrease of 2.3% in the proportion of the population of reproductive age, sexually active women not desiring pregnancy who do use a method of contraception. There was little change observed in the population of reproductive age females between 1995 and 2002 with regards to being pregnant or unable to conceive at the time of the survey (-1.0%), not sexually active within three months of the survey (+1.0%), or seeking pregnancy as a rationale for non-use(+0.2%).

Table 1 – Frequency of method of contraception by year

	1995 (n=10847)		2002 (n=7643)		% Change
	Unweighted Number	Weighted %	Unweighted Number	Weighted %	
CONTRACEPTIVE METHOD					
Contraceptive method used	7145	64.2	4619	61.9	-2.3
Currently pregnant or unable to conceive	1056	9.5	690	8.5	-1.0
Seeking pregnancy	439	4.0	346	4.2	0.2
Not sexually active	1627	17.1	1353	18.1	1.0
Sexually active and not using contraception	580	5.2	635	7.4	2.2

The demographic, socioeconomic, and family history characteristics of the entire survey populations from 1995 and 2002 are presented in Table 2. The percent change in the characteristics of the population by predictors are given to better understand whether or not there is a fundamental difference in population characteristics that could potentially lead to an increase in contraception non-use. Age and ethnicity were components of the sampling design, therefore, changes in their proportions between 1995

and 2002 were deliberate in order to accurately depict the composition of reproductive age women in the United States based on U.S. Census Bureau information. Interestingly, there were more women sampled in 2002 from the 19 and under age cohort (+0.9%), the 20-24 year old cohort (+1.1%), and the 40-44 year old cohort (+1.9%). The observed increase in older women could represent the tail-end of the Baby Boom generation and the younger women may represent the children of the older Baby Boomers. Similarly, ethnicity was part of the sampling design and there were more women sampled in 2002 that were Hispanic (+3.7%) and non-Hispanic other (+1.0%), including Southeast Asian, American Indian/Alaskan Native, and Pacific Islander populations, relative to non-Hispanic white women (-4.9%). This represents the short-term evolution of ethnic diversity in the U.S. based on census data.

The change in educational experience of women between 1995 and 2002 was somewhat bimodal; there was an increase in women without a high-school equivalent degree (+1.9%) and conversely, many more women reported some college (+3.5%) or having completed a college degree or more (+2.8%) in the 2002 survey period compared to 1995. In 2002, a larger proportion of women reported having an income of 0-149% of the federal poverty level (+6.8%). This is consistent with the increase in women without a high school degree, however, incongruent with the increase in women reporting college experience. Along the same lines as income status, there were more women reporting no insurance coverage at the time of the 2002 survey (+3.5%). Furthermore, the proportion of women who reported being unemployed at the time of the 2002 survey was only 1.5% greater than the 1995 survey results. These data show that more women were working in

jobs, regardless of educational attainment, that were not providing adequate income and/or health insurance.

There was little change in the proportion of women cohabitating with a male partner over time. The 2002 survey depicted a slight decrease in cohabitating women (-1.2%) compared to 1995. The geographic distribution of women in the U.S., as represented by the 2002 survey data, was very different between study periods. The proportion of women living in a suburban environment was much greater in 2002 (+18.2%) compared to rural (-15.4%) or central city (-2.6%) locations. While geographic location was a product of the clustering and stratification selection criteria and could be altered by chance selection of respondents, the difference was so large that it likely represents a shift of reproductive age women from suburban and rural areas to urban areas over the short time span between survey periods.

In addition to cohabitation status and geographic location, religious affiliation could impact contraceptive use patterns. However, despite an apparent shift in religious composition of the U.S., the 2002 survey period showed little change in self-reported religious affiliation of reproductive age women. If anything, there were a greater proportion of women reporting no religion (+2.1%) and fewer women aligning with Catholicism (-0.7%) and Protestantism (-1.4%).

More women reported growing up in a two-parent home in 2002 (+3.5%) compared to 1995. Additionally, more respondents reported that their mothers received either some college education (+7.4%) or have a college degree or more (+4.2%) in the 2002 survey. A slight trend is observed in 2002 of more respondents reporting that their

Table 2 – Frequency of predictors among eligible NSFG survey samples, 1995 and 2002

Predictor	1995 NSFG (n=10847)		2002 NSFG (n=7643)		% Change
	Unweighted Number	Weighted %	Unweighted Number	Weighted %	
AGE*					
19 and under	1416	15.1	1150	16.0	0.9
20-24 years	1518	14.9	1363	16.0	1.1
25-29 years	1739	16.3	1296	15.0	-1.3
30-34 years	2149	18.2	1355	16.7	-1.5
35-39 years	2144	18.8	1270	17.6	-1.2
40-44 years	1881	16.8	1209	18.7	1.9
ETHNICITY*					
Hispanic	1553	11.1	1589	14.8	3.7
Non-Hispanic black	2446	13.6	1530	13.9	0.3
Non-Hispanic other	365	4.6	385	5.6	1.0
Non-Hispanic white	6483	70.6	4139	65.7	-4.9
EDUCATION					
Less than H.S.	2721	24.5	2088	26.0	1.5
H.S. degree/GED	3438	31.1	1792	23.4	-7.7
Some college	2609	23.8	2075	27.3	3.5
College degree or higher	2079	20.5	1688	23.3	2.8
INCOME AS PERCENT OF FPL					
0-149 percent	2795	22.6	2441	29.4	6.8
150-299 percent	3509	32.6	2184	28.9	-3.7
300 percent or greater	4543	44.8	3018	41.7	-3.1
INSURANCE STATUS					
Uninsured	1321	12.1	1306	15.6	3.5
Insured	9526	87.9	6337	84.4	-3.5
EMPLOYMENT STATUS					
Unemployed	3551	32.0	2648	33.5	1.5
Employed	7296	68.0	4995	66.5	-1.5
MARITAL STATUS					
Cohabitating	6063	56.3	3812	55.1	-1.2
Non-cohabitating	4784	43.7	3831	44.9	1.2
FAMILY COMPOSITION SINCE BIRTH					
Other than two parents since birth	6474	61.8	4799	65.3	3.5
Two parents since birth	4373	38.2	2844	34.7	-3.5
MOTHER'S EDUCATION					
Less than H.S.	3534	29.3	2024	24.1	-5.2
H.S. degree/GED	4394	42.5	2583	36.1	-6.4
Some college	1463	14.3	1650	21.7	7.4
College degree or higher	1384	13.9	1336	18.1	4.2
AGE WHEN MOTHER HAD HER FIRST CHILD					
17 and under	1855	14.9	1332	15.7	0.8
18-19 years	2152	19.3	1533	20.1	0.8
20-24 years	4336	41.9	3017	42.8	0.9
25 years or more	2504	23.9	1658	21.3	-2.6
GEOGRAPHIC DISTRIBUTION					
Suburban	3809	30.8	3610	49.0	18.2
Rural	4924	48.7	2891	33.3	-15.4
Central city	2114	20.5	1142	17.6	-2.9
RELIGIOUS AFFILIATION					
No religion	3130	29.4	2261	28.7	-0.7
Catholic	5929	52.7	3822	51.3	-1.4
Other religion	576	5.8	450	5.9	0.1
Protestant	1212	12.0	1110	14.1	2.1

* Age and ethnicity are used as part of the sampling methodology. Variability likely represents changes in US Census data between study cycles.

mother was less than 25 years old when she had her first child (-2.5%) compared to the 1995 survey.

To determine if the year effect persisted with regards to contraception non-use when controlling for all significant predictors, a multivariate logistic regression was performed with all predictors and those that were not significant ($p > 0.05$) were removed through backward selection. The main effects model for the multivariate logistic regression is shown in Table 3. The predictors removed from the model were mother's education, income status, and family composition. Of these predictors, it is most surprising that income status did not have a statistically significant relationship with contraception non-use due to issues of access to care. However, in a simplified logistic regression model (year, age, ethnicity, income), income was not significantly associated with contraception non-use ($\chi^2_{2,0.95} = 0.41 \ll 5.99$; $p > 0.75$), confirming the findings from the comprehensive logistic regression model.

In the main effects model containing the nine significant predictors, the year effect continued to be present (OR 1.47[1.26-1.72], $p < 0.001$); showing that sexually active, reproductive age women are 47% more likely in 2002 to be contraception non-users, despite not desiring pregnancy, compared to 1995. While the risk of contraception non-use was attributable to the nine significant predictors identified, the persistence of a significant year effect warrants examination. There are likely unmeasured risk factors for contraception non-use that contribute to the increased risk of contraception non-use in 2002 compared to 1995. These factors may be social, behavioral, structural, and/or political.

In the multivariate model containing all significant predictors, women age 19-years and under were 79% more likely to be non-users than women age 40-44-years (OR 1.79[1.39-2.30], $p < 0.001$). These data are consistent with findings related to contraception non-use and unintended pregnancy utilizing earlier cycles of NSFG data.(2, 3, 7, 21-23)

Consistent with the risks for unintended pregnancy, non-Hispanic black women were more likely to be contraception non-users (OR 1.33[1.04-1.71], $p = 0.03$) than non-Hispanic white women.(2, 3, 7, 18, 19, 21, 23, 24) Neither Hispanic nor non-Hispanic other women had significant statistical associations with non-use in the presence of all other significant risk factors. In addition to ethnicity, women with a high school degree or GED were 23% more likely than women with a college degree or more to be non-users (OR 1.31[1.04-1.65], $p = 0.03$). Additionally, women with less than a high school degree or GED were at a greater risk of non-use that is marginally significant (OR 1.31[0.98-1.56], $p = 0.08$) in the multivariate model compared with women with a college degree or more.

Women who reported being uninsured at the time of their survey were 26% more likely to be contraception non-users (OR 1.26[1.02-1.56], $p = 0.03$) than women with health insurance. Similarly, women who were unemployed were at an 18% greater risk of non-use (OR 1.18[1.02-1.37], $p = 0.03$) than women with, at the very least, part-time employment. In this case, employment and insurance status were a proxy for socioeconomic status, as lacking both is usually associated with being poor. These predictors were likely highly correlated in the model since the U.S. operates on an

Table 3 – Multivariate logistic regression analysis to test persistence of the year effect for contraception non-use when controlling for known predictors

Predictor	Beta	SE	OR	95% CI	p-value
YEAR					
2002	0.38	0.08	1.47	1.26 - 1.72	<0.001
1995	-	-	-		reference
AGE					
19 and under	0.58	0.13	1.79	1.39 - 2.30	<0.001
20-24 years	0.11	0.13	1.12	0.87 - 1.44	0.38
25-29 years	0.02	0.14	1.02	0.78 - 1.35	0.87
30-34 years	-0.07	0.14	0.93	0.72 - 1.22	0.61
35-39 years	0.01	0.14	1.01	0.77 - 1.32	0.94
40-44 years	-	-	-		reference
ETHNICITY					
Hispanic	0.01	0.13	1.01	0.78 - 1.31	0.94
Non-Hispanic black	0.29	0.13	1.33	1.04 - 1.71	0.03
Non-Hispanic other	0.14	0.18	1.15	0.80 - 1.64	0.46
Non-Hispanic white	-	-	-		reference
EDUCATION					
Less than H.S.	0.21	0.12	1.23	0.98 - 1.56	0.08
H.S. degree/GED	0.27	0.12	1.31	1.03 - 1.65	0.03
Some college	-0.03	0.12	0.97	0.77 - 1.22	0.80
College degree or higher	-	-	-		reference
INSURANCE STATUS					
Uninsured	0.23	0.11	1.26	1.02 - 1.56	0.04
Insured	-	-	-		reference
EMPLOYMENT STATUS					
Unemployed	0.17	0.08	1.18	1.02 - 1.37	0.03
Employed	-	-	-		reference
MARITAL STATUS					
Cohabiting	-0.57	0.1	0.57	0.48 - 0.69	<0.001
Non-cohabiting	-	-	-		reference
AGE WHEN MOTHER HAD HER FIRST CHILD					
17 and under	-0.05	0.13	0.95	0.73 - 1.22	0.68
18-19 years	-0.18	0.13	0.83	0.65 - 1.08	0.16
20-24 years	-0.23	0.09	0.79	0.66 - 0.95	0.01
25 years or more	-	-	-		reference
GEOGRAPHIC DISTRIBUTION					
Suburban	-0.02	0.09	0.98	0.83 - 1.15	0.78
Rural	-0.25	0.12	0.78	0.62 - 0.98	0.03
Central city	-	-	-		reference
RELIGIOUS AFFILIATION					
No religion	0.01	0.12	1.01	0.80 - 1.26	0.96
Catholic	0.26	0.11	1.29	1.04 - 1.60	0.02
Other religion	0.34	0.17	1.40	1.00 - 1.97	0.05
Protestant	-	-	-		reference

employer-based system of health insurance coverage.

In terms of geographical distribution, women living in a rural area were 22% less likely to be contraception non-users (OR 0.78[0.62-0.98], $p=0.03$) than women living in the central city. There was no significant difference in risk for non-use amongst suburban women compared to central city women (OR 0.98[0.83-1.15], $p=0.78$).

Additionally, religious affiliation was associated with non-use in the model. Catholic women were 29% more likely not to use a method of contraception (OR 1.29[1.04-1.60], $p=0.02$) than Protestant women. Similarly, women self-identified as belonging to the “other religion” categorization, comprised of Judaism and all other non-Christian faiths, were 40% more likely to be contraception non-users (OR 1.40[1.00-1.97], $p=0.05$) than women belonging to a Protestant denomination.⁶ Interestingly, women without a reported religious affiliation were not at any different risk for contraception non-use than the reference group of Protestant women (OR 1.01[0.80-1.26], $p=0.96$).

Women who reported cohabitating with a male partner were 43% less likely to be contraception non-users (OR 0.57[0.48-0.69], $p<0.001$) than women who did not live with a male partner. Another interesting finding that does not follow any trend but rather was a stand-alone significant predictor of non-use was the finding that women with mothers that had their first child at age 20-24 years are significantly less likely to be non-users (OR 0.79[0.66-0.95], $p=0.01$) than mothers that had their first child at 25-years of age or older.

⁶ The numbers of women comprising the “other religion” category were very small, translating into very large study weights per woman surveyed due to belonging to small religious sects. Consequently, little can be interpreted from the results of the “other religion” category due the vast variability in survey respondents in that group.

The significance of interaction terms were measured by the model chi-square test. Results of the separate model chi-square tests for all nine predictors are shown in Table 4. The predictor*year interaction term with the largest decrease in deviance for the degrees of freedom was the year*insurance interaction term. The odds of contraception non-use among insured individuals in 2002 compared to 1995 was not statistically significant (OR 1.11[0.63-1.95]). Among uninsured individuals, the odds of non-use was 55% greater (OR 1.55[1.2-2.0]) in 2002 than in 1995. Significant changes in deviance, albeit smaller than the year*insurance term, were also seen in the year interaction terms with age, ethnicity, education, and geographic residence.

Table 4 – Log likelihood ratio test for models with predictor*year interaction terms versus the main effects model

Interaction term	DF	Change in deviance	Significance
YEAR*AGE	5	13.66	<0.05
YEAR*ETHNICITY	3	10.61	<0.05
YEAR*EDUCATION	3	8.30	<0.05
YEAR*INSURANCE	1	4.15	<0.05
YEAR*EMPLOYMENT	1	0.15	ns
YEAR*MARITAL	1	2.77	ns
YEAR*AGE MOM BABY	3	1.22	ns
YEAR*GEOGRAPHY	2	6.53	<0.05
YEAR*RELIGION	3	5.55	ns

ns = not significant, p>0.05

CHAPTER 4 – Discussion

In this study, a significant increase in contraception non-use between 1995 and 2002 was shown. Although some changes existed in the frequency of certain predictors amongst the entire NSFG survey populations between 1995 and 2002, none of the characteristics independent of survey design changed dramatically enough to be

concerned for biased sampling. This study confirmed known high-risk characteristics for women not using contraception: teens, non-Hispanic black ethnicity, high school equivalent educations only, uninsured, unemployed, and self-identifying as Catholic. These results are largely consistent with current contraception and unintended pregnancy literature. (2-4, 7, 9, 12, 13, 17-19, 24) However, there were some risk factors not found to be significantly associated with non-use in this study that have statistical associations in other studies.

First, unintended pregnancy is often considered to be bimodal, with peaks in the teens and late-30's to 40's.(12, 19, 25) However, these data were more suggestive that teens are at greater risk for contraception non-use compared to women in their later reproductive years. Second, in a study by Foster et al of a sample of women in California, women of Southeast Asian descent were found to be twice as likely to be non-users as non-Hispanic white women.(12) These results cannot differentiate the subpopulation of Southeast Asian women within the non-Hispanic other category and therefore, this result was not replicated.

Of these predictors, it is most surprising that income status does not have a statistically significant relationship with contraception non-use due to issues of access to care. Employment and insurance status are common confounders of income and can subsequently affect the significance of income as a predictor of contraception non-use in the model. However, when a simplified logistic regression model was built containing only year, age, ethnicity and income with an outcome of contraception non-use, income was still not a significant predictor in the model (Chi-square 0.41, $p=0.75$). Low income has traditionally been associated with deficiencies in access to health care services. In a

study of women age 15-44 in California in 2004, Foster et al showed that women with an income <100% FPL were more likely to be contraception non-users compared to women with an income of >200% FPL (p=0.008).(12) Income may not be the only barrier to contraception access and it is important to recognize that it is not necessarily poor women who are at risk for non-use.

It is interesting that women cohabitating with a male partner were less likely to be contraception non-users (OR 0.57 [0.48-0.69]) than women not cohabitating with a male partner. Several studies of sexually active reproductive age women have found that women who are formerly married or divorced/widowed are more likely to be non-users than married women.(7, 19, 21) Additionally, there is information from large population-level studies citing a greater risk of unintended pregnancy among unmarried women compared to their married counterparts.(2, 23) Women who live with a male partner are more likely to have a greater frequency of sexual encounters, perhaps promoting consistent contraceptive use as opposed to women who do not cohabit with a partner. Frost et al concluded in a study of women in the U.S. in 2004 that, “infrequent sexual intercourse [not cohabitating] was associated with a relatively high rate of non-use.”(24) However, Finer et al showed in 2006 that the rate of unintended pregnancy is higher in cohabitating women (138 per 100,000) than in non-cohabitating women (52 per 100,000).(3) There are two possible explanations for this finding in the setting of our results. First, the Finer et al study could have a greater number of cohabitating women not using contraception, as opposed to the results of this study, and subsequently they are experiencing a greater proportion of unintended pregnancy. The other approach is that cohabitating women are practicing diligent family planning and any pregnancies that

occur outside of their plan may be considered unintended. As far as the non-cohabitating women are concerned, they may be less likely to report the pregnancy as unintended if they know that they are having unprotected sex or there is undefined underreporting.

One novel finding was that women living in a rural environment were less likely to be contraception non-users (OR 0.78 [0.62-0.98]) than women living in a central city environment. Hogan et al studied geographic home with respect to sexual activity and contraception use in teenage women and found that there was no difference in either outcome between urban and rural teenagers.(22) Assuming a greater mean distance traveled for women to access family planning services in a rural environment versus a central city, the opposite findings would be expected. Therefore, a potential reciprocal effect is demonstrated where women in a rural setting exhibit a greater diligence in obtaining contraception from health care providers due to greater obstacles in accessing care. This result could also be due to the fact that rural regions tend to have lower per capita income compared to central cities and federal family planning efforts target low-income areas. The rural environments may have more programs for free or reduced-cost family planning services per capita than in central cities.

Another novel finding that is not clearly represented in family planning literature was that women with mothers who had their child at 20-24 years of age were less likely (OR 0.79 [0.66-0.95]) to be contraception non-users than women with mothers 25 years or older at the time of their first birth. Although not statistically significant, the trend towards women with younger childbearing mothers being less likely to be contraception non-users existed with mothers age less than 17 (OR 0.95 [0.73-1.22]) and age 18-19 years (OR 0.83 [0.65-1.08]). One hypothesis is perhaps that women with mothers who

started having children later in life may not communicate as effectively with their daughters compared to younger mothers. Similarly, younger childbearing mothers may be more adimate talking about sex and informing their daughters about contraception in an effort to encourage their daughters to delay childbearing until they are older.

In the main effects multivariate logistic regression model there continues to be a greater risk of contraception non-use in 2002 compared to 1995, measured by the year effect ($p < 0.001$). These results suggest that there are other factors associated with the increase in contraception non-use over time, irrespective of these predictors identified in the model. Several possibilities exist that may further explain the rise in contraception non-use that are not measured in this model.

Access to publicly funded family planning services: Cost plays a key role in whether and by what means women use a contraceptive method. The unsubsidized cost for a woman to pay for contraception is hundreds of dollars annually. Employment and insurance results from this study are very consistent with research stating that women in lower socioeconomic strata are at greater risk for unintended pregnancy.(2-4, 7, 18, 21, 23) Approximately three-fourths of reproductive age women are covered by private health insurance and 8% are covered by Medicaid; leaving nearly one in five women without health insurance coverage.(26) There is a steady increase in the number of employed Americans that are not offered employer-based health care benefits.(27) On the other hand, there is a steady decrease in the income requirements for Medicaid eligibility; creating a widening gap of uninsured Americans that is largely comprised of the “working poor.” As it stands today, families that make significantly less than minimum wage are still not eligible for Medicaid because they make too much money.

Employment and health insurance are usually covariates due to the market-based system of health care provision in the United States. However, the disparity observed in this study of a 3.5% rise in the proportion of women that were uninsured compared to a 1.5% rise in the unemployed subtly represents the growing problem that employers are less able or willing to provide health insurance to their employees. The cost of providing coverage continues to outpace inflation and wage growth.(27) Therefore, while the employment rate is relatively static between survey periods, the growth of the uninsured population represents this problem.

Publicly funded family planning clinics are the primary source of reproductive health care for uninsured women and provide a large proportion of family planning services to Medicaid recipients. Due to diminishing returns on Medicaid reimbursements to private health care facilities, many Medicaid recipients receive services from publicly funded family planning clinics. Consequently, one in four U.S. women relies on public clinics for contraception.(26) A key source of funding for public family planning clinics is Title X of the Public Health Services Act. Enacted in 1970, it is the only federal program exclusively devoted to providing nationwide family planning services by subsidizing contraception for U.S. women who cannot afford it without assistance. Although Title X funds cannot support abortion services, they remain a vital funding source for 4,500 of the 7,000 family planning clinics nationwide.(28) However, Title X funding has not kept up with the inflationary costs of contraceptive methods or operational costs of public clinics since appropriations were reduced in the 1980s. In the 2003 fiscal year, the federal government allocated \$275 million to Title X, less than half of what the appropriations would have been (\$590 million) if funding had kept pace with

inflation over the past three decades.(29) Consequently, between 1980 and 2006, Medicaid expenditures for public family planning clinics rose from 20% to 71% of total funding, while Title X expenditures fell from 44% to 12% and federal block grant expenditures fell from 22% to 5%.(30)

Currently, public family planning clinics are largely reliant on Medicaid funding (through both federal and state appropriations) and receive less and less support from Title X and grants. State-based Medicaid income expansion programs have extended eligibility for Medicaid funding in 14 states as of 2006. While the Medicaid spending on family planning has tripled in those 14 states since 1994, their growth accounts for over two-thirds of the total, national growth in inflation-adjusted public spending on family planning services. For the remaining 36 states, inflation-adjusted spending has decreased or stagnated.(30) Results from this study demonstrate that the odds of an uninsured woman not using contraception were 55% greater in 2002 than in 1995. This suggests that the observed rise in contraception non-use can be attributable, in part, to the decrease in funds per capita for family planning services offered in publicly funded clinics in a majority of states. With nearly one quarter of women receiving their services from public clinics, these women are at greater risk of limited access to family planning services that may deter them from using a contraceptive method. Longer wait times at public clinics to see a provider and greater eligibility hurdles for funding assistance due to limited resources impede these women from accessing contraception.

Access to privately funded family planning services: For the nearly 75% of reproductive age women that have private health insurance coverage, access to contraception continues to be problematic. Research published by The Guttmacher

Institute in 1994 found that while most indemnity health plans covered prescription drugs, half did not cover prescription contraceptives. Only 30% of plans covered any oral contraceptives. Health maintenance organizations (HMOs) covered a more extensive range of contraceptive services and supplies, however, only 40% covered the full range of methods then approved by the Food and Drug Administration. Coverage for contraception in preferred provider and point-of-service plans fell between the two aforementioned organizations; remaining closer to the coverage patterns of indemnity plans.(31)

Consequently, the Equity in Prescription Insurance and Contraceptive Coverage Act (EPICC) was introduced by bi-partisan co-sponsors, Sens. Olympia Snowe (Republican-Maine) and Harry Reid (Democrat-Nevada), to Congress in 1997. The hearings for the bill began on September 10, 2001 and were suspended the following day due to the attacks on the World Trade Center in New York and the Penatagon in Washington, D.C.(31) The bill was reintroduced in 2005 by Sen. Snowe and sixteen co-sponsors (S. 1214) and, as of April 2008, awaits Congressional action. Meanwhile, in June 2001, the U.S. District Court in Washington issued a monumental decision in the case of *Erickson v. Bartell Drug Company*. Jennifer Erickson, a Washington state pharmacist, brought suit against her employer, Bartell Drug Company, after she discovered that they did not provide insurance coverage for prescription contraceptives. The decision in the case prohibits prescription contraceptives from being excluded from an otherwise comprehensive prescription drug plan. The decision in *Erickson v. Bartell Drug Company* was largely based on the determination by the U.S. Equal Employment Opportunity Commission (EEOC) in December 2000 that an employer's failure to

include contraceptives in its prescription drug plan constitutes gender discrimination under Title VII of the Civil Rights Act.(31)

Nevertheless, these measures continue to leave many women without comprehensive coverage for contraception despite having private insurance, namely because Title VII only applies to employers with 15 or more employees and does not apply to employers who self-insure. Therefore, nearly half of all employees who obtain health insurance from their employer work for employers who self-insure, leaving millions of women vulnerable to individual insurance plans that continue to deny or inequitably limit coverage for prescription contraceptives. Additionally, several million women obtain health insurance through the individual market, to which these mandates similarly do not apply.(31) It is entirely reasonable to believe that out-of-pocket costs for contraceptive methods above and beyond the cost of private health insurance are a deterrent for women. Lack of equitable coverage for female-controlled prescription contraceptives and devices by private insurance may contribute to the observed rise in contraception non-use between 1995 and 2002 when controlling for known risk factors.

Geographic limitations to family planning access: The location of reproductive age women in the U.S. changed quite markedly between 1995 and 2002. With more women living in suburban areas in 2002 (49.0% compared to 30.8%), it is likely that family planning resources have not moved as quickly to accommodate these women. The majority of the population shift to suburban areas took place from rural communities (decrease of 15.4%), with a small change in central city regions (decrease of 2.9%) between 1995 and 2002. Since rural communities generally have a lower per capita income and are difficult to target for health care services due to the widely-dispersed

population, efforts have been made to provide access to public family planning services in these areas. Central cities have been targets for placement of public family planning clinics due to the presence of low-income women and the density of the population. Suburban areas have contained more affluent families in the past and have not been primary targets for expanding access to public family planning services. However, more reproductive age women were shown to be moving into suburban areas where public family planning services have not generally been located in high numbers. Additionally, with more privately-insured women having difficulty accessing family planning services, the shift of more women in suburban areas does not imply that there are fewer women in need of public family planning clinics. Access to family planning services for nearly half of all reproductive age women in the U.S. may be compromised by fewer clinics and/or providers being located in suburban areas.(32)

Legislation limiting access to family planning services: Several attempts have been made to limit access to family planning services in the United States. Recently, the Parent's Right to Know Act of 2007 (H.R. 2134) was introduced on May 3, 2007 in the 110th Congress by Todd Akin (Republican-Missouri). The bill aims to disqualify family planning clinics from federally appropriated funds if any service provider knowingly provides contraception to a minor without parental notification, parental permission, or court mandate.(33) Similar permutations of this bill have been proposed in the 108th and 109th Congress and have not made it out of committee to be debated on the floor of Congress. Nevertheless, aims to legally limit access to care threaten consistent contraception use by women and make the subject matter more controversial. As a result, women in certain regions may be more reluctant to seek out contraception based

on the predominant political climate. Persistent aims by lawmakers to limit services may influence the rise in contraception non-use.

Educational policies that omit information on contraception: In 2006, the federal government provided \$178 million for abstinence-only education through Title V, Section 510 of the Social Security Act of 1996. Programs eligible for funding must adhere to an eight point definition of abstinence education and are prohibited from disseminating information on contraceptive services, sexual orientation, and gender identity unless to discuss failure rates of contraceptive methods. Currently, no designated federal funding stream exists for comprehensive education on sexuality and family planning.(34) In an analysis of NSFG data with regards to receipt of sexual education and first intercourse, Lindberg et al show that by 2002, higher proportions of adolescent women had received abstinence-only education (75.1%) than birth control education (61.8%) prior to first intercourse. The number of adolescent women receiving any birth control education prior to first intercourse significantly declined (72.4% to 61.8%) between 1995 and 2002 ($p < 0.05$). Concerning trends away from birth control instruction and comprehensive sex education for non-Hispanic black girls, Hispanic girls, and girls living below 200% FPL are of particular concern, as they foster educational and health inequities.(35)

Health and ethical concerns exist within numerous medical professional organizations related to abstinence-only education.⁷ In December 2004, a review of abstinence-only educational curricula by the Committee on Government Reform of the

⁷ The American College of Obstetricians and Gynecologists (ACOG), the Society for Adolescent Medicine (SAM), the American Academy of Pediatrics (AAP), the American Medical Association (AMA), and the American Public Health Association (APHA), oppose abstinence-only education and endorse comprehensive sexuality education that includes both abstinence and accurate information about contraception, human sexuality, and STIs.

U.S. House of Representatives found that 11 of the 13 programs reviewed commonly contained false, misleading, or distorted information about reproductive health and contraceptive effectiveness.(34) Add Health data suggest that many teens who pledge to abstain fail to do so and have sex before marriage (88%). Those not taking an abstinence pledge are more likely to have pre-marital sex (99%). Therefore, perfect use efficacy of abstinence is 100%, however, typical use is near 0%. However, young men and women not taking the abstinence pledge are more likely to visit a physician for reproductive health concerns compared to those who have taken an abstinence pledge.(36) Additional ethical concerns exist with abstinence-only education with regards to withholding of information about contraception and STIs. Santelli et al believe that it is the ethical obligation of the health educator to provide all pertinent information to the student just as it is the obligation of the health care provider to do the same for a patient under the auspice of informed consent.(36)

The prevalence of abstinence-only education in the U.S. is concerning, as it has no proven efficacy in significantly preventing premarital sex or unintended pregnancy. By deliberately withholding information about contraceptive options, it specifically endangers the family planning choices of women. The time period between the 1995 and 2002 NSFG surveys conveniently measures the short-term impact of Title V by capturing reproductive health information before and after the law. It is very likely that the new curriculum of abstinence-only education for 12-18 year olds contributes to the rising trend in contraception non-use among young women observed during the study interval. Abstinence-only education threatens informed decision-making by women about contraceptive choice and the consequences of unprotected sex.

4.1 Limitations

There are several limitations within the type of information contained in the NSFG datasets. Due to the cross-sectional nature of the survey design, no causal relationships can be established from the statistical associations determined in this study. Additionally, temporality cannot be best established with the cross-sectional study design. While intricately designed to mirror U.S. Census data, the complex survey design has the potential for sampling errors as well as misrepresentation of the results due to calculation of weights. The NSFG reports deliberate oversampling of ethnic minorities, namely Hispanics and non-Hispanic blacks, in order to construct nationally representative study weights as well as to compensate for known underreporting of ethnic minorities in census data. Therefore, this could lead to overestimates of the associations between non-Hispanic black women and contraception non-use as well as non-Hispanic other women and increased contraception non-use between 1995 and 2002.

There is a potential for information bias related to the NSFG interview format. Respondents may not understand the questions and give incorrect responses. Similarly, the trained interviewers may erroneously record results from the respondents. Neither of these scenarios are likely to result in much information bias due to the carefully-tested standardization of questionnaires and computer real-time auditing of the responses by the CASI system. Not to mention, the questionnaires have been validated and improved over four prior survey periods in order to conduct Cycle 5 in 1995. Therefore, while information bias is possible, it is likely to be minimal.

Exposure misclassification is possible, as all predictors used in the model are self-reported by the respondents. While it is unlikely that there was any misreporting of demographic variables, such as age and ethnicity, there is more potential for inconsistencies in socioeconomic, and family history reporting. Many women may have a rationale for deliberately misreporting income information; either believing that underreporting will result in some assistance or that overreporting will make them appear more reputable. Additionally, teenage women are not likely to know the exact income status of their parents if they are still dependents. Nevertheless, errors in income reporting are likely non-differential exposure misclassification and would bias the results towards the null hypothesis.

Similarly, it is possible that women may not accurately report information about their mother's educational and/or reproductive history. If a woman does not have a close relationship with their mother or do not live with their mother, it is unlikely that the respondent would know specifics about her history. Much of this is accounted for in the coding of categorical variables related to these predictors, for instance, there are options that allow the respondent to give an estimate but it is noted that the respondent is not sure about the accuracy of the information she provided. For purposes of simplifying the analysis, women who answered but were unsure were grouped with the women who answered definitively. Hence, there is potential for informational bias within the family history predictors in this analysis, but the bias would not result in false associations as it is non-differential misclassification and would bias our results towards no association.

There is a potential for outcome misclassification within the NSFG data based on the possibility of recall bias. Women were asked to recall what contraception methods

they used in a month-by-month format spanning 12-18 months. The CONSTAT1 variable only uses information from within 3-months of the survey, however, there still is a potential for recall bias in women with regards to reporting their contraceptive use patterns, sexual activity, and intent for pregnancy. For instance, if a woman is not using contraception at the time of the survey because she is trying to get pregnant, she may report that she was also trying to get pregnant during the 3-months leading up to the survey while she was not using contraception. However, she may have stopped using contraception several months prior due to alternative reasons and was not intending on becoming pregnant, but just recently has decided to continue with non-use in the hopes of conceiving. Any month-to-month changes in rationale for use or non-use may not be able to be accurately captured within the survey due to recall bias. Likewise, a woman who is single and has sporadic sexual activity may not be able to accurately recall the exact months of sexual activity within the past year or so. Both of these examples of recall bias are not likely to bias the associations observed in the study, however, they are possible sources of inaccuracy as a result of the survey design.

The recoding of variables by the NSFG for ease of analysis introduces the possibility for misclassification. Most importantly, the outcome variable, CONSTAT1, is a product of recoding several responses to questions regarding sexual activity, contraceptive method history, and intendedness for becoming pregnant. Since many of the categorical variables have a distinct and limited number of fields, any misclassification during the NSFG recoding algorithm is likely to be non-differential. However, since many of the predictors are also recoded variables that amalgamate responses from several questions in order to produce a meaningful categorical variables,

errors in recoding are possible. Some recoding of the NSFG data, beyond the steps that they had already taken, were done to simplify the multivariate logistic regression model and subsequent results. Many of the NSFG recoded variables, such as employment and insurance status, still contained several fields with very few responses. By having categories with small sample sizes, there is a potential for differential misclassification that would bias the results away from the null hypothesis. In many of these cases, similar response categories were grouped together to create either binary predictors or more-simplified categorical predictors (See Appendix 1 and 2) in order to create more general, larger categorical predictors. Any misclassification within a specific categorical response with a small sample size is likely to wash out due to merging of like categorizations, thus becoming non-differential.

The factors that affect contraception non-use are complex and multi-faceted. Although it was attempted to include all relevant predictors in the analysis, it is possible that unmeasured confounding introduced by other factors not included in the survey could have influenced the results of this study. Behavioral and attitude questions were not asked regarding a woman's contraception non-use because the NSFG survey is not designed to answer questions specific to contraception. The general nature of the survey material is a limitation to this study, as questions regarding the rationale for contraception non-use are not provided.(21, 37, 38)

The most significant limitation of this study is that the weights for the 1995 and 2002 surveys are derived differently. The weights used for each NSFG survey are specific to the sampling design for that cycle. In each cycle, the post-stratification weights are derived using U.S. Census data from different years and the non-response

adjustments are the result of response patterns within survey periods. Therefore, the weights are not necessarily comparable when used for analysis of multiple cycles of this complex survey. This may bias the standard error and significance estimates of logistic regression analyses.

4.2 Conclusions

Despite the fact that a greater proportion of women in the United States are using highly-effective, female-controlled methods of contraception, there continues to be a concerning, paradoxical increase in contraception non-use. In 1999, the CDC declared family planning to be one of the 10 most significant US public health achievements of the 20th century, yet half of all pregnancies in the United States continue to be unintended.(1) The results of this study demonstrates that while known risk factors for contraception non-use do persist, there are other behavioral, socio-cultural, and structural barriers to contraceptive use.

Results shown demonstrate that women without insurance are at a significantly greater risk of not using contraception in 2002 compared to 1995. Rising costs of health insurance for employers has lead to the steady decline in employer-based coverage provided to employees. Additionally, Medicaid requirements have been continually reduced to include only the poorest of women for family planning services. These factors have largely contributed to the widening gap of uninsured Americans that encompass more and more of the “working poor.” Nevertheless, having private insurance is not a guarantee of equitable access to family planning services either. The problem of under-insurance for contraception among private plans has prevented women from accessing

needed family planning services despite having health insurance. Although more reproductive age women have moved to suburban areas, this does not imply greater socioeconomic status or better access to services. It presents a problem for the supply of family planning services meeting the demands of the dynamic population of reproductive age women.

Further behavioral research to examine attitudes towards family planning in ethnic minorities (Southeast Asian, Middle Eastern, Native American/Alaskan Native, and Pacific Islander) needs to be undertaken to better understand trends in non-use for the broad non-Hispanic other category. It is societally advantageous, not just from the perspective of reducing the number of unwanted children, but also financially, to address non-use aggressively. In an estimate weighting the costs in 1995 of full-term pregnancy care and delivery, induced abortion, and ectopic pregnancy; the pregnancy cost for each woman of typical fertility who does not intend to be pregnant, yet is sexually active and uses no contraception, is about \$3,200 per year.(39) In a cost-analysis study by Sonnenberg et al in 2004, the use of any reversible method of contraception, even over the short-term of one year of use results in financial savings and health gains for women compared to not using a method of contraception while being sexually active.(40) Health policy needs to focus on preventing contraception non-use in the small yet vulnerable cohort of women at risk for unintended pregnancy. With ethnic dynamics shifting in the U.S., programs focusing on contraception non-use and unintended pregnancy need to be broadened to address individuals beyond the known cohort of young, poor, non-Hispanic black women in order to reverse current trends.

Funding and legislative barriers to contraceptive access exist for women seeking care at public clinics as well as women with private insurance. The funding deficit for public clinics is represented in the greater non-use among uninsured women in 2002. Abstinence-only education also threatens informed decision-making by women about contraceptive choice and the consequences of unprotected sex. Greater understanding of the behavioral, structural, and socio-cultural factors influencing contraception non-use is ongoing and needs to be considered along with known socio-demographic risk factors in formulating future public health and policy interventions.

APPENDIX 1

Recoding matrix for 1995 NSFG data

1995				
COL	VAR	KEY	RECODE	KEY
1-8	CASEID	Numeric	A_CASEID	Numeric
10880-1	AGER	numerical value of age	A_AGER B_AGER	numerical value of age 1 = 15-19 years 2 = 20-24 years 3 = 25-29 years 4 = 30-34 years 5 = 35-39 years 6 = 40-44 years
10887-8	EDUCAT	00 = No Formal Education 01 = 1st Grade 02 = 2nd Grade 03 = 3rd Grade 04 = 4th Grade 05 = 5th Grade 06 = 6th Grade 07 = 7th Grade 08 = 8th Grade 09 = 9th Grade 10 = 10th Grade 11 = 11th Grade 12 = 12th Grade 13 = 1 Year of College 14 = 2 Years of College 15 = 3 Years of College 16 = 4 Years of College 17 = 5 Years of College 18 = 6 Years of College 19 = 7 Or More Years of College	A_EDUCAT B_EDUCAT	9 = 9 th grade or less 10-12 = 10 th -12 th grade 13-18 = 1-6 years of college/grad school 19 = 7 or more years of college/grad school 1 = No H.S. diploma or GED 2 = H.S. diploma or GED 3 = Some college, no degree 4 = College degree or more
12310	HISPRA-CE	1 = Hispanic 2 = Non-Hispanic white 3 = Non-Hispanic black 4 = Non-Hispanic Other	A_HISPRA-CE	1 = Hispanic 2 = Non-Hispanic white 3 = Non-Hispanic black 4 = Non-Hispanic Other
11150	INTCTF-AM	1 = Two biological parents from birth 2 = Two adoptive parents from birth 3 = Anything other than two biological or two adoptive parents from birth	A_INTCTF-AM	If INTCTFAM = 1 or 2, then A_INTCTFAM = 1 = Two biological or adoptive parents from birth If INTCTFAM = 3, then A_INTCTFAM = 2 = Anything other than 2 biological or adoptive parents from birth
11155-6	EDUCM-OM	00 = No formal education 01 = 1st grade 02 = 2nd grade 03 = 3rd grade 04 = 4th grade 05 = 5th grade 06 = 6th grade	A_EDUCM-OM	If EDUCMOM ≤ 11, then A_EDUCMOM = 1 = less than high school If EDUCMOM = 12, then A_EDUCMOM = 2 = high school graduate

1995				
COL	VAR	KEY	RECODE	KEY
		07 = 7th grade 08 = 8th grade 09 = 9th grade 10 = 10th grade 11 = 11th grade 12 = 12th grade 13 = 1 Year of college/university 14 = 2 Years of college/university 15 = 3 Years of college/university 16 = 4 Years of college/university 17 = 5 Years of college/university 18 = 6 Years of college/university 19 = 7 Or more years of college/university 95 = No mother/mother-figure identified		If EDUCMOM 13-15, then A_EDUCMOM = 3 = some college but no 4-year degree If EDUCMOM \geq 16, then A_EDUCMOM = 4 = 4-year college degree or more 95 = No mother/mother-figure identified
11157-8	AGEMO-MB1	Age in years or... 91 = Not sure, but probably under age 18 92 = Not sure, but probably age 18-19 93 = Not sure, but probably age 20-24 94 = Not sure, but probably age 25 or older 95 = No mother/mother-figure identified	A_AGEMO-MB1	If AGEMOMB1 \leq 17 or 91, then A_AGEMOMB1= 1 = Under 18 years If AGEMOMB1 18-19 or 92, then A_AGEMOMB1= 2 = 18-19 years If AGEMOMB1 20-24 or 93, then A_AGEMOMB1= 3 = 20-24 years If AGEMOMB1 \geq 25 or 94, then A_AGEMOMB1= 4 = \geq 25 years 95 = no mother figure/unknown
11757	RMARIT-AL	1 = Currently Married 2 = Not Married but Living with a Partner 3 = Widowed 4 = Divorced 5 = Separated 6 = Never Married	B_RMARIT-AL	If RMARITAL = 1 or 2, then A_RMARITAL = 1 = Cohabiting If RMARITAL \geq 3, then A_RMARITAL = 2 = Not cohabiting
11934-5	CONSTA-T1	40 = Other non-user-no sex since 1st menses 41 = Other non-user-R did not have sex in 3 months before interview 42 = Other non-user-R had sex in 3 months before interview	B_CONSTA-T1	If CONSTAT1 \leq 38, then B_CONSTAT1= 1 = contraception user If CONSTAT1= 40 or 41, then B_CONSTAT1= 2 = contraception non-user without sex in last 3 month If CONSTAT1= 42, then B_CONSTAT1= 3 = contraception non-user with sex in last 3 months
10362 10363 10364	MEDICAID MILINS	Did you have coverage from the following insurance in the past 12 months?	A_INSURNAC	If MEDICAID = 1 or MILINS = 1 or OTHINS=1, then A_INSURANC = 1 = Insured

1995				
COL	VAR	KEY	RECODE	KEY
	OTHINS	Blank = inapplicable 1 = yes 2 = no 3 = not ascertained 4 = refused 5 = don't know		If MEDICAID = 2,7,8,9 and MILINS = 2,7,8,9 and OTHINS = 2,7,8,9, then A_INSURANC = 2 = Uninsured
12302	METRO	1 = SMSA, Central City 2 = SMSA, Other 3 = Not SMSA	A_METRO	1 = Metropolitan service area – central city 2 = Metropolitan service area - suburban 3 = Non-metropolitan service area - rural
12306	RELIGION	0 = None 1 = Protestant 2 = Roman Catholic 3 = Jewish 4 = Other 5 = No specific denomination	A_RELIGION	If RELIGION = 0, then A_RELIGION = 1 = No religion If RELIGION = 1, then A_RELIGION = 3 = Protestant If RELIGION = 2, then A_RELIGION = 2 = Catholic If RELIGION = 3,4,5, then A_RELIGION = 4 = Other religion
12313-4	LABORFOR	01 = Working Full-Time 02 = Working Part-Time 03 = Working, but on Vacation, Strike, or had temporary illness 04 = Working, but on Maternity Leave 05 = Unemployed, laid off, looking for work 06 = In School 07 = Keeping House 08 = Working 2 or more Part-Time Jobs 09 = On permanent disability 10 = Doing Nothing; taking it easy; hanging out 11 = Other	A_LABORFOR B_LABORFOR	If LABORFOR = 8, then A_LABORFOR = 2 = Working Part-time If LABORFOR = 9,10, then A_LABORFOR = 5 = Unemployed, laid off, looking for work If LABORFOR = 11, then A_LABORFOR = 8 = Other 01 = Working Full-Time 02 = Working Part-Time 03 = Working, but on Vacation, Strike, or had temporary illness 04 = Working, but on Maternity Leave 05 = Unemployed, laid off, looking for work 06 = In School 07 = Keeping House If A_LABORFOR ≤ 4 , then B_LABORFOR = 1 = Employed If A_LABORFOR ≥ 5 , then B_LABORFOR =

1995				
COL	VAR	KEY	RECODE	KEY
				2 = Unemployed
12315-7	POVERT Y	Percent of FPL up to 998	A_POVERT Y B_POVERT Y	Percent of FPL up to 998 1 = 0-149 percent 2 = 150-299 percent 3 = \geq 300 percent
12350-9	POST_W T	Numeric (weight)	A_FINALW GT	Numeric (weight)
12347-8	COLSTR	Numeric (strata)	A_SEST	Numeric (strata)
12349	PANEL	Numeric (cluster)	A_SECU_R	Numeric (cluster)

APPENDIX 2

Recoding matrix for 2002 NSFG data

2002				
COL	VAR	KEY	RECODE	KEY
1-12	CASEID	Numeric (\$)	A_CASEID	Numeric
3749-0	AGER	numerical value of age	A_AGER B_AGER	numerical value of age 1 = 15-19 years 2 = 20-24 years 3 = 25-29 years 4 = 30-34 years 5 = 35-39 years 6 = 40-44 years
3752	EDUCAT	9 = 9 th grade or less 10-12 = 10 th -12 th grade 13-18 = 1-6 years of college/grad school 19 = 7 or more years of college/grad school	A_EDUCAT B_EDUCAT	9 = 9 th grade or less 10-12 = 10 th -12 th grade 13-18 = 1-6 years of college/grad school 19 = 7 or more years of college/grad school 1 = No H.S. diploma or GED 2 = H.S. diploma or GED 3 = Some college, no degree 4 = College degree or more
3758	HISPRA-CE	1 = Hispanic 2 = Non-Hispanic white 3 = Non-Hispanic black 4 = Non-Hispanic Other	A_HISPRA-CE	1 = Hispanic 2 = Non-Hispanic white 3 = Non-Hispanic black 4 = Non-Hispanic Other
3761	INTCTF-AM	1 = Two biological or adoptive parents from birth 2 = Anything other than 2 biological or adoptive parents from birth	A_INTCTF-AM	1 = Two biological or adoptive parents from birth 2 = Anything other than 2 biological or adoptive parents from birth
3763-4	EDUCM-OM	1= less than high school 2 = high school graduate 3 = some college but no 4-year degree 4 = 4-year college degree or more 95 = No mother/mother-figure identified	A_EDUCM-OM	1= less than high school 2 = high school graduate 3 = some college but no 4-year degree 4 = 4-year college degree or more 95 = No mother/mother-figure identified
3765-6	AGEMO-MB1	1 = Under 18 years 2 = 18-19 years 3 = 20-24 years 4 = 25-29 years 5 = 30 years or older 96 = Mother-figure had no children	A_AGEMO-MB1	If AGEMOMB1 = 4 or 5, then A_AGEMOMB1= 4 = ≥25 years If AGEMOMB1 = 96, then A_AGEMOMB1= 95 = no mother figure/unknown 1 = Under 18 years 2 = 18-19 years 3 = 20-24 years
4349	RMARIT-AL	1 = Currently Married 2 = Not Married but Living with a Partner	B_RMARIT-AL	If RMARITAL = 1 or 2, then A_RMARITAL = 1 = Cohabiting

2002				
COL	VAR	KEY	RECODE	KEY
		3 = Widowed 4 = Divorced 5 = Separated (For reasons of marital discord) 6 = Never Married		If $RMARITAL \geq 3$, then $A_RMARITAL =$ 2 = Not cohabitating
4526-7	CONSTA-T1	40 = Other non-user-no sex since 1st menses 41 = Other non-user- has had intercourse but did not have sex in 3 months before interview 42 = Other non-user-R had sex in 3 months before interview	B_CONSTA-T1	If $CONSTAT1 \leq 38$, then $B_CONSTAT1 =$ 1 = contraception user If $CONSTAT1 = 40$ or 41 , then $B_CONSTAT1 =$ 2 = contraception non-user without sex in last 3 month If $CONSTAT1 = 42$, then $B_CONSTAT1 =$ 3 = contraception non-user with sex in last 3 months
4820	INSURANC	1 = not covered by any health insurance 2 = covered by a private health insurance plan only 3 = covered by Medicaid 4 = covered by public/government/state/military health care	A_INSURANC	If $INSURANC = 2,3,4$, then $A_INSURANC =$ 1 = Insured If $INSURANC = 1$, then $A_INSURANC =$ 2 = Uninsured
4821	METRO	1 = MSA, Central city 2 = MSA, Other 3 = Not MSA (metropolitan statistical area)	A_METRO	1 = Metropolitan service area – central city 2 = Metropolitan service area - suburban 3 = Non-metropolitan service area - rural
4822	RELIGION	1 = No religion 2 = Catholic 3 = Protestant 4 = Other religion	A_RELIGION	1 = No religion 2 = Catholic 3 = Protestant 4 = Other religion
4823	LABORFOR-OR	1 = Working Full-Time 2 = Working Part-Time 3 = Working, but on Vacation, Strike, or had temporary illness 4 = Working, but on Maternity or Family Leave 5 = Unemployed, laid off, looking for work 6 = In School 7 = Keeping House 8 = Caring for family 9 = Other	A_LABORFOR-OR B_LABORFOR-OR	If $LABORFOR = 8,9$, then $A_LABORFOR =$ 8 = Other 1 = Working Full-Time 2 = Working Part-Time 3 = Working, but on Vacation, Strike, or had temporary illness 4 = Working, but on Maternity Leave 5 = Unemployed, laid off, looking for work 6 = In School 7 = Keeping House If $A_LABORFOR \leq 4$, then $B_LABORFOR =$ 1 = Employed

2002				
COL	VAR	KEY	RECODE	KEY
				If A_LABORFOR \geq 5 , then B_LABORFOR= 2 = Unemployed
4828	POVERT Y	Percent of FPL up to 500	A_POVERT Y B_POVERT Y	Percent of FPL up to 998 1 = 0-149 percent 2 = 150-299 percent 3 = \geq 300 percent
4873-90	FINALW GT	Numeric (weight)	A_FINALW GT	Numeric (weight)
4891	SECU_R	Numeric (cluster)	A_SECU_R	Numeric (cluster)
4892-3	SEST	Numeric (strata)	A_SEST	Numeric (strata)

APPENDIX 3

NSFG Cycle 6 (2002) Recode Specifications for Outcome Measure

CONSTAT1: "Current Contraceptive Status" (1995 NSFG VAR413 CONSTAT1)

This recode is designed to show current contraceptive status as used in Cycles 3, 4, and 5 of the NSFG. It refers to the method used in the month of interview, or Acurrent month. @ In cases where multiple methods were used in the current (interview) month, CONSTAT1 codes the HIGHEST priority method reported, according to a predetermined ranking of use-effectiveness, as used in earlier NSFG cycles. Up to four methods for the current month are ranked; the second, third, and fourth highest priority methods are coded in CONSTAT2-CONSTAT4, respectively. (See specifications that follow CONSTAT1.)

Code categories for CONSTAT1 are arranged below to distinguish contraceptors from noncontraceptors for analytic purposes.

Using Contraception:

- 01= Female sterilization
- 02= Male sterilization
- 03= Norplant implant
- 04= Lunelle (injectable)
- 05= Depo-Provera (injectable)
- 06= Pill
- 07= Contraceptive Patch
- 08= Morning-after pill
- 09= IUD
- 10= Diaphragm (with or w/out jelly or cream)
- 11= (Male) Condom
- 12= Female condom/vaginal pouch
- 13= Foam
- 14= Cervical Cap
- 15= Today(TM) Sponge
- 16= Suppository or insert
- 17= Jelly or cream (not with diaphragm)
- 18= Periodic abstinence: NFP, cervical mucus test or temperature rhythm
- 19= Periodic abstinence: calendar rhythm
- 20= Withdrawal
- 21= Other method

Not using contraception:

- 30= Pregnant
- 31= Seeking Pregnancy
- 32= Postpartum
- 33= Sterile--nonsurgical--female
- 34= Sterile--nonsurgical--male
- 35= Sterile--surgical--female (noncontraceptive)
- 36= Sterile--surgical--male (noncontraceptive)
- 37= [code not used]
- 38= Sterile--unknown reasons -male
- 39= [code not used]
- 40= Other non-user--never had intercourse since first period
- 41= Other non-user--has had intercourse, but not in the 3 months prior to interview
- 42= Other non-user--had intercourse in the 3 months prior to interview
- 88= inapplicable (no 2nd, 3rd, or 4th method reported -- applies to CONSTAT2-

CONSTAT4 only)

If R is pregnant at interview (RCURPREG=YES), then CONSTAT1=30.

Else, if R or her husband or cohabiting partner is surgically sterile at interview (STRLOPER NE 5)

Or she reported any sterilizing operation in the method history calendar:

CONSTAT1=01 (sterile--surgical--female):

If FECUND=1 and (STRLOPER in(1,2) or (STRLOPER=4 and rsurgstr=yes))

or

If (ED-6 METHHISTnnn-METHHISTnnnn+4 for month of interview = 6)

Else CONSTAT1=35 (sterile --surgical—female (noncontraceptive))

If FECUND=2 and (STRLOPER in(1,2) or (STRLOPER=4 and rsurgstr=yes))

Else CONSTAT1=02 (sterile--surgical--male):

If FECUND=1 and (STRLOPER=3 or (STRLOPER=4 and psurgstr=yes))

or

If (ED-6 METHHISTnnn-METHHISTnnnn+4 for month of interview = 5)

Else CONSTAT1=36 (sterile--surgical—male (noncontraceptive)):

If FECUND=2 and (STRLOPER=3 or (STRLOPER=4 and psurgstr=yes))

Else, if R is nonsurgically sterile (DE-1, POSIBLPG=2), then

CONSTAT1=33 (sterile--nonsurgical--female)

Else, if R's husband or partner is nonsurgically sterile (DE-3, POSIBLMN=2), then

CONSTAT1=34 (sterile--nonsurgical--male)

Else,

If R is using any method in the month of interview, (ED-6 METHHISTnnn for month of interview)* NE 1 and NE system-missing (inapplicable)):

**[only need to check the first one because looking for A no method@]*

If R is using only 1 method, CONSTAT1=this method,

CONSTAT1=(ED-6 METHHISTnnn for month of interview)

If R is using 2 or more methods:

CONSTAT1= method in (ED-6 METHHISTnnn - METHHISTnnn+4 for month of interview) with the highest priority (see table below).

The table below lists methods in order of priority (from highest to lowest) and gives the code equivalents for ED-6 METHHIST and CONSTAT1.

	Code in <u>METHHIST:</u>	CONSTAT1 <u>CODE</u>
Female sterilization	06	01
Respondent sterile (not on card)	22	33
Male sterilization	05	02
Partner sterile(not on card)	23	38

Norplant (TM) implant	09	03
IUD	19	09
Lunelle injectable	24	04
Depo-Provera injectable	08	05
Pill	03	06
Contraceptive patch	25	07
Morning-after pill	20	08
(Male) condom	04	11
Diaphragm	12	10
Female condom/vaginal pouch	13	12
Today (TM) Sponge	18	15
Cervical cap	16	14
NFP, Temperature rhythm	11	18
Calendar rhythm	10	19
Withdrawal	07	20
Foam	14	13
Suppository or insert	17	16
Jelly or cream alone	15	17
Other method	21	21

Else, if R is seeking pregnancy (EH-1 WYNOTUSE =1 or EH-2 HPPREGQ =1):

CONSTAT1=31.

Else, if R is postpartum, as defined by:

- Interview Date (Month/Day/Year of interview) is before the 15th day of the month, and the difference between the interview month (**cmintvw**) and the month of the last pregnancy termination (computed variable **cmlstprg**) is less than or equal to 2 months, or
 - Interview date (Month/Day/Year of interview) is on or after the 15th day of the month and the difference between the interview month (**cmintvw**) and the month of the last pregnancy termination (computed variable **cmlstprg**) is less than or equal to 1 month.
- Then

CONSTAT1=32

*Note: Computed variable **cmlstprg** is defined in Flow Check B-42 in the CAPI Reference Questionnaire.*

Else, if R never had intercourse since her first menstrual period (SEXEVER=2), then

CONSTAT1=40

Else, if (ED-6 METHHISTnnn for month of interview)=1 (no method used), or ANYMTHD=2 (never used a method) then:

CONSTAT1=41 If R had no intercourse in the 3 months prior to interview (SEXP3MO=2)

CONSTAT1=42 If R had intercourse in the 3 months prior to interview (SEXP3MO=1)

Reference: NSFG Cycle 6 Recode Specifications – User’s Guide Appendix 2, pp. 55-58.

APPENDIX 4

NSFG Cycle 5 (1995) Recode Specifications for Outcome Measure

VAR413: "Current Contraceptive Status 1995" (CONSTAT1) (1988 NSFG=VAR160
CONSTAT)

This recode is designed to show current contraceptive status as used in Cycles 3 & 4 of the NSFG. It refers to the method used in the month of interview, or "current month." In cases where multiple methods were used in the current (interview) month, CONSTAT1 codes the HIGHEST priority method reported, according to a predetermined ranking of use-effectiveness, as used in earlier NSFG cycles. Up to four methods for the current month are ranked; the second, third, and fourth highest priority methods are coded in CONSTAT2-CONSTAT4, respectively. (See specifications that follow CONSTAT1.)

Code categories for CONSTAT1 are arranged below to distinguish contraceptors from noncontraceptors for analytic purposes.

Using Contraception:

- 01= Female sterilization
- 02= Male sterilization
- 03= Norplant implant
- 04= Depo-Provera injectable
- 05= Pill
- 06= Morning-after pill
- 07= IUD
- 08= Diaphragm (with or w/out jelly or cream)
- 09= (Male) Condom
- 10= Female condom/vaginal pouch
- 11= Foam
- 12= Cervical Cap
- 13= Today(TM) Sponge
- 14= Suppository or insert
- 15= Jelly or cream (not with diaphragm)
- 16= Periodic abstinence: NFP, cervical mucus test or temperature rhythm
- 17= Periodic abstinence: calendar rhythm
- 18= Withdrawal
- 19= Other method

Not using contraception:

- 30= Pregnant
- 31= Seeking Pregnancy
- 32= Postpartum
- 33= Sterile--nonsurgical--female
- 34= Sterile--nonsurgical--male
- 35= Sterile--surgical--female (noncontraceptive)
- 36= Sterile--surgical--male (noncontraceptive)
- 37= [code not used]
- 38= Sterile--unknown reasons -male
- 39= [code not used]
- 40= Other non-user--never had (voluntary) intercourse since first period
- 41= Other non-user--has had intercourse, but not in the 3 months prior to interview
- 42= Other non-user--had intercourse in the 3 months prior to interview

88= inapplicable (no 2nd, 3rd, or 4th method reported -- applies to CONSTAT2-CONSTAT4 only)

If R is pregnant at interview (VAR202 RCURPREG=YES), then CONSTAT1=30.

Note: OTHR, IOPERSTC, and IOPERMNC are intermediate variables that were defined to facilitate construction of VAR404 STRLOPER. See recode specifications for STRLOPER for further details.

Else, if R or her husband or cohabiting partner is surgically sterile at interview (VAR404 STRLOPER NE 5), then:

If STRLOPER IN(1,2) and VAR 411 FECUND=1, then CONSTAT1=01 (contraceptive female surgical).

If STRLOPER IN(1,2) and FECUND=2, then CONSTAT1=35 (noncontraceptive female surgical).

If STRLOPER=4 and OTHR=YES and FECUND=1, then CONSTAT1=01 (contraceptive female surgical).

If STRLOPER=4 and OTHR=YES and FECUND=2, then CONSTAT1=35 (noncontraceptive female surgical).

If STRLOPER=3 and FECUND=1, then CONSTAT1=02 (contraceptive male surgical).

If STRLOPER=3 and FECUND=2, then CONSTAT1=36 (noncontraceptive male surgical).

If STRLOPER=4 and OTHR NE YES and FECUND=1, then CONSTAT1=02 (contraceptive male surgical).

If STRLOPER=4 and OTHR NE YES and FECUND=2, then CONSTAT1=36 (noncontraceptive male surgical).

Else, if R is nonsurgically sterile (DE-1, POSIBLPG=2), then CONSTAT1=33.

Else, if R's husband or partner is nonsurgically sterile (DE-3, POSIBLMN=2), then CONSTAT1=34.

Else If R is using a method in the month of interview, (computed variable METH(CUR) NE 1):

If R is using ONE method, CONSTAT1 codes this one method;

If R is using 2 or more methods:

CONSTAT1 codes the method with the highest priority (see table below).

Note: METH(CUR) [not on file] is defined in the CAPI Reference Questionnaire, Flow Check E-25a. Depending on the month when R was interviewed, METH(CUR) could fall anywhere from EF-1 METHH192-METH231.

The table below lists methods in order of priority (from highest to lowest) and gives the code equivalents for METH(CUR) and CONSTAT1.

	Code in <u>METH(CUR):</u>	CONSTAT1 <u>CODE</u>
Female sterilization	20	01
Male sterilization	05	02
Partner sterile(not on card)	21	38
Norplant (TM) implant	14	03
Depo-Provera injectable	15	04
Pill	03	05

Morning-after pill	16	06
IUD	13	07
Diaphragm	06	08
(Male) condom	04	09
Female condom/vaginal pouch	12	10
Foam	07	11
Cervical cap	09	12
Today (TM) Sponge	11	13
Suppository or insert	10	14
Jelly or cream alone	08	15
NFP, Temperature rhythm	18	16
Calendar rhythm	17	17
Withdrawal	19	18
Other method	22	19

Else, if EH-1 WYNOTUSE =1 or EH-2 HPPREGQ =1, then R is seeking pregnancy, so
CONSTAT1=31.

Else R is postpartum (CONSTAT = 32) if:

- Interview Date (A_DOI) is before the 15th day of the month, and the difference between the interview month (A_DOI) and the month of the last pregnancy termination (ENDDAT{VAR 203 PREGNUM}) is less than or equal to 2 months; (IF SUBSTR(A_DOI,4,2)< 15 AND (A_DOI-ENDDAT{PREGNUM})<=2)< OR
- Interview date (A_DOI) is on or after the 15th day of the month and the difference between the interview month and the month of the last pregnancy termination is less than or equal to 1 month.; (IF SUBSTR(A_DOI,4,2)>=15 AND (A_DOI-ENDDAT{PREGNUM})<=1)

Else, if R never had (voluntary) intercourse since her first menstrual period (VAR333 SEXEVER=2), then CONSTAT1=40 ("other non-user").

Else, CONSTAT1= "other non-user" (codes 41 and 42):

If computed variable METH(CUR)=1 (no method used), then do:

If R had no intercourse in the 3 months prior to interview (EI-1
FREQSEX=BLANK), then CONSTAT1=41.

If R had intercourse in the 3 months prior to interview (FREQSEX=1
through 5), then CONSTAT1=42.

Reference: NSFG Cycle 5 Recode Specifications – Section D & E, pp. 16-19.

APPENDIX 5

SUDAAN coding for reduced multivariate logistic regression models using the SUBPOPN function

```
*****Multivariate model for TABLE 3 - test year effect *****;

LIBNAME INDAT "H:\THESIS\SAS code";
data sudaandata;
    set INDAT.NSFG95_02;

***** DEFINE AN INCLUSION CRITERIA VARIABLE *****;
    ** EXCLUDED = PREGNANT, DESIRING PREGNANCY, OR NO SEX IN PAST 3
MONTHS
    ** INCLUDED = ALL OTHERS;
    IF A_CONSTAT1=30 OR (32 <= A_CONSTAT1 <= 38) THEN INC_CRIT = 1;
    IF A_CONSTAT1 = 31 THEN INC_CRIT = 2;
    if a_constat1 = 40, 41 then INC_CRIT = 3;
    ELSE INC_CRIT = 4;

***** creation of binary variables for full
model*****;
if a_constat1 = 42 then non-user = 1; else non-user = 0;
if year = 2002 then yr2002 = 1; else yr2002 = 0;
if b_ager = 1 then age1519 = 1; else age1519 = 0;
if b_ager = 2 then age2024 = 1; else age2024=0;
if b_ager = 3 then age2529 = 1; else age2529=0;
if b_ager = 4 then age3034 = 1; else age3034=0;
if b_ager = 5 then age3539 = 1; else age3539=0;
if a_hisrace = 1 then racehisp = 1; else racehisp=0;
if a_hisrace = 3 then raceblack = 1; else raceblack=0;
if a_hisrace = 4 then raceother = 1; else raceother=0;
if b_educat = 1 then nohs = 1; else nohs=0;
if b_educat = 2 then hsged = 1; else hsged=0;
if b_educat = 3 then somecoll = 1; else somecoll = 0;
if b_poverty = 1 then pov0149 = 1; else pov0149 = 0;
if b_poverty = 2 then pov150249 = 1; else pov150249 =0;
if a_insuranc = 2 then uninsured = 1; else uninsured =0;
if b_laborfor = 2 then unemployed = 1; else unemployed=0;
if b_rmarital = 1 then cohab = 1; else cohab=0;
if a_intctfam = 2 then famnot2 = 1; else famnot2 =0;
if a_educmom = 1 then momnohs = 1; else momnohs = 0;
if a_educmom = 2 then momhsged = 1; else momhsged=0;
if a_educmom = 3 then momsomcoll = 1; else momsomcoll = 0;
if a_agemomb1 = 1 then momage17 = 1; else momage17 = 0;
if a_agemomb1 = 2 then momage1819 = 1; else momage1819 =0;
if a_agemomb1 = 3 then momage2024 = 1; else momage2024 = 0;
if a_metro = 2 then suburban = 1; else suburban =0;
if a_metro = 3 then rural = 1; else rural = 0;
if a_religion = 1 then noreligion = 1; else noreligion =0;
if a_religion = 2 then catholic = 1; else catholic =0;
if a_religion = 4 then otherrelig = 1; else otherrelig = 0;

RUN;
```

```
*****FIT THE REDUCED MODEL IN SUDAAN AS FOLLOWS *****;  
PROC SORT DATA = sudaandata;  
BY A_SEST_FIXED A_SECU_R_FIXED;  
RUN;  
PROC RLOGIST DATA = sudaandata filetype = sas;  
    WEIGHT A_FINALWGT;  
    NEST A_SEST_FIXED A_SECU_R_FIXED;  
    MODEL non-user = yr2002 age1519 age2024 age2529 age3034 age3539  
racehisp raceblack raceother nohs hsged somecoll unemployed uninsured  
cohab momage17 momage1819 momage2024 suburban rural noreligion catholic  
otherrelig;  
    SUBPOPN INC_CRIT = 4;  
    CLASS inc_crit;  
RUN;
```

REFERENCES

1. Sonfield A. Preventing unintended pregnancy: The need and the means. The Guttmacher Institute. December 2003:7-10.
2. Henshaw SK. Unintended pregnancy in the united states. *Fam Plann Perspect.* 1998 46; Jan-Feb;30(1):24-9.
3. Finer LB, Henshaw SK. Disparities in rates of unintended pregnancy in the united states, 1994 and 2001. *Perspect Sex Reprod Health.* 2006 Jun;38(2):90-6.
4. Sable MR, Libbus MK, Chiu JE. Factors affecting contraceptive use in women seeking pregnancy tests: Missouri, 1997. *Fam Plann Perspect.* 2000 May-Jun;32(3):124-31.
5. Mosher WD, Deang LP, Bramlett MD. Community environment and women's health outcomes: Contextual data. *Vital Health Stat 23.* 2003 Apr;(23)(23):1-72.
6. The Guttmacher Institute. Facts in brief: Contraception use. 2006.
7. Forrest JD. Epidemiology of unintended pregnancy and contraceptive use. *Am J Obstet Gynecol.* 1994 May;170(5 Pt 2):1485-9.
8. Abma JC, Chandra A, Mosher WD, Peterson LS, Piccinino LJ. Fertility, family planning, and women's health: New data from the 1995 national survey of family growth. *Vital & Health Statistics - Series 23, Data From the National Survey of Family Growth.*(19):1-114, 1997 May.
9. Mosher WD, Martinez GM, Chandra A, Abma JC, Willson SJ. Use of contraception and use of family planning services in the united states: 1982-2002. *Adv Data.* 2004 Dec 10;(350)(350):1-36.
10. Santelli JS, Lindberg LD, Abma J, McNeely CS, Resnick M. Adolescent sexual behavior: Estimates and trends from four nationally representative surveys. *Fam Plann Perspect.* 2000 Jul-Aug;32(4):156,65, 194.
11. Sable MR, Libbus MK. Beliefs concerning contraceptive acquisition and use among low-income women. *J Health Care Poor Underserved.* 1998 Aug;9(3):262-75.
12. Foster DG, Bley J, Mikanda J, Induni M, Arons A, Baumrind N, et al. Contraceptive use and risk of unintended pregnancy in california. *Contraception.* 2004 Jul;70(1):31-9.
13. Jones RK, Darroch JE, Singh S. Religious differentials in the sexual and reproductive behaviors of young women in the united states. *J Adolesc Health.* 2005 Apr;36(4):279-88.

14. Chandra A, Martinez GM, Mosher WD, Abma JC, Jones J. Fertility, family planning, and reproductive health of U.S. women: Data from the 2002 national survey of family growth. National Center for Health Statistics. 2005;23(25).
15. National Center for Health Statistics. Public use data file documentation - 2002 NSFG user's guide. . 2007:January 3, 2008.
16. Lepkowski JM, Mosher WD, Davis KE, et al. National survey of family growth, cycle 6: Sample design, weighting, imputation, and variance estimation. National Center for Health Statistics. 2006;2(142).
17. Williams LB, Pratt WF. Wanted and unwanted childbearing in the united states, 1973-88 : Data from the national survey of family growth. Hyattsville, Md.: U.S. Dept. of Health and Human Services, Public Health Service, Centers for Disease Control, National Center for Health Statistics; 1990.
18. Williams LB. Determinants of unintended childbearing among ever-married women in the united states: 1973-1988. Fam Plann Perspect. 1991 221; Sep-Oct;23(5):212-5.
19. Gaydos L, Hogue CJ, Kramer MR. Riskier than we thought: Revised estimates of noncontracepting women risking unintended pregnancy. Public Health Rep. 2006 Mar-Apr;121(2):155-9.
20. UCLA Academic Technology Services. SUDAAN FAQ: How can I use the subpopn statement in SUDAAN? :June 29, 2007.
21. Jones RK, Darroch JE, Henshaw SK. Contraceptive use among U.S. women having abortions in 2000-2001. Perspect Sex Reprod Health. 2002 Nov-Dec;34(6):294-303.
22. Hogan DP, Sun R, Cornwell GT. Sexual and fertility behaviors of american females aged 15-19 years: 1985, 1990, and 1995. Am J Public Health. 2000 Sep;90(9):1421-5.
23. Mosher WD, Bachrach CA. Understanding U.S. fertility: Continuity and change in the national survey of family growth, 1988-1995. Fam Plann Perspect 1996/01//Jan/Feb96;28:4-12.
24. Frost JJ, Singh S, Finer LB. U.S. women's one-year contraceptive use patterns, 2004. Perspectives on Sexual & Reproductive Health. 2007 Mar;39(1):48-55.
25. Frost JJ, Singh S, Finer LB. Factors associated with contraceptive use and nonuse, united states, 2004. Perspect Sex Reprod Health. 2007 Jun;39(2):90-9.
26. Baylor College of Medicine. Public funding and private insurance coverage for contraception. The Contraception Report October 2002;13(3):April 2008.
27. Kaiser Family Foundation. Survey finds steady decline in businesses offering health benefits to workers since 2000. The Health Research and Educational Trust September 14, 2005:May 13, 2008.

28. Dailard C. Challenges facing family planning clinics and title X. The Guttmacher Report on Public Policy. April 2001;4(2):8-11.
29. National Family Planning and Reproductive Health Association. Title X - america's federal family planning program. March 2008:April 29, 2008.
30. Sonfield A, Alrich C, Gold RB. Public funding for family planning sterilization and abortion services - FY 1980-2006. The Guttmacher Institute January 2008(Annual Report No. 38):April 2008.
31. Cohen S. Federal law urged as culmination of contraceptive insurance coverage campaign. The Guttmacher Report on Public Policy. October 2001;4(5):10-12.
32. Rosenzweig MR, Wolpin KI. Evaluating the effects of optimally distributed public programs: Child health and family planning interventions. Am Econ Rev June 1986;76(3):470-482.
33. H.R. 2134 - parent's right to know act of 2007 [homepage on the Internet]. . May 3, 2007.
34. Ott MA, Santelli JS. Abstinence and abstinence-only education. Curr Opin Obstet Gynecol. 2007 Oct;19(5):446-52.
35. Lindberg LD, Santelli JS, Singh S. Changes in formal sex education: 1995-2002. Perspect Sex Reprod Health. 2006 Dec;38(4):182-9.
36. Santelli J, Ott MA, Lyon M, Rogers J, Summers D, Schleifer R. Abstinence and abstinence-only education: A review of U.S. policies and programs.[see comment]. J Adolesc Health. 2006 Jan;38(1):72-81.
37. Iuliano AD, Speizer IS, Santelli J, Kendall C. Reasons for contraceptive nonuse at first sex and unintended pregnancy. Am J Health Behav. 2006 Jan-Feb;30(1):92-102.
38. Nettleman MD, Chung H, Brewer J, Ayoola A, Reed PL. Reasons for unprotected intercourse: Analysis of the PRAMS survey. Contraception. 2007 May;75(5):361-6.
39. Lee PR, Stewart FH. Editorial: Failing to prevent unintended pregnancy is costly. Am J Public Health. 1995 April;85(4):479-80.
40. Sonnenberg FA, Burkman RT, Hagerty CG, Speroff L, Speroff T. Costs and net health effects of contraceptive methods. Contraception. 2004 Jun;69(6):447-59.
41. Research Triangle International. SUDAAN user's manual release 8.0. Research Triangle Park, NC: Research Triangle International; 2001.