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Tiffany Hoyte Date

Examining the Association between Socio-Demographic Variables and the Use of Contraception Before and After Abortion in the United States Using the 2006-2010 National Survey of Family Growth

By

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Master of Public Health

Global Environmental Health

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An abstract of
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Abstract

Examining the Association between Socio-Demographic Variables and the Use of Contraception Before and After Abortion in the United States Using the 2006-2010 National Survey of Family Growth

by

Tiffany Hoyte

Background: Unintended pregnancies present a significant cost to the health care system in the U.S. that can be markedly reduced by improving access to and utilization of effective contraception. Nearly half of all pregnancies in the U.S. are unintended and of these 43% end in abortion with 47% of all abortions being repeat procedures. Use of effective contraception post-abortion is essential in preventing a repeat unintended pregnancy and repeat abortion.

Objective: To determine the contraceptive prevalence of women pre and post abortion and determine which socio-demographic factors are associated with using more effective contraceptive methods post-abortion compared to pre-abortion using data from the 2006 to 2010 National Survey of Family Growth (NSFG).

Methods: Data was obtained from the 2006–2010 NSFG, which conducted a nationally representative, area probability sample of 12,279 women age 15-44 years in the U.S. Multivariate linear regression was performed to determine which selected socio-demographic factors are the best predictors of the use or non-use of contraception pre-abortion and post-abortion and of the effectiveness of contraception used before and after abortion. Chi-square tests were also performed to determine if there was an association between each socio-demographic variable and the effectiveness of contraception used.

Results: Most (56.1%) women at risk of unintended pregnancy in the U.S. use a moderately effective form of contraception and among those who have had an abortion 39.2% use a highly effective form of contraception. It is concerning that 31.4% of women chose to use no method of contraception post-abortion. Informal marital status and total number of births were associated with the effectiveness of contraception chosen pre-abortion and race and total number of births were associated with effectiveness of contraception chosen post-abortion.

Discussion: The association of higher abortion rates and higher rates of unintended pregnancies occurring among women of certain socio-demographic characteristics suggests that the key to reducing abortion rates lies in improving family planning among these vulnerable groups. Emphasis should be placed on reducing barriers to contraceptive access especially for these groups of women and family planning providers should help clients to identify methods that they are most likely to use successfully.

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Chapter 1: Introduction

Background

In the United States (U.S.) approximately one-half of all pregnancies annually are unplanned (W.D. Mosher, Jones, & Abma, 2012) which is a significantly higher rate compared to other developed countries (Peipert, Madden, Allsworth, & Secura, 2012a). Studies using the 2006–2008 cycle of the National Survey of Family Growth (NSFG) reported that 49% of all pregnancies were unintended of which 29% were mistimed, 19% were unwanted, and 43% ended in abortion (Peipert et al., 2012a).

Unintended pregnancies present a significant cost to the health care system in the U.S. (Trussell, 2007). They account for half of the total public expenditure on births which amounts to approximately US$11billion in costs annually (Sonfield, Kost, Gold, & Finer, 2011).

In addition to being costly, unintended pregnancies are associated with a high rate of abortion and other adverse social, economic, and health consequences for both mother and child (Logan, Holcombe, Manlove, & Ryan, 2007). Of the unintended pregnancies that end in abortion 47% are repeat procedures (Rachel K. Jones, Jacqueline E. Darroch, & Stanley K. Henshaw, 2002). Several studies have shown that unintended pregnancies have an elevated risk of delayed prenatal care, smoking during pregnancy, and if there is a live birth there is poorer health during childhood and poorer outcomes for the mother (W.D. Mosher et al., 2012).

Reducing the national level of unintended pregnancies has been identified as one of the most important reproductive health goals of the U.S. Department of Health and Human Services (Lawrence B. Finer & Zolna, 2011), and has been an objective of the Healthy People national health initiative since its beginning in 1980 (W.D. Mosher et al., 2012). However, unintended pregnancies continue to be a stubborn problem in the U.S. with no progress in the reduction of unintended pregnancies since 2001 (Lawrence B. Finer & Zolna, 2011). Improving access to and utilization of effective contraception can markedly reduce the incidence of unintended pregnancies (Trussell et al.). The recent CHOICE study demonstrated a reduction in the rates of abortions and repeat abortions and in teenage birth rates by providing contraception and promoting the most effective contraceptive methods (Peipert et al., 2012a).

Persons who have induced abortions represent a population at high risk for additional unintended pregnancies and abortions: among women having abortions in the U.S., about one half have already had a prior abortion (Megan L. Kavanaugh, Carlin, & Jones, 2011). Linking post-abortion care with family planning is a crucial factor in reducing the number of future unintended pregnancies (Mittal, 2006). This is because most women are unaware that fertility returns within three weeks after induced abortion and therefore they underestimate their risk of getting pregnant (Curtis, Huber, & Moss-Knight, 2010). The possibility of medical complications following repeat abortions and given the consensus that contraception is safer, simpler, cheaper and more ethical than abortion as a means of fertility control (A. Margolis, R. Rindfuss, P. Coghlan, & R. Rochat, 1974), emphasizes the need to begin using contraception immediately after an abortion.

Problem Statement

In the United States among all pregnancies, regardless of their outcome, one-half (50%) are unintended pregnancies (W.D.. Mosher, Jones, Abma, & Statistics, 2012). Research shows that women of particular socio-demographic groups, (minority groups, poor women, cohabiting, and women in their 20s), have higher abortion rates as well as higher rates of contraceptive failure (Kost, Singh, Vaughan, Trussell, & Bankole, 2008) and higher rates of unintended pregnancies (L.B. Finer & Henshaw, 2006).

In the U.S. abortion is one of the most common surgical procedures performed on women (Owings & Kozak, 1998) with 30% of women expected to have an induced abortion by age 45 (R. K. Jones & Kavanaugh, 2011). Most abortions are the end result of unintended pregnancies which have a higher incidence rate in certain socio-demographic groups, and this suggests that these groups are not receiving adequate contraceptive and family planning services (R. K. Jones & Kavanaugh, 2011).

There is still a lot of stigma about abortion even among patients and clinicians. It may help to streamline abortion within the medical community if there was a greater consciousness of the frequency and associated characteristics of abortion (R. K. Jones & Kavanaugh, 2011). The association of higher abortion rates and higher rates of unintended pregnancies occurring among women that have the same socio-demographic characteristics suggests that the key to reducing abortion rates lies in improving family planning among these vulnerable groups.

Purpose

The specific aims of this study are:

- To determine the contraceptive prevalence of women pre-abortion and post-abortion using data from the 2006 to 2010 National Survey of Family Growth (NSFG).
- To determine which socio-demographic factors are associated with using more effective contraceptive methods post-abortion compared to pre-abortion, among women in the 2006 to 2010 NSFG.

Research Questions

(1) What are the socio-demographic factors associated with the use of contraception among women who participated in the 2006 – 2010 NSFG in the U.S.

(2) What select socio-demographic factors – ethnicity and race, poverty level, level of education, place of residence, informal marital status, religion, parity, number of life partners, and wantedness of pregnancy by respondent and respondent's partner - are associated with women switching to a more effective method of contraception after an abortion procedure.

Significance

Unintended pregnancies present a significant cost to the health care system in the United States (U.S.) (Trussell, 2007) that can be markedly reduced by improving access to and utilization of effective contraception (Trussell et al.). In 2002 the direct medical costs from unintended pregnancies were US$5 billion while savings due to contraceptive use were US$19 billion (Trussell, 2007). For every $1 spent to prevent an unintended pregnancy by providing family planning services, the government saves about $4 from the cost of providing medical care for the mother during the unintended pregnancy and for the infant up to 1 year after birth (Frost, Finer, & Tapales, 2008).

The ‘‘standard measure of unintended pregnancy’’ refers to the ability, or inability, of women to have the number of births they want, when they want them (W.D.. Mosher et al., 2012). Studies have shown that unintended births are more likely among unmarried women, black women, and women with less education or income compared to married women, white women, college-educated, and high-income women (W.D.. Mosher et al., 2012). Nearly half (49% in 2006 and 48% in 2001) of all pregnancies in the U.S. are unintended and of these 43% end in abortion (Lawrence B. Finer & Zolna, 2011) with 47% of all abortions being repeat procedures (Rachel K. Jones et al., 2002).

Study of data from sequential NSFG surveys showed that the average abortion rate for unmarried women (28.9%) was almost five times higher than for married women (6.1%). Figure 1 below illustrates these findings and the disparity in pregnancy rates and abortion

rates between married and unmarried women from 1990 to 2009 (Curtin, Abma, Ventura, & Henshaw, 2013).

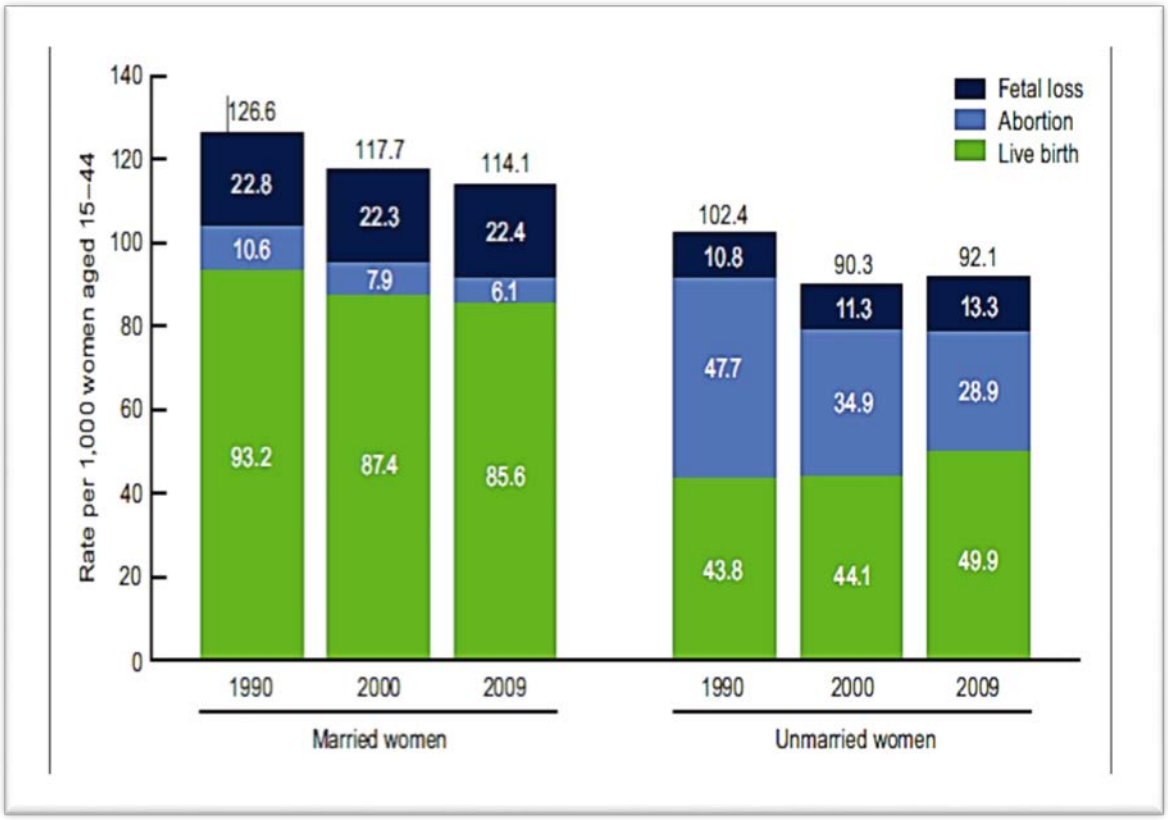

Figure 1: Bar Graph illustrating Pregnancy Rates in the United States by Outcome and Marital Status: 1990, 2000, and 2009

Source: (Curtin et al., 2013) (Available from: http://www.cdc.gov/nchs/data/databriefs/db136.htm)

Figure 2 below shows that when pregnancy outcomes in the U.S. for 2009, were stratified by race and age, non-Hispanic black women had the highest rate of induced abortions, and women aged 20-24 years had the highest abortion rates among all races.

Pregnancy outcome and race and Hispanic origin	Total	Age in years								
		Under 15	15–19			20–24	25–29	30–34	35–39	40 and over
			Total	15–17	18–19					
All pregnancies[1]	6,369	12	705	231	474	1,608	1,696	1,353	793	203
Live births	4,131	5	410	124	286	1,006	1,167	955	474	114
Induced abortions	1,152	5	176	60	116	376	284	173	101	37
Fetal losses[2]	1,087	2	120	47	73	226	245	224	217	52
Non-Hispanic white										
All pregnancies	3,207	3	267	75	192	738	900	746	440	113
Live births	2,232	1	161	40	121	495	663	570	276	66
Induced abortions	383	1	60	20	41	130	86	52	38	16
Fetal losses[2]	591	0	46	15	31	113	150	125	126	30
Non-Hispanic black										
All pregnancies	1,253	5	199	69	130	390	308	209	112	30
Live births	615	2	99	32	67	196	155	100	51	13
Induced abortions	445	3	70	25	45	146	115	68	34	9
Fetal losses[2]	192	1	29	12	17	48	39	40	28	7
Hispanic[3]										
All pregnancies	1,474	4	214	79	136	408	374	277	156	39
Live births	1,000	2	136	48	88	275	271	196	97	23
Induced abortions	252	1	37	13	25	82	64	39	21	7
Fetal losses[2]	222	1	41	18	23	52	39	42	38	9

Figure 2: Table showing Number (in thousands) of pregnancies by outcome of pregnancy, by age, race, and Hispanic origin of women: US, 2009

Source:(Curtin et al., 2013) (Available from: http://www.cdc.gov/nchs/data/databriefs/db136.htm)

Ivankovich (2009), examined the contraceptive prevalence of women 1 and 3 months post-abortion and the influence of socio-demographic variables on the use of contraception after an abortion based on 2002 NSFG database. The results of this study showed that over 38% of women reported using no contraceptive method within the first month after abortion but

contraceptive use increased slightly at 3 months post-abortion. Poverty level, education level, informal marital status, and parity were significantly associated with contraceptive use 1 month after abortion, and poverty level was associated with contraceptive use 3 months after abortion. The study also found that women living below the poverty level had a high rate of no contraceptive use post-abortion as well as Hispanic women and non-Hispanic black women (Ivankovich, 2009). I hope to compare these findings with results from the 2006-2010 NSFG database.

Increasing the use of effective contraceptives is important to help women and couples plan their pregnancies, and efforts should focus on groups at greatest risk of unintended pregnancies (Lawrence B. Finer & Zolna, 2011). Use of effective contraception post-abortion is essential in preventing a repeat unintended pregnancy, since fertility returns almost immediately after an abortion (T. Moslin & R. Rochat, 2011). There is a dearth of published research on post-abortion contraceptive use, especially at a national level in the U.S. This proposed research can contribute towards identifying socio-demographic characteristics of women at high risk of contraceptive nonuse post-abortion and therefore risk of repeat unintended pregnancy and abortion. This information can help policymakers focus family planning services to target those most at risk.

Chapter 2: Literature Review

Unintended Pregnancy and Induced Abortion in the U.S.

Based on conventional definitions which reflect a woman's intentions before becoming pregnant, an *unintended* pregnancy is one that was either unwanted or mistimed (Santelli et al., 2003). If a woman became pregnant at a time when she did not want to have any children, or any more children, and she had no desire of having children at anytime in the future that pregnancy is considered *unwanted.* If a woman became pregnant and she did not want to have any children at the time the pregnancy occurred, but did want to become pregnant at some point in the future, the pregnancy is considered *mistimed* (W.D.. Mosher et al., 2012). An *intended* pregnancy is one that happened at the "right time" or later than desired (because of difficulties in conceiving) (Santelli et al., 2003).

Reducing the proportion of pregnancies that are unintended has been one of the objectives of the *Healthy People* national health initiative since its beginning in 1980 (Lawrence B. Finer & Zolna, 2011). Addressing the rate of unintended pregnancy is a national public health issue because it is a major problem that affects not only individuals but society as a whole. Unintended pregnancies account for half of the total public expenditure on births which amounts to approximately US$11billion in costs annually (Sonfield et al., 2011). In the U.S. about half of unintended pregnancies end in abortion and unintended pregnancies that are continued to term result in unintended births and childbearing which is associated with an increased risk of detrimental prenatal behaviors and adverse health and social outcomes for both mother and child (L.B. Finer & Henshaw, 2006). Poor maternal and child health outcomes, such as inadequate or delayed prenatal care, smoking and drinking during pregnancy, domestic violence during pregnancy, premature birth, lack of

breastfeeding, as well as negative physical and mental health effects on children and mothers, are some of the adverse outcomes for births resulting from unintended pregnancies (Barber, Axinn, & Thornton, 1999).

The rate of unintended pregnancies in the U.S. is significantly higher than in many other developed countries (Singh, Sedgh, & Hussain, 2010), with approximately half (51%) of the 6.6 million pregnancies annually being unintended (L.B. Finer & Zolna, 2014). In 2001, there were 50 unintended pregnancies for every 1000 women aged 15-44 years, (48%), and there was a slight increase to 52 per 1000 women aged 15-44 years, (49%), in 2006 (Lawrence B. Finer & Zolna, 2011). This means there were 3.1 million unintended pregnancies in 2001 and 3.2 million unintended pregnancies in 2006, in the U.S. (Lawrence B. Finer & Zolna, 2011). When the timing of these pregnancies was disaggregated, 29% were mistimed and 19% were unwanted (Lawrence B. Finer & Zolna, 2011).

More than half of all American women will experience an unintended pregnancy by age 45, and about 40% of these pregnancies will end in an abortion (R. K. Jones & Kavanaugh, 2011). The southern states and states with large urban populations have the highest rates of unintended pregnancies (Kost, 2013).

One in 20 American women has an unintended pregnancy each year, and the burden falls more heavily on certain socio-demographic groups (L.B. Finer & Henshaw, 2006). Unintended births are more likely among non-Hispanic black women, unmarried women, and women of lower education and income levels compared with white, married, college-

educated, and high-income women (W.D.. Mosher et al., 2012). Unintended pregnancy rates are also highest among women aged 18–24, cohabiting women and minority women (L.B. Finer & Zolna, 2014).

The higher rates of unintended pregnancy among these groups of women is the reason these groups also have above-average rates of unintended birth and abortion (L.B. Finer & Henshaw, 2006).

Research on unintended pregnancies in the U.S. from 2001 to 2008 by Finer and Zolna (2014), highlights these disparities. They found that black women had the highest unintended pregnancy rate (at 92 per 1,000 women aged 15-44) of any racial or ethnic groups (L.B. Finer & Zolna, 2014). In 2008, among women of all educational levels, those without a high school degree had the highest unintended pregnancy rate at 101 per 1,000 women aged 15–44 (L.B. Finer & Zolna, 2014). The more years of education women have the lower their rate of unintended pregnancy. They also found that the unintended birth rate among poor women was almost six times as high as that of higher-income women (at or above 200% of poverty) (L.B. Finer & Zolna, 2014). Poor and low-income women are less likely to end an unintended pregnancy by abortion resulting in poor women having a higher unintended birth rate compared with higher-income women (L.B. Finer & Zolna, 2014).

As a result of their high rate of unintended pregnancy in 2008, poor women also experience high rates of both abortions (52 per 1,000) and unplanned births (70 per 1,000) (L.B. Finer & Zolna, 2014). According to Finer & Zolna (2014), the proportion of pregnancies that are unintended generally decreases as age increases and in 2008 the highest unintended pregnancy rate was among women aged 20–24 (104 per 1,000 women) (L.B. Finer & Zolna, 2014).

More than 50 % of all abortions worldwide are considered unsafe (Singh et al., 2010). Unsafe abortions result in approximately one in seven maternal deaths and are the cause of about five million women being hospitalized annually in the developing world (Singh et al., 2010). Abortion is one of the primary consequences of unintended pregnancy (Singh et al., 2010) and women in the U.S. continue to resolve about 40% of their unintended pregnancies with induced abortion (L.B. Finer & Zolna, 2014).

Review of the literature suggests that abortions are usually the result of unintended pregnancies (R. K. Jones & Kooistra, 2011). Half of pregnancies among American women are unintended, and four in 10 of these are terminated by abortion (L.B. Finer & Zolna, 2014). There has since been a paradigm shift to recognize abortion is only part of the larger picture of unintended pregnancy (R. K. Jones & Kooistra, 2011). Women who have an unintended pregnancy are also at risk for unintended birth (this refers to births that result from unintended pregnancy and not to premature labor), and unintended childbearing. As discussed earlier unintended birth and childbearing are associated with a number of adverse maternal behaviors and deleterious outcomes for both maternal and child health.

The proportion of unintended pregnancies ending in abortion decreased from 47% in 2001 to 43% in 2006 (Lawrence B. Finer & Zolna, 2011). This coincided with an increase in the rate of unintended births from 23 to 25 per 1000 women 15–44 years (Lawrence B. Finer & Zolna, 2011). This decline in the percentage of unintended pregnancies terminated by induced abortions may have resulted in part from increased stigmatization of abortion, reduced availability of abortion services (L.B. Finer & Henshaw, 2006), and also increased acceptance of carrying unintended pregnancies to term (L.B. Finer & Zolna, 2014).

The incidence of abortion initially showed a continuous decline between 1990 and 2005, but this trend is presently leveling off (R. K. Jones & Kooistra, 2011). In 2011, 1.06 million abortions were performed, compared to 1.21 million in 2008. From 1973 through 2011, nearly 53 million legal abortions occurred in the U.S. (R. K. Jones & Jerman, 2014). Access to abortion services has had a critical impact in the decline in abortion rates, particularly since the number of abortion providers has been falling for the last three decades (R. K. Jones & Kooistra, 2011). The number of abortion providers in the U.S. peaked in 1982, at 2,900 facilities, and by 2005 had decreased to 1,800 facilities. In 2005, there was no abortion services provider in 87% of counties, and 35% of women aged 15–44 lived in those counties. These women may lack the time or resources to travel to a provider (R. K. Jones & Kooistra, 2011).

In addition to fewer service providers, other factors contributing to the decreased accessibility of abortion services included, but are not limited to, gestational limits, cost, antiabortion harassment (R. K. Jones & Kooistra, 2011), and a growing number of state

level restrictions (L.B. Finer & Zolna, 2014). In 2000, 13 states were considered hostile to abortion rights because they had at least four types of major abortion restrictions (R.B. Gold & Nash, 2012). In 2013, there were 27 states which fell into this category (Nash, Gold, Rowan, Rathbun, & Vierboom, 2013). The proportion of women living in restrictive states went from 31% to 56% from 2000 to 2013. During this time period the proportion of women of reproductive age living in supportive states decreased from 40% to 31% as the number of states supportive of abortion rights decreased from 17 to 13 (Nash et al., 2013).

Abortion in the U.S. is legal following the 1973, *Roe v. Wade* decision, in which the Supreme Court ruled that women, in consultation with their physician, have a constitutional right to have an abortion in the early stages of pregnancy, free from government interference (R. K. Jones & Jerman, 2014). In 1992, the *Planned Parenthood v. Casey* ruling reinforced a woman's right to abortion but weakened the legal protections previously afforded by giving states the right to enact restrictions that do not create an "undue burden" for women seeking abortion (R. K. Jones & Jerman, 2014). As of January 1, 2014, at least half of the states have imposed very strict regulations on abortion clinics, and prohibited the use of state Medicaid funds to pay for medically necessary abortions (R. K. Jones & Jerman, 2014).

Role of Contraception in Preventing Unintended Pregnancy and Induced Abortions

Women who use contraceptives will have fewer lifetime pregnancies than women who do not use any contraceptives (Trussell, 2004). However, the effectiveness of contraceptive methods vary, and certain methods have a high failure rate compared to other methods.

Contraceptive failure is cited as a major cause of unintended pregnancy in the U.S. but very few unintended pregnancies occur as a result of a 'true' failure of contraception, but rather they result from failure of couples to use their chosen method consistently and correctly (Glasier, 2009). Nearly half of the 3.1 million unintended pregnancies in 2001 occurred to women who were using contraception (L.B. Finer & Henshaw, 2006). There are many other causes of unintended pregnancies, including underlying factors such as poverty. More proximate factors include discontinuation of contraceptive use due to difficulty with the method, nonuse of contraceptives because of partner's opposition or fear of side effects, incomplete understanding of the risk of pregnancy, problems with accessing contraceptive services and/or supplies, and unexpected changes in life circumstances (for example divorce or separation, unemployment, or illness)(Singh et al., 2010).

The NSFG has long been the primary source of data for estimating contraceptive failure rates[1] in the U.S. (Ranjit, Bankole, Darroch, & Singh, 2001). However, every round of the NSFG has been affected by underreporting of conceptions resolved by abortion, with the

[1] NSFG data estimates the probabilities of failure during typical use of each method (use-failure rates), rather than the probabilities of failure during perfect use (clinical failure rates).

extent of underreporting varying by method and by socioeconomic subgroup. Consequently, contraceptive failure rates calculated from NSFG data alone are biased downward (Ranjit et al., 2001).

The average failure rate for all reversible methods, adjusted for abortion underreporting, declines from 13% in the first year of method use to 8% in the second year of use. First-year failure rates are highest among women using spermicides, withdrawal and periodic abstinence (on average, 23-28% in the first year), and lowest for women relying on long-acting methods and oral contraceptives (4-8%) (Ranjit et al., 2001). Sometimes a substantial degree of failure occurs with all reversible methods, even more than their clinical failure rates, because reversible contraceptives are rarely used perfectly (Trussell, 2004). Failure rates tend to decline with longer duration of use for all reversible methods, probably because use improves with practice, and in part because less-effective users are filtered out (Trussell & Kost, 1987).

Half (53%) of women with unintended pregnancies report using a family planning method in the month they conceived. Many of these women may have become pregnant because their method was not highly effective or was difficult for them to use consistently and correctly (Trussell & Vaughan, 1999).

In the U.S., among women at risk for unintended pregnancy[2], two-thirds use contraception consistently and correctly throughout the course of any given year; these women account for only 5% of all unintended pregnancies (R.B. Gold, Sonfield, Richards, & Frost, 2009).

According to Gold et al. (2009), the 19% of women at risk who use contraception inconsistently or incorrectly account for 43% of all unintended pregnancies and the 16% of at risk women who do not use any method of contraception for a month or more during the year account for 52% of all unintended pregnancies (R.B. Gold et al., 2009).

About 13% of women become pregnant during their first year of using a reversible contraceptive, and 8% accidentally become pregnant in their second year of use (Ranjit et al., 2001). Contraceptive failure rates are lowest among users of the pill and long-acting methods, and most likely among users of spermicides, withdrawal or periodic abstinence (Ranjit et al., 2001), while there is an intermediate risk of failure for the male condom (17%) (L.B. Finer & Henshaw, 2006). Reliance on fertility-awareness-based methods results in the highest probability of failure, with 25% of users becoming pregnant within 12 months of initiating use (L.B. Finer & Henshaw, 2006). By far the most effective reversible methods being used by a number of U.S. women are injectables (7% probability of failure) and the pill (9% probability of failure) (L.B. Finer & Henshaw, 2006).

[2] Women at risk for an unintended pregnancy are those who are fertile and sexually active and do not want to become pregnant, but could become pregnant if they and their partners fail to use contraception.

In general, higher-income users have lower failure rates than those who are poorer, and white users are almost twice as likely to be in the highest-income group (67%) than Hispanic and black users (38% and 39%, respectively) (Ranjit et al., 2001). The socioeconomic factors associated with differential risks of failure are not the same for all methods. Women living in poverty who rely on a partner-dependent method (such as the condom or withdrawal) are almost twice as likely to experience a failure as other women, but those in poverty who use the pill experience the same risk as higher income women who also use the pill. And while black women who use the condom are more likely to experience a failure than women from other ethnic groups, race/ethnicity has no effect on the risk of failure for the pill or withdrawal (L.B. Finer & Henshaw, 2006). These patterns are generally reflected in elevated levels of unintended pregnancy in these subgroups (Ranjit et al., 2001). More focused analyses with larger data sets are needed to better understand these subgroup differences (Ranjit et al., 2001).

Male and female sterilization and long-acting, reversible contraceptives (LARC) – such as intrauterine devices and hormonal implants - are the most effective methods of contraception (LeMier, 2014). LARC methods are basically not dependent on compliance for their effectiveness, and have lower discontinuation rates (Peterson & Curtis, 2005). Typical failure rates for intrauterine systems are only 0.1% and for contraceptive implants are only 0.05% (Hatcher, Trussell, & Nelson, 2007). Very few women using LARC have an unintended pregnancy and less than 1% of women having an abortion were using LARC (R.K. Jones, J.E. Darroch, & S.K. Henshaw, 2002). Lack of information about effective

contraception, limited access, and cost remain barriers to the use of LARC methods (Secura et al., 2014).

Access to affordable, effective contraceptive methods is critical to preventing unintended pregnancies. Promoting the use of the most effective contraceptive methods, such as LARC, would have a major impact on reducing unintended pregnancy, and induced abortions, in the U.S. Uptake of LARC by women can be achieved by increasing access to these methods, through eliminating cost and raising awareness of the benefits of long-acting methods among clinicians and patients (Rose, Lawton, & Brown, 2010).

Publicly funded family planning services help women become pregnant when they want and avoid pregnancies they do not want. According to Gold et al. (2009), in 2006, these services helped women avoid 1.94 million unintended pregnancies, which would likely have resulted in about 860,000 unintended births and 810,000 abortions (R.B. Gold et al., 2009). Affordable family planning services need to be widely available to women and their partners to reduce the number of unintended pregnancies and, in turn, abortions (R. K. Jones & Kooistra, 2011).

Pre and Post Abortion Contraceptive use in the U.S.

Pre-Abortion

Approximately 57% of all American women who are at risk of unintended pregnancy use reversible methods of contraception, and the majority of women currently using reversible methods use the pill or the condom (76%) (L.B. Finer & Henshaw, 2006). These methods are often used ineffectively since they are dependent on daily and proper application.

Fifty-one percent of women who have abortions reported using a contraceptive method in the month they got pregnant, most commonly condoms (27%) or a hormonal method (17%) (R. K. Jones, Frohwirth, & Moore, 2013). In 1994, 51% of unintended conceptions occurred during a month when contraceptives were used, compared to 48% in 2001 (L.B. Finer & Henshaw, 2006). National estimates of failure rate show that about one in every eight uses of a reversible method results in a contraceptive failure during the first year. This estimate reflects typical use (rather than perfect use), which includes incorrect and inconsistent use (L.B. Finer & Henshaw, 2006).

NSFG data for 1995 and 2002 indicate that poor women at risk of pregnancy were less likely to use contraceptives than women above the poverty line. Poor women are less likely to have health insurance which may in part account for this disparity (L.B. Finer & Henshaw, 2006).

Washington Behavioral Risk Factor Surveillance System (BRFSS) data for 2009 show that 85% of women ages 18–44 who were at risk for unintended pregnancy reported using birth control at last intercourse, and 78% reported they always were protected when having sex during the last 12 months (LeMier, 2014).

There has been a significant increase in the use of LARC among women who practice contraception from 2.4% in 2002 to 3.7% in 2007 and 8.5% in 2009. The increase occurred among women in almost every age, race, education and income group. Among women at risk of unintended pregnancy, increases in LARC methods (primarily IUDs) are contributing to an increase in contraceptive effectiveness in the U.S. (L.B. Finer, Jerman, & Kavanaugh, 2012).

Post-Abortion

There are only two published studies examining post-abortion contraceptive use in the U.S. Margolis and colleagues (1974) and Moslin and Rochat (2007) conducted prospective studies to gauge the use of contraception after an abortion.

Margolis and colleagues conducted a study in 1972 to determine the contraceptive method used at the time of abortion and the method used 6 months later, among 303 women who obtained a legal first trimester abortion at a clinic in Washington, D.C. The authors found that 93% of women chose a method of contraception at the time of the abortion and 91% were using a contraceptive method 6 months later. At the time of their abortion 86% of women chose the pill or IUD, and 78% were using the pill, IUD, or sterilization 6 months after the abortion (A. Margolis, R. Rindfuss, P. Coghlan, & R. W. Rochat, 1974). Because

this study looked at patients at one clinic in one month, and interviewed less than half of all clients with an overrepresentation of older and ever-married women, the study population cannot be considered representative of all women obtaining abortions in the U.S. (A. Margolis et al., 1974).

In 2007, Moslin and Rochat conducted the first quantitative study of post-abortion contraceptive use after the legalization of abortion in the U.S. Abortion clients of an Atlanta, GA clinic were surveyed over the telephone 3 – 5 weeks post-abortion, to determine their contraceptive use and sexual behaviors. They found 54.2% of women had engaged in sexual intercourse in the immediate post-abortion period and of these, 30.8% were not using any contraceptive method or were not using contraception effectively (T. A. Moslin & R. W. Rochat, 2011). This study was based on a relatively small sample of women in one city in the U.S. so its findings are not generalizable.

In 2009, Ivankovich examined the contraceptive prevalence of women 1 and 3 months post-abortion and the influence of socio-demographic variables on the use of contraception post-abortion based on data from the 2002 NSFG. This study found almost 40% of women reported using no contraceptive method 1 month after abortion, 29.8% were using a moderately effective method, and 31.9% were using a highly effective method of contraception post-abortion. At 3 months post-abortion there was a slight increase in contraceptive use with 32.5% of women using a moderately effective method and 35% using a highly effective method. Poverty level, education level, informal marital status, and parity were significantly associated with contraceptive use 1 month post-abortion, and

poverty level was associated with contraceptive use 3 months post-abortion (Ivankovich, 2009).

Inadequate knowledge of the contraceptive behaviors and unmet needs of women seeking abortions is an impediment to improving access to family planning services and implementing appropriate public health interventions to address the issue of induced abortions. In the U.S. there is a lot of stigma surrounding the issue of induced abortions, which may in part contribute to the dearth of research about post-abortion contraceptive use. An improved awareness of post-abortion contraceptive use and the socio-demographic factors which affect it can contribute to preventing unintended pregnancies and thereby repeat abortions.

Chapter 3: Methodology

The National Survey of Family Growth

The 2006–2010 National Survey of Family Growth (NSFG) is conducted by the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS). The NSFG was designed to collect data from a national sample of women aged 15–44 years. NSFG has conducted national interviews in 1973, 1976, 1982, 1988, 1995, 2002, and 2006-2010. In 2002 and 2006–2010, national samples of men were also interviewed. Data is collected on factors affecting birth and pregnancy rates, contraception; infertility; marriage, divorce, and cohabitation; pregnancy outcomes; and closely related health topics (Groves, Mosher, Lepkowski, & Kirgis, 2009). The University of Michigan's Institute for Social Research was contracted by NCHS to conduct the interviews and data preparation for the 2006–2010 survey (Groves et al., 2009).

Sampling Design

The 2006–2010 NSFG is based on a nationally representative, multistage, area probability sample of women and men 15-44 years living in households in the U.S., drawn from 110 primary sampling areas across the country. The sample is designed to produce national (not state) estimates relating to (Groves et al., 2009):

- *Trends and differentials in birth and pregnancy rates*
- *Determinants of birth and pregnancy rates, including sexual activity, contraceptive use, infertility, and sterilization*
- *Marriage, divorce, and cohabitation*

- *Adoption and factors related to the demand for adopted children*
- *Use of medical services for birth control, infertility, and selected health screening*
- *Behavior related to the risk of HIV and other sexually transmitted diseases*
- *Men's roles in raising and supporting their children*
- *Men's and women's attitudes about marriage, children, and families*

The 2006–2010 survey was the first time the NSFG was fielded using a ‘‘continuous design’’, which means that NSFG interviewing will be done every year as long as circumstances permit (Lepkowski, Mosher, Davis, Groves, & Van Hoewyk, 2010).

The sampling plan for the 2006–2010 NSFG was revised from previous surveys in order to provide larger and more cost-effective samples. For the 2006–2010 NSFG a national sample was drawn from 110 primary sampling units (PSUs) – which are metropolitan areas, counties, or groups of adjacent counties. These were divided into four national subsamples of 33 PSUs, and each subsamples was worked for 1 year, so the entire 110 PSUs were completed within 4 years and yielded the largest ever NSFG sample (Lepkowski et al., 2010). Interviewing was conducted for 48 weeks each year in the 33 areas, with a rotation of 25 new areas each year (Groves et al., 2009).

A total of approximately 5,000 women and men were interviewed annually with Black, Hispanic, teenage, and female respondents being sampled at higher rates than others (Lepkowski et al., 2010).

Data Collection

The 2006-2010 NSFG began interviewing on or about July 1, 2006. Interviews were conducted face-to-face at the respondents' homes by trained, professional, female interviewers.

All subjects selected for the survey were asked for their consent prior to starting the interview. Signed parental consent had to be obtained for persons 15-17 years, followed by that selected minor's signed assent, before the interviewer could talk to the selected minor. In three states the age of majority used was 19 or 21 instead of 18 years. In cases where the parent refused to sign the parental consent form, or the minor refused to sign the Minor's Assent Form, the case was documented as a refusal (Groves et al., 2009).

The first part of the interview conducted, involved the interviewer reading the questions to the respondents and entering their responses into a laptop computer. This was known as the computer-assisted personal interviewing (**CAPI**) part of the interview. After the CAPI interview, the interviewer gave the laptop to the respondent and a pair of headphones and showed the respondent how to make entries on the computer. The respondent then completed an audio computer-assisted self-interview (**ACASI**) for 10 to 20 minutes. During the ACASI portion of the interview, interviewers could not hear what questions the respondents were asked over the headphones nor could they see the respondent's answers (in the household or later) (Groves et al., 2009).

At the end of the ACASI section, the interviewer turned off and locked the computer, thanked the respondent, and all respondents were given $40 for their participation in the survey (Groves et al., 2009). The interviews with women lasted an average of 80 minutes, and the response rate was about 78% (W.D.. Mosher et al., 2012).

During the 2006-2010 NSFG 22,682 men and women aged 15–44 years were interviewed from the household population of the United States. This thesis is based on the sample of 12,279 women interviewed.

Data Analysis

Datasets

Four datasets from the 2006-2010 NSFG were used for analysis. The **female respondent file** (which includes information on demographic characteristics, pregnancy history, contraceptive use, pregnancy wantedness, and use of family planning services) and the **female pregnancy (interval) file** (which includes detailed pregnancy histories and wantedness of pregnancies) together with their corresponding SPSS program codes were downloaded from the CDC website. These are public use data files containing de-identified data.

The **female ACASI file** (which contains information on drug use, sexually-transmitted infections, pregnancies, abortion, sexual activity, and income) and the **contextual data file** (which include information on the context or community in which respondents live) are restricted-access files and were obtained through written request from NSFG (see request letter in Appendix G. IRB approval was not required since these files are also de-identified.

Treatment of Data

Appendix A shows how the selected socio-demographic variables were recoded and Appendix B shows how pregnancy-related variables were recoded for analysis.

Female respondents were asked to report the type of contraceptive method they used from a list of 25 different contraceptive methods - including no method. For the purpose of analysis these contraceptive methods were grouped into three different categories – no method, moderately effective method, highly effective method – similar to the study done by Ivankovich (2009) in order to allow comparison of results between both studies.

According to Ivankovich (2009), a moderately effective method was one with a typical-use rate[3] of less than 90% and a highly effective method had a typical-use rate of 90% or greater. Appendix C summarizes how the survey choices for contraceptive method were categorized.

Statistical Analysis

SPSS software was used to recode the select socio-demographic and pregnancy variables then analysis was done to determine what percentage of respondents from subsets of each category had reported having an induced abortion.

SPSS software was also used to determine:

[3] Typical-use rate estimates contraceptive failure based on women's 'typical-use' behavior reported in population surveys rather than measures of the inherent efficacy of a contraceptive method when used perfectly. Typical-use rates were determined by contraceptive failure rates from the following sources: Hatcher, R.A. et al, eds., *Contraceptive Technology, 18th rev. ed.*, New York: Ardent Media, 2004, Table 9-2; Fu, H. et al, 1998; Kost et al, 2007.

- What proportion of women who had a pregnancy that ended in an induced abortion used no method, a moderately effective method, or a highly effective method of contraception before becoming pregnant and post-abortion.
- The association between having a pregnancy that ended in an induced abortion and – number of live births, number of abortion procedures, and discontinuation of contraception before becoming pregnant.

Multivariate linear regression was performed to determine which selected socio-demographic factors (ethnicity, place of residence, poverty level, education, informal marital status, religion, age of respondent at pregnancy end, parity, number of life partners, pregnancy wantedness by respondent and respondent's partner, and respondent's type of medical insurance) are associated with the use or non-use of contraception pre-abortion and post-abortion. For this analysis pregnancy outcome used was induced abortion, with the *dependent variable* being whether or not any contraception method was used (pre-abortion), or is in use (post-abortion), and the *independent variables* being examined for effect were the selected socio-demographic variables. Using a typical $\alpha = 0.05$, we can determine which variables are measurably correlated to use or non-use of contraception pre and post abortion. If the p-value $< \alpha$ we can assume there is a correlation, and if p-value $\geq \alpha$ assume no correlation.

Finally, to determine which socio-demographic variables are the best predictors of the effectiveness of contraception used before and after abortion multivariate regression analysis was performed which yielded the ANOVA tables shown in Appendix D (pre-abortion contraception use) and Appendix E (post-abortion contraception use). Analysis

was done using the dependent variable as the grouped efficacy of contraception methods used with the levels (1) No method, (2) Moderately-effective method, and (3) Highly-effective method. The independent variables examined for effect were the selected socio-demographic variables discussed earlier. The p-values indicate whether a selected variable is a predictor of the efficacy of contraception chosen pre and post abortion. If $p<0.05$ then we can assume there is a measurable correlation from that particular variable but if $p \geq 0.05$ we assume that variable has no effect on efficacy of contraception chosen. Chi-square tests were also performed to determine if there was an association/relationship between each socio-demographic variable and the effectiveness of contraception used. Similar rules hold regarding the use of p-values in the chi-square tests to determine if a demographic variable has any association with the efficacy of contraceptive method chosen.

IRB approval was not needed for this analysis because the data used was public-use, de-identifiable data.

Chapter 4: Results

The 2006-2010 NSFG interviewed 12, 279 females aged 15 – 44 years and the data derived was analyzed to determine the contraceptive prevalence of these women pre and post abortion and the key socio-demographic characteristics of the survey participants who reported having induced abortions. I present the descriptive findings of these analyses.

Induced Abortions

In the CAPI interviews, out of the 12, 279 female respondents 1,600 (13%) women reported ever having an induced abortion. Since some women had more than one abortion the total number of induced abortions among all the female respondents was 2,295.

The same women who were interviewed face-to-face during the CAPI portion of the interviews were again asked about abortion in the ACASI portion of the interviews. This time out of the 12,279 respondents 713 (5.8%) women reported ever having an induced abortion.

Table 1 below compares the differences in reporting of abortion, stratified by number of pregnancies, during the face-to-face CAPI interviews and the self-administered ACASI interviews. Statistics derived from the CAPI interviews were used to perform all further analyses, rather than statistics from the ACASI self-reported interviews, because the ACASI results only include the five (5) years preceding the survey while the CAPI dataset has no such limitations and provides a greater font of information such as insurance coverage.

Table 1: Comparison of reporting of Induced Abortions, stratified by number of pregnancies, during CAPI interviews and ACASI self-reporting

from the 2006-2010 NSFG

	CAPI Total # of Induced Abortions	**ACASI Total # of Induced Abortions**	**Percentage Difference (%) [*CAPI – ACASI*]**
Variable Name	**'ABORTION'**	**'CASIABOR'**	
None	5799	11466	-46.2
1 pregnancy	1152	549	+4.9
2 pregnancies	311	99	+1.7
3 or more pregnancies	137	65	+0.6
Did not complete – *ACASI only*	n/a[1]	52	n/a
Refused - *ACASI only*	n/a	29	n/a
Don't know - *ACASI only*	n/a	19	n/a
Missing – *CAPI only*	4880	n/a	n/a
Total	12279	12279	

[1] *(n/a = Not Applicable)*

Table 2 shows the number of induced abortions by chronological order of pregnancy based on the CAPI interviews. It delineates which pregnancy/ pregnancies (1^{st} to 5^{th}) a respondent decided to terminate via an induced abortion. The proportion reporting having had an abortion was highest for the first pregnancy. For women who had more than one pregnancy the rate of abortion increased as the chronological order of the pregnancy increased.

Table 2: Number and Percentage of Induced Abortions by chronological order of pregnancy; reported from CAPI interviews of 2006-2010 NSFG

	Number of Respondents who reported Induced Abortions *[X]*	Number of Women who Responded Yes or No to Question *[n]*	Percent (%) *[100(X/n)]*
1st Pregnancy	999	7538	13.3
2nd Pregnancy	469	5610	8.4
3rd Pregnancy	345	3515	9.8
4th Pregnancy	211	1899	11.1
5th Pregnancy	120	942	12.7

Table 3 shows the number of respondents who had different numbers of induced abortions, with the majority of respondents (72%) having had only one induced abortion.

Table 3: Number and Percent of women who reported having had an induced abortion by order of Induced Abortion, NSFG 2006-2010

NUMBER OF INDUCED ABORTIONS PER RESPONDENT	NUMBER OF RESPONDENTS	PERCENTAGE OF RESPONDENTS **(%)**
1	1152	72.0
2	311	19.5
3	85	5.4
4	26	1.6
5	18	1.1
6	1	0.0
8	2	0.1
9	4	0.3
16	1	0.0
TOTAL	1600	100

Socio-demographic Characteristics

The demographic and pregnancy-related profile of all women who reported having an induced abortion during the CAPI interviews are represented in Table 4 below.

The majority of women who had induced abortions were non-Hispanic whites at 43.3 % and second most were non-Hispanic black women at 31.9%. Most of these women resided in the metropolitan area (91.1%) and had incomes one to three times the poverty level (41%).

Mostly women who were high school graduates or had some college education (53.6%) and women who practice protestant or some other religion (55.8%) had induced abortions compared to persons of other educational levels and religions.

Women who were unmarried and/or not living with their partners were more likely to have an induced abortion (54.9%) compared to women who were living with their partners (45.1%).

Survey participants gave less than 100% response rate for pregnancy-related questions. Among women who had an induced abortion and responded to the questions on parity the majority (50.6%) had 1 or 2 live births, the majority (61.2%) felt their pregnancy was mistimed, while the majority (38%) reported that the pregnancy was unwanted by their partner.

Table 4: Socio-Demographic Characteristics of women who reported having Induced Abortions during CAPI interviews of the 2006-2010 NSFG

		Percent (%)	Sample Size
DEMOGRAPHIC VARIABLES			
Ethnicity and Race	Hispanic	18.4	295
	Non-Hispanic White	43.3	693
	Non-Hispanic Black	31.9	510
	Non-Hispanic Other	6.4	102
	Total	100.0	1600
Place of Residence	Metropolitan area	91.1	1458
	Non-metropolitan area	8.9	142
	Total	100.0	1600
Poverty	Below poverty level	29.0	464
	1 to 3 times poverty level	41.0	656
	Over 3 times poverty level	30.0	480
	Total	100.0	1600
Highest Level of Education	Less than 12th grade	18.6	298
	High school grad or some college	53.6	857
	Higher educational achievement	27.8	445
	Total	100.0	1600
Informal Marital Status	Living with partner	45.1	722
	Unmarried/not living with partner	54.9	878
	Total	100.0	1600
Religion	No religion	23.9	382
	Catholic	20.3	325
	Protestant and others	55.8	893
	Total	100.0	1600
PREGNANCY-RELATED VARIABLES			
Age of Respondent at 1st Pregnancy End	0-14	3.2	27
	15-19	53.6	450
	20-29	39.9	335
	30-44	3.2	27
	Total	99.9	839
Parity	No births	23.0	368
	1 or 2 births	50.6	810
	3+ children	23.0	368
	Total	96.6	1546
Wantedness of Pregnancy by Respondent	Intended/indifferent	12.0	192
	Mistimed	61.2	980
	Unwanted	25.0	400

	Total	98.2	1572
Wantedness of Pregnancy by Respondent's Partner	Intended/indifferent	21.7	347
	Mistimed	28.6	458
	Unwanted	38.0	608
	Total	88.3	1413

Use of Contraception

Analysis of responses to questions in the NSFG survey specific to contraceptive use yielded the following results for women who ended their pregnancy by an induced abortion:

- Of all the women who became pregnant and ended their pregnancy by an induced abortion:
    - 31.4% reported they became pregnant because their "birth control failed".
    - 51.7% reported they became pregnant because they "did not use birth control properly".
    - 16.1% reported they became pregnant because they "did not use any birth control".

As discussed in the chapter on Data Analysis, the methods of contraception used were categorized as no method, moderately effective methods, and highly effective methods based on typical-use rate (Kost, et. al, 2007). Figure 3 below compares the proportion of women who used each category before abortion and the proportions that used each category of contraception after abortion. The percentage of women who used no method of contraception increased from 8.6% pre-abortion to 31.4% post abortion. The percentage of

women who used moderately effective contraceptive methods decreased from 56.1% before abortion to 22.7% after abortion. The use of highly effective methods increased only slightly from 34.4% pre abortion to 39.2% post abortion.

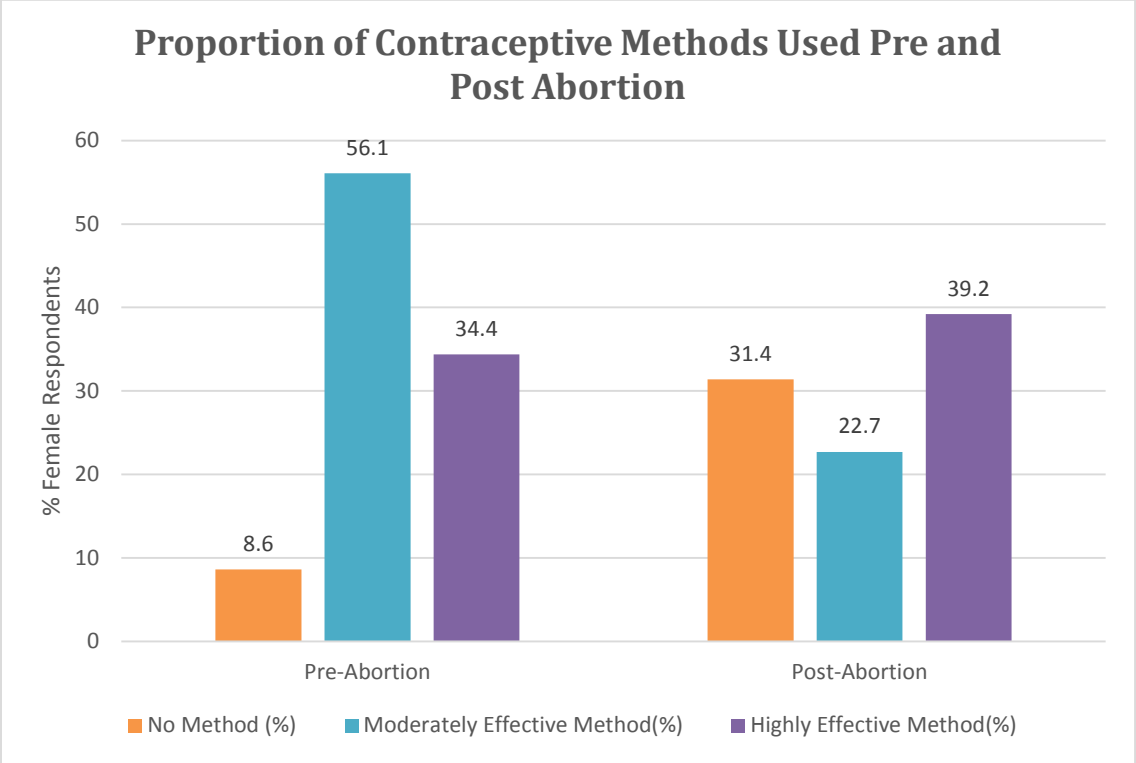

Figure 3: Bar Graph Comparing Contraceptive use Pre and Post Abortion

Table 5 below summarizes which socio-demographic variables are associated with use or non-use of contraception pre and post abortion based on the results of the ANOVA tests and Table 6 below summarizes which socio-demographic variables are associated with efficacy of contraceptive use pre and post abortion based on the results of the ANOVA and chi-square tests.

Table 5: Summary of Socio-demographic Variables associated with Use or Non-Use of Contraception Pre and Post Abortion

Socio-demographic Variables	Correlation with Contraception use/nonuse* PRE-ABORTION?	Correlation with Contraception use/nonuse* POST-ABORTION?
Age at pregnancy beginning	No	No
Informal marital status at pregnancy outcome	No	No
Wantedness of pregnancy by respondent's partner	No	No
Wantedness of pregnancy by respondent	**Yes**	No
Highest completed year of school or degree	**Yes**	No
Race & Hispanic origin of respondent	No	**Yes**
Total number of live births	No	**Yes**
Current health insurance coverage	No	No
Poverty level income	No	No
Current religious affiliation	No	No
Place of residence (Metropolitan / Nonmetropolitan)	No	No

*Correlation with Contraception use/non-use: **Yes= p-value < 0.05; No= p-value ≥ 0.05)**

Table 6: Summary of Socio-demographic Variables associated with Efficacy of Contraceptive Use Pre and Post Abortion

Demographic Variables	ANOVA Test: Pre-Abortion	ANOVA Test: Post-Abortion	Chi-Square: Pre-Abortion	Chi-Square: Post-Abortion
Age at Pregnancy Outcome	No	No	No	No
Informal Marital Status at Pregnancy	**Yes**	No	**Yes**	No
Wantedness of Pregnancy - Respondent's Partner	No	No	No	**Yes**
Wantedness of pregnancy - Respondent	No	No	No	No
Highest Completed Year of School or Degree	**Yes**	No	No	No
Race & Hispanic Origin of Respondent	No	**Yes**	No	**Yes**
Total Number of Live Births	**Yes**	**Yes**	**Yes**	**Yes**
Current Health Insurance Coverage	No	No	No	**Yes**
Poverty Level	**Yes**	No	No	No
Current Religious Affiliation	No	No	No	**Yes**
Place of Residence	**Yes**	No	No	No

Does a given variable have a Significant Association? Yes means p-value < 0.05 ; No means p-value ≥ 0.05

Chapter 5: Discussion

We found that more persons reported having induced abortions in the face-to-face CAPI interviews than in the self-reported ACASI interviews although higher levels of reporting are expected in self-administered surveys (Fu, Darroch, Henshaw, & Kolb, 1998). The reason for this is the ACASI statistics only include data for the five (5) years prior to the interview, while the CAPI figures have no such restriction. Essentially these figures are not comparable because women who had induced abortions more than five (5) years ago would not have these abortions counted in the ACASI statistics. For this reason, the CAPI statistics were used to perform the analyses. In the CAPI dataset out of the 12,279 women interviewed only 7,399 responded. According to the NSFG website, the missing data may be due to questions about abortion not being asked for some respondents in the CAPI interviews. For example, if it was not applicable because a respondent was never pregnant.

Women at risk of unintended pregnancy, using any kind of contraception before having a pregnancy that ended in abortion was associated with wantedness of pregnancy by respondent and highest completed year of school or degree. The use of any kind of contraception post-abortion is associated with women's race and their total number of live births.

After the first pregnancy, as the number of pregnancies a woman had increased the percentage of induced abortions also increased – which indicates women are more likely to have an induced abortion as the number of pregnancies they experience increase. This

may be due to women using abortion as a form of family planning. In 2008, the U.S. experienced an economic recession which affected many providers' ability to offer family planning services and women's ability to access basic health care (R. K. Jones & Kavanaugh, 2011). Decreased access to contraceptive services for women correlates with an increased number of unintended pregnancies, and during economic instability most women would be less equipped to support another child (R. K. Jones & Kavanaugh, 2011).

A survey by the Guttmacher Institute reported that the recession altered the childbearing goals of most of the women surveyed who reported that because of the economy they wanted to delay pregnancy, or have fewer children, and some wanted no more children (R.B. Gold, 2010). Thus for women who already have children and are not ready to or cannot afford to expand the size of their family if they have an unwanted pregnancy they may see having an induced abortion as the only means of controlling the size of their family.

The stratification of women who had induced abortions by race shows that the majority of women who reported induced abortions were non-Hispanic whites. This is consistent with the findings of several other studies including (Ivankovich, 2009; Pazol et al., 2012) and (R. Jones, Finer, & Singh, 2010). Jones and colleagues (2010), reported abortion rates of 36% for non-Hispanic white women, 30% for non-Hispanic black women, 25% for Hispanic women, and 9% for women of other races. Similar ranking among the various races were also found by Ivankovich (2009), using the 2002 NSFG dataset (non-Hispanic

white women 46.2%, non-Hispanic black women 31.1%, Hispanic women 12.5%, women of other races 10.2%) and in this analysis using the 2006-2010 NSFG dataset which also found that non-Hispanic white women had the highest abortion rates (43.3%) followed by non-Hispanic black women (31.9%), then Hispanic women (18.4%), and then women of other races (6.4%).

Findings of previous studies, as stated in the literature review, have reported that non-Hispanic black women have the highest rate of unintended pregnancies compared to other races (L.B. Finer & Zolna, 2014). However, not all unintended pregnancies end as induced abortions, some are carried to term and result in unintended births. Poor and low-income women are less likely to end an unintended pregnancy by abortion resulting in poor women having a higher unintended birth rate compared with higher-income women (L.B. Finer & Zolna, 2014). Since congress has restricted the use of Medicaid funds to pay for abortions, except when the woman's life would be endangered or in cases of rape or incest (Boonstra, 2007), most women would have to stand the costs of an abortion procedure themselves or through private insurance. As a result, lower income women are less likely to be able to afford an abortion and therefore their unintended pregnancies are more likely to end as unintended births. Studies report that non-Hispanic white women are more likely to belong to higher-income groups and therefore more likely to be able to afford an abortion, which may explain why they had the highest abortion rate among all the races, in this study.

During interpretation of these findings one must bear in mind that in nationally representative surveys of women it is common to have underreporting of abortions (R. K.

Jones & Kavanaugh, 2011). Research by Jones and Kost (2007), found that Hispanic women, black women, and poorer women were more unlikely to report having an abortion. In our study we utilized data from the face-to-face CAPI interviews rather than the self-administered ACASI dataset. Since face-to-face interviews affect the reporting of induced abortions (Fu et al., 1998) and Hispanic and black women have been shown to be more likely not to report having an abortion, it casts some doubt on whether non-Hispanic white women indeed have the highest rates of abortion or rather are more likely to report having an abortion.

ANOVA and chi-square tests showed that the socio-demographic variables which had significant association with the level of effectiveness of contraception used pre-abortion were: informal marital status, education level, parity, poverty level, and place of residence. Socio-demographic factors that were statistically associated with efficacy of contraceptive method post-abortion were: race, wantedness of pregnancy by respondent's partner, total number of live births, current health insurance, and current religious affiliation.

Analysis of NSFG data in 2008 showed that cohabiting women had the highest unintended pregnancy and unintended birth rates compared to noncohabiting or married women (Finer, 2014). Cohabiting women are particularly vulnerable to unintended pregnancy although they use contraceptives at rates similar to those of married women. This results from their levels of sexual activity typically being higher, and they have greater fecundity because they are typically younger than married women (Finer, 2006).

Although many cohabiting women may indicate that they do not intend to become pregnant, they may in fact be deferring to their partners' desires to avoid pregnancy, and as a result these women's efforts to avoid childbearing may not always be great (Finer, 2006).

The majority of women who reported having an induced abortion (91.1%) lived in a metropolitan area which is in-keeping with findings that states with large urban populations have the highest rates of unintended pregnancies (Kost, 2013).

As in other studies, there was a disparity in abortion rates by women's income level. The poorest women are the least likely to be able to afford an abortion. Research has shown that women with low levels of education and income have more unintended births because they use the pill and other birth control methods less effectively (W.D.. Mosher et al., 2012). Studies have also shown that women of low socioeconomic status and formerly married women, are at greater risk for contraceptive nonuse and for contraceptive failure (Forrest, 1994).

It can be inferred that these sub-groups which had higher reporting of abortion rates used less-effective or no methods of contraception, since abortions are indicators of unintended pregnancy (Peipert, Madden, Allsworth, & Secura, 2012b) and most unintended pregnancies result from failure to use any contraception or to use contraception consistently and correctly.

Examination of contraceptive prevalence pre-abortion showed that the majority (56.1%) were using only a moderately effective method. Although there was a slight increase (from 34.4% to 39.2%) in the percentage of respondents that used a highly-effective method of contraception post-abortion there was a greater increase (from 8.6% to 31.4%) in the percentage of women that used no method of contraception. Analysis of the 2002 NSFG data showed that that 38.2% of respondents were not using any method of contraception 1 month post-abortion but 3 months post-abortion there was only a slight decrease to 32% of women using no method of contraception (Ivankovich, 2009).

The fact that a respondent had an abortion indicates that she did not want to have a birth at that particular time. Therefore it seems counterintuitive that women who had an abortion would use no method of contraception post-abortion and risk becoming pregnant again. One possible reason for this may be that these women are not away that fertility can return ten days after an abortion. It has also been shown that 30% of women who have abortions lack health insurance so cost may be a barrier to the use of contraception post abortion (M.L. Kavanaugh, Jones, & Finer, 2011).

A woman has an unmet need for contraception if she is fertile, sexually active, and does not want to have a child in the next two years but is not using any form of contraception (Singh, 2010). Also, some women who use modern methods use them incorrectly or inconsistently (Singh, 2010). Non-use or improper use of contraception may be due to

factors such as poverty, fear of methods' side effects, poor understanding of the risk of pregnancy, partner's opposition to the use of contraceptives, problems with accessing contraceptive services and/or supplies (Singh, 2010).

Limitations

My findings must be interpreted in light of some study limitations such as:

- NSFG data can only be used to give descriptive reports and cannot demonstrate a cause and effect relationship.
- The 2006-2010 NSFG data, like all survey data, is subject to sources of non-sampling error. These could include misunderstanding of questions on the part of the interviewer or respondent, non-uniformity in asking the questions, and possible bias due to giving socially desirable answers especially considering the stigma attached to abortion and other questions asked in this survey (Chandra, Martinez, Mosher, Abma, & Jones, 2005) .
- The 2006-2010 NSFG is subject to recall error because many questions required participants to recall past events, some of which participants may not have been able to recall accurately such as date of first sexual intercourse (Chandra et al., 2005).
- It is common to have high level of underreporting of induced abortions in surveys such as the NSFG (R. K. Jones & Kost, 2007) which can skew abortion rates obtained. The data must be adjusted to account for the discrepancy between reporting and actual occurrence of induced abortion (L.B. Finer & Henshaw, 2006)

- The stigma and expectations associated with contraceptive use and nonuse may also lead to false reporting of contraceptive use by respondents.
- Because this survey was not designed specifically for the aims of my study the data was not conducive to extracting variables I would have like to asses such as the method of contraception used 1 month and 3 months post abortion. While there are dates for pregnancy endings, and there is data for the contraception method used by month, the actual year is unspecified for the latter, and the range of years for the former are unbounded. Thus we cannot make any assumptions about pre/post abortion contraception methods by calendar month. Even if assumptions can be made as to which year the contraception method months reference, when induced abortion data is mined, the sample space for many months is null or too small to for any serious analysis to be done because the margins of error are unworkably large.

Chapter 6: Conclusions and Recommendations

This study provided a descriptive look at pre and post abortion contraceptive use among women in the U.S. and the socio-demographic characteristics associated with women choosing more effective methods of contraception post-abortion. Most (56.1%) women at risk of unintended pregnancy in the U.S. use a moderately effective form of contraception and among those who have had an abortion 39.2% use a highly effective form of contraception. It is concerning that 31.4% of women chose to use no method of contraception post-abortion. We found that a woman's informal marital status and total number of births were associated with the effectiveness of contraception chosen pre-abortion and race and total number of births were associated with effectiveness of contraception chosen post-abortion.

Information on which socio-demographic groups are more likely to have an induced abortion because of unintended pregnancies can be used to guide policy makers. Since most unintended pregnancies result from contraceptive failure or nonuse, in order to mitigate the incidence of repeat abortions, abortion service providers should use these results to target women shown to be more likely to use no method or only moderately effective methods of contraception. They should be guided to tailor counselling for these vulnerable population subgroups in order to ensure adequate sex education is delivered and promote use of highly effective methods which are more likely to give their clients successful birth control. Family planning providers should help clients to identify methods that they are most likely to use successfully, and counsel them on how to be consistent users and to avoid behaviors that contribute to method failure (Ranjit et al., 2001). Emphasizing the rapid return of

fertility and risk of conception in pre-abortion counseling sessions could prevent future unintended pregnancies among abortion clients (T. A. Moslin & R. W. Rochat, 2011).

Emphasis should be placed on reducing barriers to contraceptive access for women at increased risk of unintended pregnancies and therefore induced abortions. A number of interventions need to be pursued in order to encourage correct and consistent use of the most effective contraceptive methods especially among the most disadvantaged groups. These include increased education and provision of information to reduce misperceptions about methods; improved access to contraceptive services including a wide choice of methods especially long-acting methods such as injectables, implants and IUDs; and more widespread practice of counseling for both women and men to improve consistency and correctness of use, as well as to improve communication between partners about contraceptive use and planning pregnancies (L.B. Finer & Henshaw, 2006).

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APPENDIX A: Table sumarizing how Socio-demographic Variables were recoded for Analysis

NSFG Variable	Original Categories	Re-coded Categories (Treatment)	New Variable Name
DEMOGRAPHIC VARIABLES			
PLACE OF RESIDENCE	MSA, Central City	Metropolitan area	Place of Residence
	MSA,Other		
	Not MSA	Non-metropolitan area	
POVERTY	25-99 percent of poverty level	Below poverty level	Poverty Level
	100-300 percent of poverty level	1 to 3 times poverty level	
	301-500+ percent of poverty level	Over 3 times poverty level	
EDUCATION	9th grade or less	12th grade or lower	Highest Level of Education
	10th grade		
	11th grade		
	12th grade, no diploma (nor GED)		
	High school graduate (diploma/GED)	High school grad or some college	
	Some college but no degree		
	Associate degree in college/university	Higher Educational Achievement	
	Bachelor's degree		
	Master's degree		
	Doctorate degree		
	Professional degree		
INFORMAL MARRIAGE SITUATION	Currently married	Living with partner	Informal Marital Status
	Not married but living with opposite sex partner		
	Widowed	Unmarried/not living with partner	
	Divorced		
	Separated for reasons of marital discord		
	Never been married		
RELIGION	No religion	No religion	Religion
	Catholic	Catholic	
	Protestant	Protestant and others	
	Other religions		
RACE	'Hispanic'	Hispanic	Ethnicity and Race
	'Non-Hispanic White, Single Race'	Non-Hispanic White	
	'Non-Hispanic Black, Single Race'	Non-Hispanic Black	
	'Non-Hispanic Other or Multiple Race'	Non-Hispanic Other	

APPENDIX B: Table sumarizing how Pregnancy-related Variables were recoded for Analysis

NSFG Variable	Original Categories	Re-coded Categories (Treatment)	New Variable Name
PREGNANCY VARVARIABLES			
PARITY (No. of Live Births)	0 babies	No births	Parity
	1 baby	1 or 2 births	
	2 babies		
	3 babies	3+ children	
	4 babies		
	5 or more babies		
NO. OF LIFE PARTNERS	*Continuous variable:* 1-50+	1-3 partners	Number of Opposite-Sex Partners in Lifetime
		4-14 partners	
		15+ partners	
WANTPREGRESP	Later, overdue	Intended/indifferent	Wantedness of Pregnancy by Respondent
	Right time		
	Didn't care, indifferent		
	Too soon, mistimed	Mistimed	
	Unwanted	Unwanted	
WANTPREGPART	Later, overdue	Intended/indifferent	Wantedness of Pregnancy by Respondent's Partner
	Right time		
	Didn't care, indifferent		
	Too soon, mistimed	Mistimed	
	Unwanted	Unwanted	

APPENDIX C: Table sumarizing Level of Effectiveness of each choice of Contraceptive Method from 2006-2010 NSFG

CONTRACEPTIVE METHOD	EFFECTIVENESS
• No method used	No method used
• Condom • Withdrawal, pulling out • Rhythm or Safe period by calendar • Safe period by temperature or cervical mucus test, natural family planning • Diaphragm • Female condom, vaginal pouch • Foam • Jelly or cream • Cervical cap • Suppository, insert • Today™ Sponge	Moderately effective method
• Birth control pills • Partner's vasectomy • Sterilizing operation/tubal ligation • Depo-Provera, injectables (shot) • Norplant™ implants • IUD, coil, or loop • "Morning after" pills or emergency contraception • Lunelle injectable (monthly shot) • Contraceptive patch	Highly effective method

APPENDIX D: ANOVA Tests for association between select Socio-demographic variables and Efficacy of Contraception Pre-Abortion

Model		Unstandardized Coefficients		Standardized Coefficients	t	Significance (p-value)
		B	Std. Error	Beta		
1	(Constant)	2.020	.217		9.322	.000
	Age at pregnancy outcome	4.980E-06	.000	.004	.116	.907
	Informal marital status at pregnancy outcome	-.026	.013	-.073	-2.029	.043
	Wantedness of pregnancy by respondent's partner	-.010	.014	-.023	-.722	.470
	Wantedness of pregnancy by respondent	.001	.019	.002	.053	.958
	Highest completed year of school or degree	.031	.011	.104	2.855	.004
	Race & Hispanic origin of respondent	-.022	.024	-.030	-.894	.372
	Total number of live births	.049	.016	.103	2.995	.003
	Current health insurance coverage	.006	.018	.012	.359	.720
	Poverty level income	.000	.000	-.076	-1.963	.050
	Current religious affiliation	.009	.021	.014	.418	.676
	Place of residence (Metropolitan / Nonmetropolitan)	.065	.031	.068	2.134	.033

Coefficients[a,b] : a. Dependent Variable = Contraceptive methods grouped by efficacy

b. Selecting only cases for which Pregnancy outcome = INDUCED ABORTION

APPENDIX E: ANOVA Tests for association between select Socio-demographic variables and Efficacy of Contraception Post-Abortion

Model		Unstandardized Coefficients		Standardized Coefficients	t	Significance (p-value)
		B	Std. Error	Beta		
1	**(Constant)**	2.416	.353		6.837	.000
	Race & Hispanic origin of respondent	-.107	.038	-.096	-2.853	.004
	Total number of live births	.111	.026	.150	4.293	.000
	Age at pregnancy outcome	.000	.000	-.056	-1.419	.156
	Informal marital status at pregnancy outcome	-.029	.030	-.035	-.986	.324
	Wantedness of pregnancy--R's partner	.007	.023	.010	.311	.756
	Current health insurance status	-.035	.026	-.047	-1.350	.177
	Place of residence (metropolitan-non-metropolitan)	.059	.046	.042	1.269	.205
	Current religious affiliation	-.045	.031	-.048	-1.440	.150
	Highest completed year of school or degree	.018	.017	.041	1.093	.275
	Poverty level income	.000	.000	.024	.619	.536
	Wantedness of pregnancy by respondent	.027	.031	.029	.878	.380

Coefficients[a,b] : **a.** Dependent Variable = Contraceptive methods grouped according to efficacy
b. Selecting only cases for which Outcome of pregnancy = INDUCED ABORTION