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Contextual Factors and Reproductive Control in U.S. Women

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Contextual Factors and Reproductive Control among US Women

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

by

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Abstract

CONTEXTUAL FACTORS AND REPRODUCTIVE CONTROL IN US WOMEN

By Brianna Michele Magnusson, MPH, Ph.D.

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Virginia Commonwealth University, 2011.

Major Director: Kate L. Lapane, Ph.D.
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Introduction: Access to family planning services is a major public health issue. State policies and funding for family planning services may increase access to contraceptive services and help women avoid unintended pregnancies.

Study Design: We identified sexually active, fertile women participants of the National Survey of Family Growth (2006-2008). Women were categorized as consistent or inconsistent users of contraceptives based on self-report. States were classified based on 2006 Medicaid family planning waiver status (income expansions, limited expansions, or no Medicaid family planning expansions), 2006 public funding for family planning in dollars per woman, and insurance coverage of contraceptive mandate status (comprehensive mandate, partial mandate, or no mandate). Multi-level logistic

regression was used to estimate the extent to which state-level constructs increase consistent contraceptive use among reproductive aged women at risk of unintended pregnancy.

Results: Women living in states with an Medicaid family planning income expansion waiver had 44% increased likelihood of consistent contraceptive use relative to women living in states with no Medicaid expansions (adjusted odds ratio (aOR): 1.44; 95% confidence interval (CI): 1.06-1.96). Limited Medicaid expansion was also associated with consistent contraceptive use (aOR: 1.30; 95% CI: 0.91-1.87). Nationwide a median of $86 (Interquartile range: $59-$133) of total public family planning funding was spent per woman in 2006. Higher levels of total public funding per woman for family planning services were not associated with an increase in the odds of consistent contraceptive use among all women (OR:1.05; 95% CI:0.98-1.12) or among women with incomes <250% of the federal poverty level (OR:1.06; 95%CI: 0.96-1.17). Comprehensive insurance coverage of contraceptives mandates increased the likelihood of consistent contraceptive use for privately insured women (aOR: 1.64; 95% CI: 1.08-2.50). Partial mandates were not associated with consistent contraceptive use. No association was observed among uninsured women (aOR: 0.77; 95%CI: 0.38-1.55).

Conclusions: Comprehensive insurance mandates and income-based Medicaid eligibility expansions are associated with increased likelihood of consistent contraceptive use. More research is needed to understand the association between public funding for family planning and contraceptive use among women in need of publicly funded services.

Chapter 1: Background

Each year in the United States 3.1 million or approximately half of all pregnancies are considered to be unintended.[1] Recently, we reported that 51% of these women have at least one additional unintended pregnancy.[2] The direct medical cost of unintended pregnancies is estimated to be five billion dollars per year.[3] Unintended pregnancy is associated with a host of negative outcomes for women and their children, including delayed prenatal care,[4] risky behaviors, such as drug or alcohol use during pregnancy,[5] preterm birth,[6] infant low birth weight,[4] and lower cognitive development scores in childhood.[7] Unintended pregnancies resulting in births significantly impact a woman's life course and may contribute to a continuing cycle of disadvantage in vulnerable populations.[6,8,9] Contraceptive non-use among sexually active, fecund women not desiring a pregnancy puts them at risk for unintended pregnancy. It is estimated that 36.2 million U.S. women are at risk for unintended pregnancy,[10] and of these approximately 4.5 million are not currently using any contraceptive method.[11] The ability to control if and when to have children is fundamental to women's health[12] and this ability is strongly influenced by the social, political and economic context in which a woman resides.

Reproductive control refers to a woman's ability to control her own reproduction. Reproductive control is a conceptually broad construct that may include all decision making or experiences surrounding sexual activity, as well as negotiation of sexual relationships and contraceptive use. Reproductive control is difficult to assess directly. For the purposes of this research we will focus on the ability of a woman to control the timing and spacing of her children through contraceptive use.

Reproductive control is affected by both individual and contextual factors. These factors include relationship dynamics,[13,14] sociodemographic factors[1] and access to contraceptive and reproductive health care.[15] One of the most important contextual factors is access to family planning services.[16] Access is defined as the ability of a woman to make contact with a family planning provider and her subsequent ability to choose and obtain a contraceptive drug or device and sustain contraceptive use over time.[15] Access is a process, not a static condition, and any interruption in the process can result in an interruption of contraceptive use, which may translate into unintended pregnancy.[17] The process of accessing family planning services is heavily influenced by the laws and policies of states regarding consent, sex education and insurance coverage for family planning services, as well as public funding and resource allocation for clinics and services and the geographic and physical availability of such services.

Publicly funded contraceptive services were key to the prevention of an estimated 2 million unintended pregnancies in 2006, which would likely have resulted in approximately 860,000 unintended births and 810,000 abortions.[18] The majority of publicly funded contraceptive services were received at one of the more than 8,000

family planning centers nationwide.[19] In the 2006 fiscal year 1.85 billion public dollars were spent on contraceptive services.[20] Despite these efforts only slightly more than half of the women in need of publicly funded services actually received these services.[19] The need for publicly funded family planning services is increasing. Between 2000 and 2006 the number of women in need of publicly funded contraceptive services increased by 7% or 1 million women.[10] Of US women at risk for unintended pregnancy, 48% or 17.5 million women were in need of publicly funded contraceptive services and supplies.[19] The majority of women (71%) needing publicly funded contraceptive services have incomes less than 250% of the federal poverty level.[18]

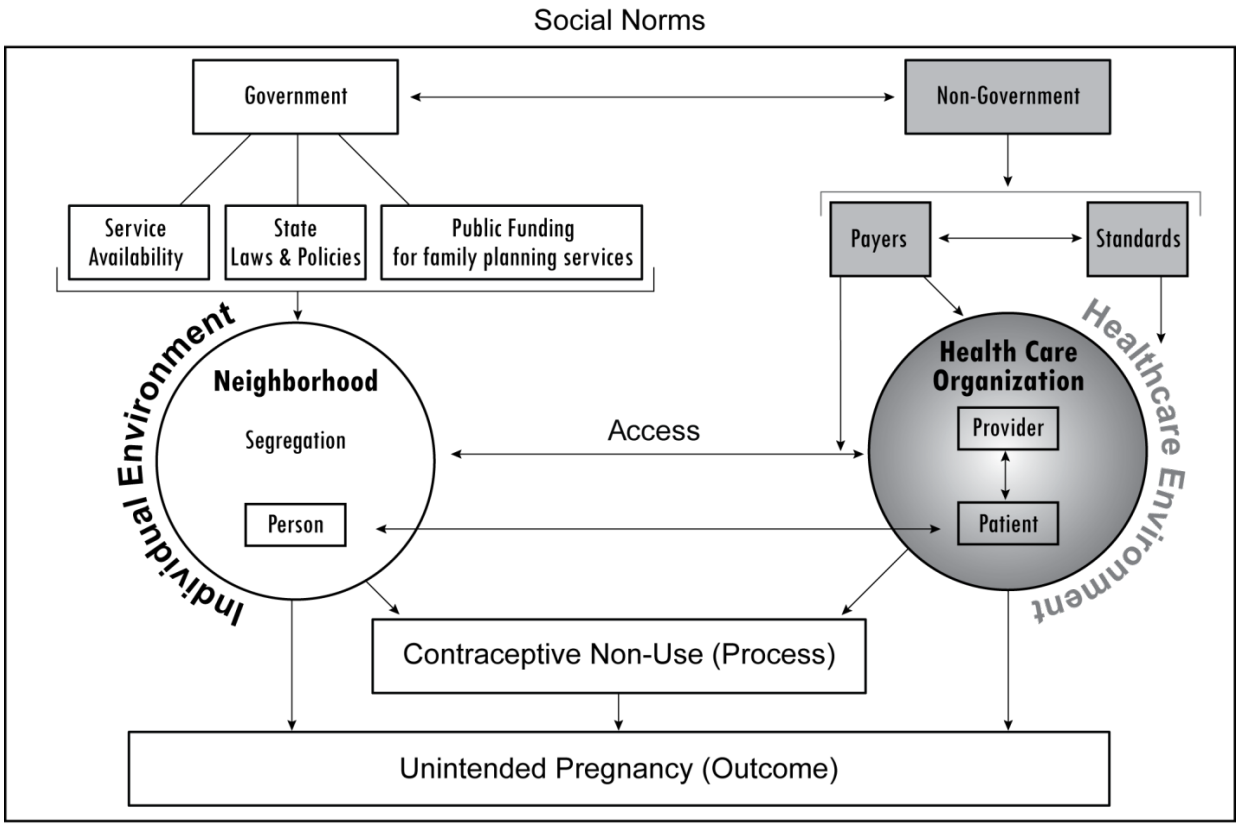
The majority of public funding for contraceptive services is Medicaid dollars with other funds coming from state appropriations, Title X and other block grants.[20] Since 1980 the inflation adjusted public funding for family planning services increased 18%, attributable almost entirely to increases in Medicaid funding.[21] However public funding for contraceptive services has not been stable over time. In the early 1980's funding was sharply cut, rebounding in the mid 1990's with increased Medicaid funding and finally reaching fiscal year 1980 levels in 2006.[20] Although funding on the national level has increased, funding in individual states has not universally increased.[20] Between 1994 and 2006 inflation adjusted spending held steady or decreased in 18 states and the District of Columbia.[20] Nationwide 28% of family planning dollars are state discretionary funds allocated to family planning services, ranging from 0% to 88% between the states.[22] Similarly the total number of dollars available per woman in need of publicly funded family planning services varies by state. In the United States an

average of $79 is allocated to family planning services for each woman in need, ranging from 21-183 dollars per woman between the states.[22]

A state's laws and policies regarding family planning services affect a woman's access to these services. The presence or absence of policies may facilitate or hinder contraceptive use.[22] State laws and policies may directly affect the economic, geographic and administrative accessibility of family planning services.[15] There are no federal laws governing access to family planning services and as such these policies vary, sometimes dramatically, by state.[22] In general, laws have been improving across the nation, but a number of states lack policies addressing important family planning issues or continue to have laws and policies which hinder or fail to facilitate contraceptive access and use.[23-29]

This dissertation is guided by a conceptual model used to frame health disparities research.[30] This multi-factorial model has been modified to include individual behaviors and contextual factors such as individual environment, health care environment, and social norms which may influence process and outcome measures associated with reproductive control such as contraceptive non-use and unintended pregnancy. Figure 1.1 illustrates this modified conceptual model describing the potential mechanisms by which access to family planning services affects reproductive control. The model addresses the multi-factorial context in which women live and the resulting influence of this context on the process and outcome measures associated with reproductive control. As the conceptual model demonstrates individual women live in a community, complete with its own characteristics. Further this community is located in the larger

individual environment and surrounded by an umbrella of social norms. Many factors occurring within these various contexts may affect an individual woman's ability to access family planning services, to obtain and consistently use contraceptives (process measure) and to prevent unintended pregnancy (outcome measure).



Adapted from Chin M, Walters AE, Cook SC, Huang ES. Interventions to reduce racial and ethnic disparities in health care. Med Care Res Rev. 2007 Oct;64(5 Suppl):7S-28S.
*Primary determinants denoted by bold lines
**Shaded area indicates important components beyond the scope of this study.

Figure 1.1 Conceptual model for reproductive control

As the conceptual model illustrates a state's laws, policies, procedures, and actions related to access to family planning services influence the community and the individual environment. These government factors related to public funding and service availability have direct effect on the ability of a woman to access family planning

services. Inadequate or restrictive funding reduces access by limiting the number of family planning clients a clinic can serve, increasing wait times to receive services and reducing the number of choices and/or increasing the cost of contraceptive options available to women who utilize these clinics. The model further acknowledges the importance of health care organization factors in determining access to family planning services and their effect on reproductive control; however these factors are outside the scope of the current study.

The research design cross-links three data sources: 1) public use data from the National Survey of Family Growth (NSFG); 2) restricted access NSFG contextual files which include US Census Bureau and American Community Survey data; and 3) state-level family planning access constructs compiled by the Alan Guttmacher Institute (AGI). State of the art analytic techniques including multi-level modeling accounting for the complex sampling design of the NSFG are used to evaluate the effect of family planning state-level access related constructs (e.g. public funding and state policies) on contraceptive use while controlling for individual and contextual factors.

Although there is a substantial body of research investigating factors related to contraceptive use, the current research focuses almost exclusively on individual level factors. This research recognizes that the context in which a woman lives affects her reproductive control. The models developed consider both individual level factors as well as contextual variables that may be associated with contraceptive use and unintended pregnancy. Specifically, this research examines contextual factors that are markers of economic deprivation, including income, crime rate and income inequality.

Given the recent health care reform legislation, an increased understanding of these factors can inform interventions and services to ultimately help prevent unintended pregnancy and promote reproductive control. Efforts to ensure that adequate resources are provided and that all women have access to family planning services will increase the likelihood that women bear children when they are desired, and thus improving health outcomes for mothers and children.

Chapter 2: The impact of Medicaid family planning eligibility expansion on contraceptive use

Abstract

Introduction: Access to family planning services is a major public health issue. Medicaid family planning eligibility expansion waivers extend Medicaid coverage for family planning services to men and women with incomes below an expanded threshold, typically <200% of the federal poverty limit. However, only half of the states in the United States have Medicaid family planning expansion waivers.

Study Design: We identified 3,681 sexually active, fertile women participants of the National Survey of Family Growth (2006-2008). Women were categorized as consistent or inconsistent users of contraceptives based on self-report. States were classified based on 2006 status as: 1) income expansions 2) limited expansions and 3) no Medicaid family planning expansions. Multi-level logistic regression was used to estimate the extent to which Medicaid family planning waivers increase consistent contraceptive use among reproductive aged women at risk of unintended pregnancy.

Results: Women living in states with an income expansion waiver had 44% increased likelihood of consistent contraceptive use relative to women living in states with no Medicaid expansions (adjusted odds ratio (aOR): 1.44; 95% confidence interval (CI): 1.06-1.96). Limited expansion was also associated with consistent contraceptive use (aOR: 1.30; 95% CI: 0.91-1.87).

Conclusions: Consistent contraceptive use among women in states with Medicaid expansion waivers is higher than in states without waivers. States without waivers should be encouraged to take advantage of the provisions of Health Care Reform legislation which allow them to expand Medicaid coverage for family planning services.

Introduction

Consistent use of contraceptives among women at risk for unintended pregnancy is arguably the most effective process for preventing the 3.1 million unintended pregnancies in the U.S. each year.[1] About half of unintended pregnancies are attributable to inconsistent or nonuse of contraceptives.[31] Contraceptive use in the U.S. is high, yet 1 in 10 sexually active, fertile women remain persistent non-users of contraceptives[11,32] with an additional 15% experiencing a gap in contraceptive use lasting at least one month.[32] Contraceptive non-use is more common among disadvantaged women, including women of minority race/ethnicity, women with low-levels of income or education and women without insurance coverage.[31]

An estimated 36.2 million U.S. women are at risk of unintended pregnancy in a given year.[19] Of these, 48% are in need of publicly funded contraceptive services and supplies.[19] Medicaid is the single largest payer of publicly funded contraceptive services accounting for 71% of public funding.[20] In 1993 South Carolina petitioned the federal government for a waiver to expand Medicaid funded family planning services to women who would otherwise exceed the very low income limits for Medicaid coverage.[33,34] Since then half of U.S. states have received one of two forms of family planning expansion waivers: 1) limited waivers that extend eligibility for family planning services to women who are losing Medicaid coverage (typically postpartum) and 2) income waivers that extend eligibility for Medicaid funded family planning services strictly on the basis of income. Two-thirds of states with waivers raise the family planning eligibility income ceiling to, or near, 200% of the federal poverty level (FPL) and one-

third expand eligibility through a defined postpartum period for women losing Medicaid coverage.[33]

It is generally believed that increasing Medicaid eligibility for family planning services has the potential to reduce unintended pregnancy by increasing consistent contraceptive use among women at risk for such pregnancies. However, no recent studies have evaluated the impact of Medicaid family planning expansion waivers on consistent contraceptive use. Using the most recent National Survey of Family Growth (NSFG) data, we evaluated the extent to which Medicaid family planning waivers increased consistent contraceptive use among women at risk of unintended pregnancy. We also conducted an analysis stratified by federal poverty limits, because we hypothesized that the effect of the waivers may be stronger in women eligible for services under the expansion waivers.

Methods

Study Design

We combined data from: 1) the NSFG public use file; 2) the NSFG contextual file containing county-level indicators; and 3) state-level indicators compiled by the Alan Guttmacher Institute (AGI). Individual-level, respondent data were obtained from the first release of the continuous NSFG including 7,356 in-person interviews with women ages 15-44 years, collected between July 2006 and December 2008. This national probability survey[35] is designed to collect information on childbearing, marriage/relationships and parenthood among women and men of reproductive age

(15-44 years).[36] This study was approved as exempt by the Human Subjects Review Board at Virginia Commonwealth University.

The NSFG contextual file includes data from the 2000 US Census, the American Community Survey 2006-2008 3-Year Estimates Summary File and County Characteristics, 2000-2007. State-level data on Medicaid Family Planning waivers is compiled by AGI and published monthly in their long-standing series *State Policies in Brief*. [37] Staff at the NCHS, RDC in Hyattsville Maryland linked the contextual file and the AGI data on Medicaid waivers to the NSFG public use file, with 100% match. All analyses were conducted on-site at the RDC.

We identified women at risk of unintended pregnancy. Women who were currently pregnant (n=328), trying to conceive (n=234), had never had sex (n =1,033), or did not have at least one sex partner in the year prior to interview (n=651) were not eligible. An additional 67 women with missing data on contraceptive use were excluded. The final sample included 3,681 sexually active, fecund (i.e. not surgically or medically sterile) women.

Contraceptive use

Women were categorized by contraceptive use status in the year prior to interview as 1) consistent users or 2) inconsistent/non-users (reference group). For each of the 12 months preceding the interview, respondents reported whether or not they had at least one episode of intercourse. For each month in which intercourse was reported, women reported use of contraceptive methods. Consistent users reported use of any contraceptive method in each at risk month, regardless of the number of months at

risk. Inconsistent/nonusers reported no use of contraceptives in at least one at-risk month.

Expanded Medicaid Eligibility

The primary determinant of interest was state policies governing the expansion of Medicaid family planning eligibility. AGI compiles monthly reports on state laws and policies that have ability to impact reproductive health, including contraceptive use.[37] We classified states according to the state Medicaid family planning eligibility expansion waiver status in January 2006 representing policies in place at the start of the NSFG data collection period. Using the state-level data, respondents were classified into three categories: 1) living in a state that provides Medicaid expansion to women based solely on income 2) living in a state that provides eligibility expansion to women losing Medicaid coverage postpartum or for any other reason, and 3) living in a state with no eligibility expansion (reference category).

Potential Confounders

Andersen's 1995 behavioral model on access to medical care[38] was used to conceptualize the relationship between state-level Medicaid Family Planning Expansion polices and contraceptive use. Predisposing and enabling factors were identified and considered as potential confounders. Predisposing factors associated with contraceptive use include age, race/ethnicity, education and marital status.[11] Respondent's age at interview (15-19, 20-34, 35-45 years), self-reported race and ethnicity (white, non-Hispanic; black, non-Hispanic; Hispanic; or other non-Hispanic), education (less than

high school, high school graduate or equivalent, or at least some college), and marital status (married, cohabitating, formerly married, or never married) were evaluated. Other predisposing factors including sexual history, specifically age at first intercourse and number of lifetime partners, and reproductive history, pregnancy and abortion history and future pregnancy intentions, were also considered. A woman's age at the time of first intercourse was determined by self-report and classified as <15 years, 15-17 years or 18+ years. Pregnancy and abortion history were based on self-report. Two dummy variables were defined using a nested coding approach.[39] First, women were classified as ever having been pregnant (yes/no) and women who reported at least one pregnancy were asked how each pregnancy ended (live birth, stillbirth, pregnancy loss or abortion). We were then able to identify women reporting they had ever had an abortion (yes/no). With this approach we were able to evaluate the effect of abortion history only among women having experienced at least one pregnancy. Women were considered to intend a future pregnancy if they responded "yes" to the survey question, "Looking to the future, do you, yourself want to have a baby (or another baby)?"

Individual-level enabling factors including current insurance status (private insurance, Medicaid, or no coverage) and poverty status based on the percentage of the FPL income[40] (<100% , 100-199% or >200%) were evaluated as potential confounders. Respondents reported combined family income from all sources in the calendar year before the interview. Several area-based markers of economic disadvantage, which may represent county-level enabling factors, were also considered as potential confounders. We considered the percentage of the county population that

was black, percentage of county population that was Hispanic, the 2005 per capita income, the 2004 crime rate, the 2005 unemployment rate and the Gini index, each considered as continuous variables. The Gini Index is a measure of income inequality ranging from 0 to 1, with 0 representing perfect equality and 1 representing maximum inequality. [41] We also examined the impact of having at least one population in the county designated by the Health Resources and Services Administration as having significant barriers to primary medical care.[42]

Three contextual variables had missing values: Gini index (n=263), 2005 per capita income (n =54) and 2004 crime rate (n=172). The distribution of the variables was evaluated and mean imputation employed for those variables with a normal distribution (per capita income) and median imputation employed for variables with a slightly skewed distribution (Gini and crime rate).[43] In total, 11% of the respondents had missing data on at least one contextual factor. To determine the impact of imputation, confirmatory analyses were run using complete case data. Results and conclusions did not change, thus we present results from the database with imputations.

Statistical Analysis

To account for the complex survey design of the NSFG, we used SUDAAN[44] with NSFG sample weights.[35] We first evaluated the characteristics of women and the county-level contextual variables according to their state's Medicaid family planning waiver status (income wavier, limited waiver, no waiver (referent)) as a preliminary evaluation of the potential for confounding by these factors. Next, multi-level logistic

regression models were used to understand the relationship between state's Medicaid waiver status and consistent contraceptive use. An iterative process of modeling was employed to control for confounding in the most parsimonious model possible. [45] Individual-level and county-level confounders were introduced individually into the model.[45] Potential confounders were retained in the model if their addition resulted in a greater than 10% change in the odds ratio for the association between waiver status and consistent use of contraceptives. We hypothesized that the impact of family planning expansions would be strongest in women who meet eligibility guidelines for income based Medicaid waivers (<200%FPL). We further hypothesized that the impact of the waiver may extend beyond women explicitly affected by the waiver through policy spillover.[46,47] To evaluate this, we stratified the analysis by income level reflective of expanded eligibility waivers (<200% FPL vs. >200% FPL). We further conducted descriptive analysis of other contraceptive promoting (minor's access to contraceptive services & emergency contraception) policies to determine if states with Medicaid waivers were more likely to have other contraceptive promoting policies.

Results

Nearly half of the sample of women at risk of unintended pregnancy lived in a state with some Medicaid family planning eligibility waiver: 34% lived in states with an income-based eligibility waiver and 15% in states with a limited waiver. Inconsistent or nonuse of contraceptive methods was reported by 23% of women. In the month prior to interview the most common contraceptive methods used were the oral contraceptive pill (31%), condoms (21%) and various forms of long-acting reversible contraceptives

(i.e. injectables, implants or intrauterine devices) (10%). Among those reporting any use of the oral contraceptive pill or any use of long-acting reversible contraceptives, on average, use was reported in approximately 83% of their sexually active months. Condom users reported use of that method an average of 77% of sexually active months.

Characteristics of the sample by Medicaid waiver status are summarized in Table 2.1. In states with no Medicaid expansion waivers, approximately 70% of women were white, compared to 56% in states with income expansions. Similarly, 48% of women in states with no Medicaid expansion waivers were married compared to approximately 40% in both income and limited expansion states. Of women in income expansion states, 18% had no insurance coverage, compared to 22% in both limited and no expansion states.

The county-level contextual variables were similar across waiver status. States with limited expansions had a higher proportion of the population black (mean 17.9%; 95% Confidence Interval (CI): 11.9-24.0) compared to states with no expansions (mean: 10.0; 95% CI: 7.1-12.9). States with income expansions had the highest proportion of the population Hispanic (mean: 18.6%; 95% CI: 11.9-25.2) compared to around 12% in both no expansion and limited expansion states. States without expansions had slightly lower per capita income and lower crime rates than those with waivers. The Gini coefficient indicating income inequality was similar across the three groups ranging from 0.44-0.45 across the three groups. Among women living in states

with a limited expansion, 51% lived in counties with at least one population designated as a HPSA population compared to 37% of women in expansion states.

Table 2.2 shows the association between individual-level factors and contraceptive use. Compared to non-Hispanic White women, Black and Hispanic women were less likely to report consistent contraceptive use (Odds Ratio (OR) Blacks: 0.60; 95% CI: 0.42-0.86; OR Hispanics: 0.66; 95% CI: 0.45-0.96). The association between race/ethnicity and consistent contraceptive use was reduced when adjusted for confounding by other individual-level factors (adjusted OR (aOR) Blacks: 0.76; 95% CI: 0.49-1.17; aOR Hispanics: 0.96; 95% CI: 0.69-1.133). Having income >200% of the FPL and a college education was associated with a greater likelihood of consistent contraceptive use. Compared to women without insurance coverage, women covered by Medicaid were 40% less likely to report consistent contraceptive use (OR: 0.61 (0.37-0.99)). After adjustment for individual level-factors, there was no association between having Medicaid coverage and consistent contraceptive use (Adjusted OR: 0.76; 95% CI: 0.46-1.26).

The relationship between Medicaid waiver status and contraceptive use is included in Table 2.3. Women living in states with an income expansion had 43% increased likelihood of consistent contraceptive use relative to women living in states with no waivers (OR: 1.43; 95% CI: 1.08-1.88). Models adjusting for potential confounders as well as groups of potential confounders (demographic, individual economic, sexual history, reproductive history, and contextual variables) produced no material change in this association. There was a trend towards an increased likelihood

of consistent use of contraceptive methods among women in states with limited expansions relative to no expansions (OR: 1.38; 95% CI: 0.92-2.07). Further adjustment by factors did not materially alter the estimate of association (aOR: 1.30; 95% CI: 0.91-1.87).

Among women with income <200% FPL, living in a state with income expansion waivers relative to no Medicaid expansions did not increase the likelihood of consistent contraceptive use (OR: 1.23; 95% CI: 0.77-1.97). Among women with ≥200% FPL, living in a state with income expansion waivers was associated with an increased likelihood of consistent contraceptive use (OR: 1.60; 95% CI: 1.09-2.34). No association was observed regardless of income level for limited expansion waivers.

Among states with income waivers 64% allowed all minors to consent to receiving contraceptive services, compared to 41% of no expansion states and 50% of limited expansion states. Similarly, 43% of income waiver states had policies aimed at expanding access to emergency contraception compared to 28% of no expansion states and 12% of limited expansion states.

Conclusions

Similar to the estimates of consistent contraceptive method use from the 2002 NSFG, [11] we found that 77% of sexually active women reported consistent use of any contraceptive method. Vulnerable populations including poor women, women of color, and women with low levels of education were least likely to report consistent contraceptive use. Our study suggests that Medicaid family planning eligibility

expansion waivers are associated with modest increases in consistent contraceptive use. Compared to women living in states with no Medicaid expansion waivers, women living in states with an income expansion and women living in states with limited expansion had approximately 44% higher likelihood of consistent contraceptive use.

We hypothesized that the effect of Medicaid expansion would be greatest in women likely to be directly affected by such policies (i.e. those with income <200% FPL). That the association between waivers and consistent contraceptive use was not as strong among economically disadvantaged women is surprising. However, women with income <200% FPL are also eligible for publicly-funded contraceptive services under other funding mechanisms (e.g. Title X, block grants, state appropriations). The provision of waivers may have resulted in a shift in the source of funding (e.g. from Title X, block grants, etc. to Medicaid waivers) rather than an increase the number of women served. If so, this would have diluted the impact of the Medicaid expansion waivers in our study. We were unable to explore the extent to which this explained our findings. The observed stronger association in women with income ≥200% FPL may represent a spillover effect. Increased Medicaid funding for women <200% FPL may free up larger blocks of public funding for family planning services for those women who are eligible for publicly funded family planning services (income ≤250% FPL), but not eligible for Medicaid expansion. Further, the finding that a higher percentage of states with income waivers also have other contraceptive promoting policies may indicate the presence of social norms valuing contraceptive use.

Expansion of Medicaid waivers for family planning may also address health disparities related to a women's ability to be in control of family planning decisions. Disparities in consistent contraceptive use and use of the most effective methods among racial and ethnic minorities, poor women and women with less education have been persistent.[48] Indeed, our finding that racial and ethnic minorities, as well as educationally and economically disadvantaged women are less likely to report consistent contraceptive use, were similar to reports based on 1995 NSFG data[49] and 2002 NSFG data.[11,50] As the financial and social costs of unintended pregnancy are well documented,[3-7] unintended pregnancies resulting in births significantly impact a woman's life course and may contribute to a continuing cycle of disadvantage in vulnerable populations.[6,8,9] Thus, Medicaid family planning expansions may ultimately be critical in reducing health disparities.

These data must be interpreted with several caveats in mind. This study examined only the presence of a state waiver and did not evaluate an individual woman's enrollment or ability to access such services, even if she was eligible. Women astute in navigating the public services system may be better able to take-advantage of expansions in eligibility than women lacking experience with such services. States possessing a specific type of waiver were considered equal, which may not fairly represent differences in awareness of waivers, enrollment procedures or accessibility of services in various states. Consideration of other issues influencing consistent contraceptive use is important, but was beyond the scope of our study. Non-use of contraceptives may reflect partner preferences, pregnancy ambivalence, or a lack of

knowledge of how to prevent pregnancy or how to correctly use contraceptive methods.[51] All individual-level data, including contraceptive use, is self-reported and thus subject to recall and reporting bias. Owing to the constraints imposed by use of existing data sources, we defined contraceptive use without consideration of whether contraceptives were used correctly, consistently, or with every episode of intercourse. We imputed values for missing data on some of the contextual variables. Thus, there may be residual confounding on these factors. However, analyses conducted on a subset of data with non-missing data yielded the same finding.

Medicaid family planning eligibility waivers help to reduce the cost barrier to family planning services, while saving state and federal government's money.[52-54] Our data provide support for the notion that expansion may be associated with increased consistent contraceptive use. Others have estimated that national expansion of Medicaid-funded family planning services to all women at or below 200% of the FPL could reduce the incidence of unintended pregnancy by 17% overall and 28% in low-income women resulting in a $1.5 billion savings in Medicaid expenditures.[33] The Patient Protection and Affordable Care Act (ACA) includes an immediate provision which extends to all states an option to extend Medicaid family planning eligibility to men and women up to the eligibility levels used for pregnancy-related care through amendments to their Medicaid Plans. During a time of economic recession, state governments are nearly universally forced to reduce budgets and nearly all states have implemented some sort of Medicaid cost-containment strategy in recent years.[54] Providing contraceptive services to an increased number of women has consistently proven to be

cost-effective.[52,53,55] Provision of family planning services through Medicaid eligibility expansions should be considered a plausible and effective means that may increase health, while reducing government costs.

Table 2.1: Characteristics of sexually active, fecund women participating in the National Survey of Family Growth by Medicaid family planning waiver status

	Income Expansion n = 1242 WtdN =9,584,416	Limited Expansion n = 558 WtdN = 5,503,841	No Medicaid Expansion n = 1881 WtdN = 14,761,760
		Weighted Percentages	
Sociodemographic Factors			
Age at Interview			
15-19years	12.7	13.0	11.3
20-34 years	60.6	56.7	62.8
35-45 years	26.6	30.3	25.9
Education			
Less than High School	18.5	12.4	16.9
High School Graduate	23.9	21.0	23.8
At Least Some College	57.6	66.6	59.3
Race/Ethnicity			
White, Non-Hispanic	56.0	62.4	69.5
Black, Non-Hispanic	13.5	17.5	12.6
Hispanic	21.0	12.7	12.9
Other, Non-Hispanic	9.5	7.5	5.0
Marital Status			
Married	39.5	41.0	48.3
Cohabitating	14.8	15.9	13.9
Formerly Married	7.1	8.9	7.4
Never Married	38.7	34.2	30.5
Economic Factors			
Poverty Level			
<100% FPL	17.6	16.0	19.8
100-199% FPL	21.9	20.5	23.5
>=200% FPL	60.4	63.5	56.7
Insurance Status			
Private Insurance	67.2	70.1	65.0
Medicaid	15.2	8.0	13.5
No Coverage	17.6	21.9	21.5
Sexual History Factors			
Age at First Intercourse			
<15 years	14.3	14.3	12.4
15-17 years	46.1	42.4	49.4
18+years	39.6	43.3	38.3
5 + lifetime sex partners	43.8	45.2	45.6

	Income Expansion	Limited Expansion	No Medicaid Expansion
Reproductive History Factors			
Future Pregnancy Intentions			
Intends or does not know intent	60.7	58.1	64.7
Does Not Intend Future Pregnancy	39.3	41.9	35.3
Pregnancy & Abortion History			
Had at least 1 abortion	17.2	15.8	12.6
Never had an abortion	41.6	43.3	51.6
Never Pregnant	41.2	40.9	35.8

Table 2.2: Association between sociodemographic characteristics & contraceptive use

	Weighted Percent Consistent Use	Odds Ratio (95% Confidence Interval)	Adjusted* Odds Ratio (95% Confidence Interval)
Age at Interview			
15-19years	80.1	1.29 (0.91-1.84)	1.01 (0.59-1.74)
20-34 years	75.7	1.00 (referent)	1.00 (referent)
35-45 years	79.4	1.23 (0.86-1.76)	1.25 (0.80-1.93)
Education			
Less than High School	66.0	1.00 (referent)	1.00 (referent)
High School Graduate	73.9	1.46 (0.89-2.38)	1.39 (0.82-2.36)
At Least Some College	81.6	2.28 (1.51-3.45)	1.64 (1.03-2.59)
Race/Ethnicity			
White, Non-Hispanic	79.6	1.00 (referent)	1.00 (referent)
Black, Non-Hispanic	70.1	0.60 (0.42-0.86)	0.76 (0.49-1.17)
Hispanic	71.9	0.66 (0.45-0.96)	0.96 (0.69-1.33)
Other, Non-Hispanic	81.6	1.14 (0.58-2.23)	1.05 (0.55-2.02)
Marital Status			
Married	74.4	1.00 (referent)	1.00 (referent)
Cohabitating	75.9	1.08 (.74-1.57)	1.61 (1.06-2.43)
Formerly Married	69.8	0.79 (0.49-1.29)	1.10 (0.66-1.84)
Never Married	83.2	1.70 (1.19-2.43)	2.06 (1.25-3.40)
Poverty Level			
<100% FPL	65.7	1.00 (referent)	1.00 (referent)
100-199% FPL	73.3	1.43 (0.86-2.39)	1.29 (0.80-2.09)
>=200% FPL	82.3	2.44 (1.63-3.65)	1.65 (1.11-2.47)
Insurance Status			
Private Insurance	81.7	1.69 (1.24-2.30)	1.20 (0.87-1.64)
Medicaid	61.7	0.61 (0.37-0.99)	0.76 (0.46-1.26)
No Coverage	72.6	1.00 (referent)	1.00 (referent)
Age at First Intercourse			
<15 years	65.1	1.00 (referent)	1.00 (referent)
15-17 years	76.1	1.71 (1.13-2.58)	1.40 (0.91-2.16)
18+years	82.7	2.57 (1.73-3.81)	1.58 (0.99-2.52)
Lifetime Partners			
1 to 4	80.0	1.41 (1.01-1.96)	1.42 (0.98-2.05)
5 +	73.9	1.00 (referent)	1.00 (referent)
Does not intend future pregnancy	77.4	1.01 (0.77-1.33)	1.50 (1.07-2.12)
Ever Pregnant	70.1	0.28 (0.21-0.38)	0.37 (0.25-0.54)
Ever Had an Abortion	74.6	1.33 (0.92-1.93)	1.37 (0.99-1.89)

*Adjusted for all variables in the table.

Table 2.3: Association between state Medicaid family planning waiver status and contraceptive use

	Income Expansion n = 1242 WtdN = 5,503,841	Limited Expansion n = 558 WtdN = 14,761,760	No Medicaid Expansion n = 1881 WtdN =9,584,416
Percentage Consistent Users	80.4%	79.9%	74.2%
	Odds Ratio (95% Confidence Interval)		
Crude Association*	1.43 (1.08-1.88)	1.38 (0.92-2.07)	1.00 (referent)
Adjusted for Pregnancy & Abortion History†	1.34 (1.00-1.80)	1.31 (0.92-1.86)	1.00 (referent)
Adjusted for Demographic Characteristics‡	1.42 (1.06-1.90)	1.28 (0.90-1.82)	1.00 (referent)
Adjusted for Individual Economic Characteristics§	1.42 (1.08-1.86)	1.28 (0.88-1.88)	1.00 (referent)
Adjusted for Sexual History Characteristics‖	1.44 (1.10-1.90)	1.38 (0.92-2.06)	1.00 (referent)
Adjusted for Reproductive History Characteristics**	1.31 (0.98-1.77)	1.31 (0.92-1.87)	1.00 (referent)
Adjusted for Contextual Variables††	1.44 (1.06-1.96)	1.30 (.91-1.87)	1.00 (referent)

*Unadjusted model.

† Adjusted for pregnancy and abortion history. Variable that produced the largest change (~6%) in the odds ratio for the association between waiver status and contraceptive use.

‡ Adjusted for respondents age, education, self-reported race/ethnicity and marital status.

§ Adjusted for respondents income as a percentage of federal poverty level and insurance status.

‖ Adjusted for age at first intercourse and number of lifetime sexual partners.

** Adjusted for pregnancy and abortion history and future pregnancy intentions

††Adjusted for county level proportion of population black, proportion of population Hispanic, Gini Index and Crime Rate.

Chapter 3: Public funding for family planning services and consistency of contraceptive use

Abstract

Objective: To examine the association between public funding for family planning services and consistent contraceptive use

Methods: We identified 3,681 women at risk of unintended pregnancy from the National Survey of Family Growth. Multi-level logistic regression provided estimates of the association between state-level funding for family planning services and consistent contraceptive use.

Results: Nationwide a median of $86 (Interquartile range: $59-$133) of total public family planning funding was spent per woman in 2006. Higher levels of total public funding per woman for family planning services were not associated with an increase in the odds of consistent contraceptive use among all women (Odds Ratio (OR):1.05; 95% Confidence Interval (CI):0.98-1.12) or among women with incomes <250% of the federal poverty level (OR:1.06 (0.96-1.17).

Conclusions: We observed no association between public funding for family planning services and consistent contraceptive use in our sample. Public health systems research to understand best practices for allocating family planning funding to increase contraceptive use in women at risk for unintended pregnancy is warranted.

Introduction

Half of the 36 million women at risk of unintended pregnancy, living in the United States (US), are in need of publicly funded family planning services and the number of women in need is increasing.[10] Women in need of public family planning services include adolescents and women with incomes <250% of the federal poverty level (FPL).[19] In the 2006 fiscal year, 1.85 billion public dollars were spent on contraceptive services.[20] On average, $79 per woman in need per year is allocated to family planning services. This varies widely by state, however, ranging from $21-$183 per woman in need.[22] Medicaid is the largest source of public funding for contraceptive services, accounting for 71% of overall funding in 2006. Other funds are provided by Title X, Maternal Child Health block grants, and state appropriations.[20] Since 1980 the inflation adjusted public funding for family planning services increased 18%, attributable almost entirely to increases in Medicaid funding.[21] However public funding for contraceptive services has not been stable over time. In the early 1980's funding was sharply cut, rebounding in the mid 1990's with increased Medicaid funding and finally reaching FY 1980 levels in 2006.[56] Although funding on the national level has increased, funding in individual states has not universally increased.[56] Between 1994 and 2006 inflation adjusted spending held steady or decreased in 18 states and the District of Columbia.[56] A majority (77%) of publicly funded family planning services are received at public family planning clinics, including health departments and family planning and community health centers, while 23% are received through private physicians who accept Medicaid reimbursement.

We designed this study using a modified version of *Chin's Conceptual Model for Racial and Ethnic Disparities in Health Care* (Figure 3.1).[30] Public funding for family planning services is rooted in health equality frameworks. In the 1960s, research noted that although low-income women desired the same number of children as higher income women, they were much less likely to have access to modern methods of contraception and therefore less likely to achieve their reproductive goals.[57] In 1970 Congress passed Title X legislation, which was aimed at creating a network of family planning services within reach of the low-income women who were the intended beneficiaries of this legislation. Public family planning services seek to reduce the high rates of unintended pregnancies among poor and disadvantaged women and to help these women achieve their childbearing goals.[1,53] The Chin model describes potential mechanisms by which factors affecting access to family planning services, of which public-sector funding is only one, may affect a woman's ability to contracept and control her childbearing and fertility. Many factors occurring within these various contexts may affect an individual woman's ability to access family planning services, to obtain and consistently use contraceptives and to prevent unintended pregnancy. Nationwide approximately ¼ of sexually active women who are not planning a pregnancy experience a gap in contraceptive use lasting at least one month. [11,32] Gaps in contraceptive use as well as resulting unintended pregnancies are more likely among disadvantaged women including racial and ethnic minorities and women who are poor or who have low-levels of education.[1,31]

The success of publicly funded family planning programs is typically measured in the number of contraceptive clients served, through estimates of averted births and the Medicaid cost savings of those averted births.[53] However, little is known about how state funding levels influence consistent contraceptive use among women. This study uses a sample generalizable to the US population to examine the association between public funding for family planning services at the state level and use of contraceptives in the year prior to interview. Specifically, we evaluated 1) the association between total public funding at the state-level and the likelihood of consistent contraceptive use; 2) the association between state-level Medicaid funding and other (non-Medicaid) public funding for family planning services and the likelihood of consistent contraceptive use; and 3) the association between total funding and subsets of funding and consistent contraceptive use stratified on women's income represented as a percentage of the federal poverty level.

Methods

Study Design

The 2006-2008 National Survey of Family Growth (NSFG) public use and contextual files as well as public-sector funding estimates compiled by the Alan Guttmacher Institute (AGI) were used for the study. The NSFG public use file is a national probability survey containing in-person interviews for 7,356 women aged 15-44.[36] Interviews were conducted between July 2006 and December 2008. The NSFG contextual file contains data from three sources: 1) the 2000 US Census, 2) the American Community Survey 2006-2008 3-Year Estimates Summary File (ACS3) and 3)

County Characteristics, 2000-2007. State-level funding information for family planning services was obtained from AGI. In 2007, AGI conducted a survey of public-sector family planning providers and payers including health departments, social service agencies, Title X grantees and the Centers for Medicare and Medicaid Services (CMS). The survey resulted in a comprehensive database of national- and state-level funding for public-sector family planning services, published in 2008.[20] The three data sources were linked to respondent information from the NSFG, with 100% match, by the Research Data Center in Hyattsville Maryland. The Human Subjects Review Board at Virginia Commonwealth University approved this study as exempt. The final sample included 3,681 sexually active, fecund (i.e. not medically or surgically sterile) women at risk of unintended pregnancy.

Contraceptive Use

We defined contraceptive use as consistent or inconsistent in the year prior to interview, using self-reported information on sexual activity and contraceptive use. For each of the 12 months preceding the interview, women reported if they had at least one episode of intercourse and if they had used any form of contraception. Consistent users were women who reported use of any method of contraception in each month for which intercourse was reported. Women experiencing a gap in contraceptive use of at least one sexually active month were considered inconsistent users.

Public Funding for Family Planning Services

State-level public-sector funding for family planning services was defined as the total number of public-sector dollars per woman in need of publicly funded family planning services. To evaluate if the source of funding was differentially associated with contraceptive use we divided total public funding into: 1) the number of Medicaid dollars per woman in need and 2) the number of dollars per woman in need from other public sources. We constructed average dollars per woman in each of the three categories, by dividing the total funding by the number of women in need to arrive at average public dollars per woman in need of public family planning services. Women in need of publicly funded contraceptive services and supplies are those at risk of unintended pregnancy, who are either adolescent (aged <20 years) or who have a family income <250% federal poverty level.[19] Dollars per woman in need was evaluated as a continuous variable. Assumptions of linearity were confirmed and squared and cubic terms were ruled out. To improve interpretability of the findings, we rescaled the measures of funding using a constant of $25. Rescaling was achieved by dividing the number of dollars per woman by 25, such that a one unit increase in the rescaled model represents an increase of $25 in funding.[58]

Potential Confounders

Factors associated with contraceptive use were considered as potential confounders.[11,50] We considered sociodemographic factors including respondent's age at interview (15-19, 20-34, 35-45 years), marital status (married, cohabitating, formerly

married, or never married), education (less than high school, high school graduate or equivalent or at least some college), and self-reported race and ethnicity (white, non-Hispanic; black, non-Hispanic; Hispanic; or other non-Hispanic). Economic factors including current insurance status (private insurance, Medicaid, or no coverage) and income based on the percentage of the federal poverty level (<100%, 100-199%, or >200%) were also considered. Sexual history variables, including age at first intercourse (<15 years, 15-17, or 18 or older) and the number of lifetime sexual partners (1-4 partners vs. 5 or more) as well as reproductive history, including whether the respondent had ever been pregnant, ever had an abortion and future pregnancy intentions were evaluated. Abortion history was evaluated only among women who reported ever being pregnant using a nested coding approach.[39]

To examine the potential impact of county-based markers of economic disadvantage we evaluated several area-based confounders. Specifically, we considered the percentage of the county population that was black, percentage of county population that was Hispanic, the 2004 crime rate, the 2005 unemployment rate and the Gini index, each considered as continuous variables. We also considered 2005 county-level per capita income and the Gini Index, a marker of income inequality. The Gini Index has a potential range of 0 to 1, where 0 represents perfect equality and 1 represents maximum inequality.[41,59] We considered the impact of residing in a county designated as a Health Provider Shortage Area (HPSA) as a categorical marker of economic disadvantage. A HPSA population is defined by the Health Resources and

Services Administration as a county having at least one population with significant barriers to primary medical care.[42]

Less than 11% of the total sample had missing values on one of three contextual variables: Gini index, 2005 per capita income and 2004 crime rate. The distribution of the variables was evaluated, and mean (normally distributed) or median (skewed distribution) imputation employed, as appropriate. Mean imputation was used for the Gini index and crime rate, while median imputation was utilized for per capita income.[43] After a comprehensive complete case analysis to evaluate the robustness of the findings based on imputation, we decided to present the results based on the imputed data, which were essentially the same as the complete case analysis.

Statistical Analysis

SUDAAN, with NSFG sample weights, was used to account for the complex survey design of the NSFG.[35,44] Descriptive analyses were conducted to compare the individual- and area-level characteristics across the two levels of contraceptive use. [60] Additionally, mean and median funding levels were calculated for the sample and by contraceptive use status and correlations for the continuous contextual variables and the three funding variables were calculated. Multi-level logistic regression was used to evaluate the association between public funding for contraceptive services and consistent contraceptive use. We used several modeling approaches to evaluate confounding in our model. First, individual-level and county-level variables were introduced separately into the model with the primary determinant of interest. Variables were retained in the model if their addition resulted in a greater than 10% change in

the odds ratio for the association between funding and consistent use of contraceptives. This approach is consistent with parsimonious modeling to adjust for confounding.[45] We also evaluated confounding by partially adjusting for groups of conceptually related factors: sociodemographic, income/insurance factors, sexual history, reproductive history and contextual factors. Attempts to create a full model resulted in an over-parameterized model with unstable estimates of effect and thus are not shown. We included squared and cubic terms in the models to rule out non-linear relationships between funding and consistent contraceptive use. We anticipated that the effect of public funding for family planning services would be highest among women who were eligible to receive these services. To evaluate this, we stratified the analysis by income level reflective of eligibility for publicly funded family planning services (≤250% FPL vs. >250%FPL). Four states had very high funding values that were potential outliers (Kentucky, Oregon, Washington, Wyoming). To evaluate the effect of outliers on the results we conducted a sensitivity analysis excluding the 115 women who lived in these states. As an additional sensitivity analysis, we categorized the funding variables by quartiles and constructed models with 3 dummy variables (with the first quartile as the referent). The overall findings were consistent with the approach conducted based on the continuous variable for total funding and as such are not shown.

Results

The median amount of total public funding for contraceptive services for women in the sample was $86 with an interquartile range (IQR) of $58-$132 per woman in

need of publicly funded services. Median Medicaid funding was approximately $57 (IQR: $27-$100) per woman and median funding from other public sources was $28 (IQR: $25-$33) per woman. Table 3.1 provides the median state-level funding for women by their contraceptive use status. The median total public funding dollars per woman among consistent users was $93, compared to $73 for inconsistent users.

Twenty-three percent of women in our sample of sexually active women not seeking a pregnancy reported a gap in contraceptive use lasting at least one sexually active month. Table 3.2 summarizes the characteristics of the sample by contraceptive use status (consistent vs. inconsistent). One-quarter of inconsistent users had less than a high school education, compared to 14% of consistent users. Of inconsistent users, 18% were black and 19% were Hispanic, compared to 13% and 14% respectively of consistent users. Among consistent users, 36% had never been married, whereas 25% of inconsistent users had never been married.

We calculated the correlation between the continuous county-level indicators of economic disadvantage and each of the three funding measures. Only minor to modest correlation was found with correlation coefficients between the county-level indicators and total funding ranging from 0.03 for the 2005 unemployment rate to 0.27 for 2005 per capita income. Similar levels of correlation were found for Medicaid and other public dollars funding.

Table 3.3 shows the association between public funding and consistent contraceptive use in the overall sample and stratified by federal poverty level (≤250% FPL vs. >250%FPL). A $25 per woman increase in average public funding for family

planning services from all sources was not associated with an increase in the likelihood of consistent contraceptive use (Odds Ratio (OR):1.05; 95% Confidence Interval (CI):0.98-1.12). This finding held for a $25 increase in Medicaid family planning dollars per woman (OR: 1.12; 95% CI: 1.03-1.21) and also for funding from other public sources (OR: 0.79; 95% CI: 0.60-1.05). Including individual and county-level variables or groups of conceptually related variables did not change this association materially. Analyses stratified by the FPL of the women (<250% FPL and >250% FPL) demonstrated no association between funding and consistent contraceptive use.

The sensitivity analysis, excluding women from states with potentially outlying values of state funding showed a slight trend toward increased consistent use of contraceptives. A $25 per woman increase in total public funding for family planning services was associated with a 10% increase in the likelihood of consistent contraceptive use (Odds Ratio (OR):1.10; 95% Confidence Interval (CI):1.02-1.18). Similarly a $25 increase in Medicaid family planning dollars per woman in need was associated with a 12% increase in the odds of consistent contraceptive use (OR:1.12; 95% CI: 1.04-1.22). The addition of any of the individual or county-level variables or groups of conceptually related variables did not alter the association. After stratification by FPL the confidence interval for the association between a $25 increase in total public funding dollars per woman and the association between a $25 increase in Medicaid dollars per woman and consistent contraceptive both included unity, though smaller sample sizes within the stratified samples provided lower power to detect an association.

Table 3.4 shows the association between area-based contextual factors and consistent contraceptive use. A $5,000 increase in county-level per capita income, adjusted for other contextual variables, was associated with an 18% increased likelihood of consistent contraceptive use (OR: 1.18; 95%CI: 1.09-1.29). An increase in the number of index crimes (willful homicide, forcible rape, robbery, burglary, aggravated assault, larceny over $50, motor vehicle theft and arson) reported to police of 500 per 100,000 persons was associated with a 6% decrease in the likelihood of consistent contraceptive us (OR:0.94; 95%CI:0.90-0.98).

Conclusions

Using a national probability sample, we observed no association between consistent contraceptive use and public funding per woman in need of family planning services. Adjustment by known factors associated with consistent contraceptive use such as education and race/ethnicity did not change these results. Further, stratification by income as a percentage of FPL did not change the association (≤250% FPL vs. >250% FPL). We did, however, observe that county-level per capita income was associated with an increase in consistent contraceptive use and county-level crime rate was associated with a decrease in consistent contraceptive use.

Contraceptive use is a complex phenomenon influenced by a woman's ability to negotiate contraceptive use in relationships and adhere to method instructions, as well as having a regular source of health care. Our data may suggest that state-level funding amounts are one component which may be less influential than individual-level socioeconomic factors, behavioral factors, social norms, and other contextual factors on

a women's decision and ability to contracept.[48,61-70] Indeed, our study confirmed that individual factors including sociodemographic variables (e.g. higher education, higher income, never married or cohabitating, and having had an abortion) were associated with consistent contraceptive use. Further, in previous work we have shown the impact of state mandates for insurance coverage of contraceptives[71] and Medicaid eligibility expansion waivers on contraceptive consistency.[72] This study suggests that county level income and crime rate is associated with consistent contraceptive use. This is consistent with recent data that has linked neighborhood disadvantage with sexual behaviors in young men.[73]

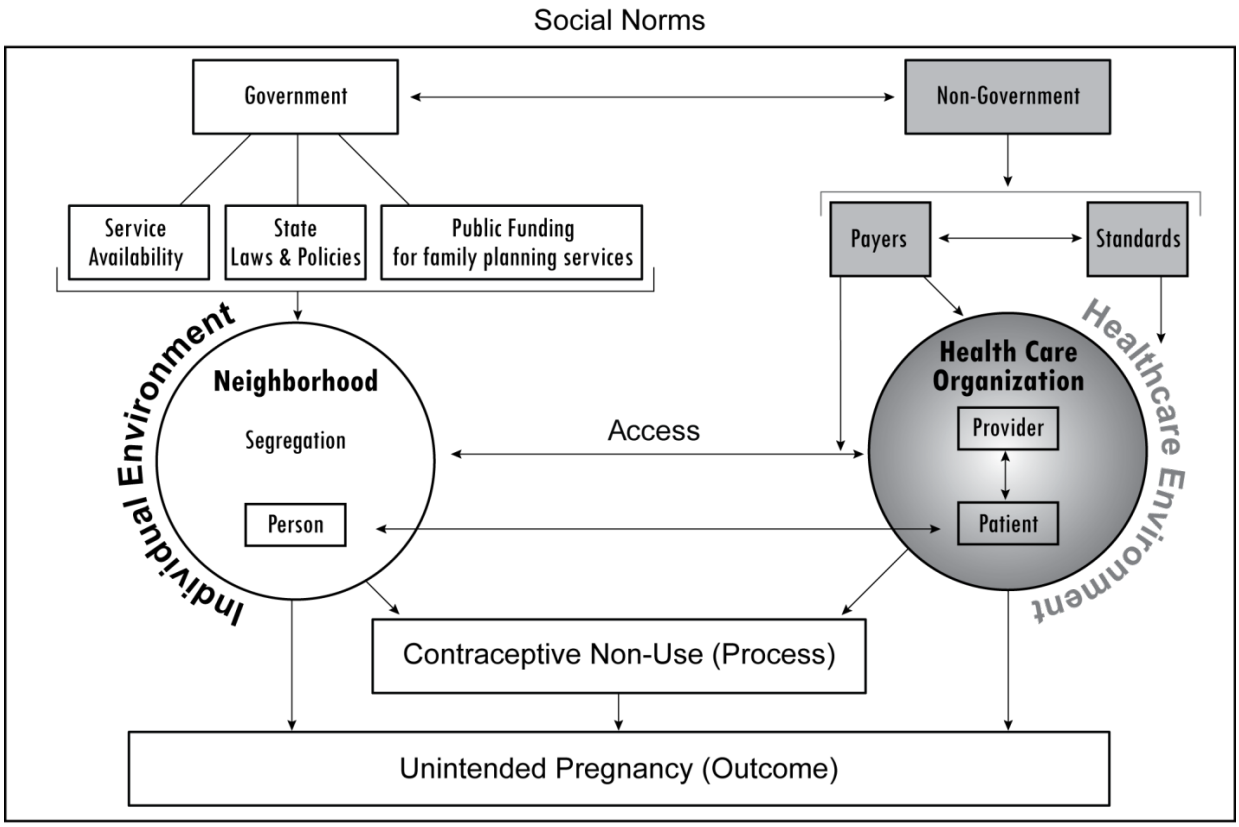
It is important to consider that dollars may not be the appropriate metric to evaluate a program's impact on consistent contraceptive use. States may implement Medicaid, Title X, and block grants differently and the effectiveness of these programs may not be reflected by dollars spent per woman in need. For example, previous research has shown that prescription dispensing practices at family planning clinics which provide one year of oral contraceptive pill packs, and thus do not require regular return visits to obtain contraception, are associated with higher rates of pill continuation. This indicates that differences in clinic practices may affect consistent contraceptive use and that changes in such policies may increase the ability of publicly funded family planning services to affect contraceptive use.[74] Further, it is possible that states increase funding for family planning services in response to higher rates of contraceptive nonuse. The data available for this study were not amenable to further exploration of these issues.

Our study must be interpreted with caution given its limitations. We were unable to determine if eligible women in our sample were aware of or sought out public services. Further, owing to the design of the NSFG we were not able to evaluate other structural barriers that may influence a woman's ability to obtain and consistently use contraceptive methods. We were also unable to evaluate the extent to which women used contraceptive methods correctly, consistently, or with every episode of intercourse. Other issues, such as partner preference or knowledge deficits about pregnancy prevention or correct contraceptive use, that may contribute to gaps in contraceptives use are important, but were not captured by the NSFG. [32]

The lack of observed association between funding levels and increased consistent contraceptive use should not be interpreted as a failure of the funding programs. Our study was unable to disentangle which women specifically benefited from the funding available. These findings may reflect the reach of the programs to all women in need which may not be optimal. We know funding is effective for the women that receive services. However, nationwide only 54% of women in need of publicly funded services actually receive them.[10] It is estimated that $1 in family planning services saves $4 in Medicaid-financed maternity costs.[53] Public funding for family planning services has consistently been shown to be cost effective.[53,55] Our study should not alter public health priorities to fund ongoing public-sector family planning programs. However, it should be noted that the cost to provide contraceptive services is rising. The per client cost of providing one year of contraceptive services increased from $203 in 2004 to $257 in 2008.[75] Increases in the cost of providing care may

reduce the number of clients who can receive contraceptive services at current funding levels.

In summary, our study suggests that increases in public spending for family planning services may not improve consistent contraceptive use. Nevertheless, the ability to control if and when to have children is fundamental to women's health.[12] Public-sector programs targeted at improving contraceptive use among poor and disadvantaged women are credited with dramatically reducing the number of unintended pregnancies among these women.[53] Unintended pregnancies resulting in births significantly impact a woman's life course and may contribute to a continuing cycle of disadvantage in vulnerable populations.[6,8,9] Thus, public health systems research encompassing individual-level, contextual factors, policy, insurance and public funding to develop an evidence-base for best practices for implementing publicly funded family planning programs appears warranted.



Adapted from Chin M, Walters AE, Cook SC, Huang ES. Interventions to reduce racial and ethnic disparities in health care. Med Care Res Rev. 2007 Oct;64(5 Suppl):7S-28S.
*Primary determinants denoted by bold lines
**Shaded area indicates important components beyond the scope of this study.

Figure 3.1: Modified Chin's conceptual model for racial and ethnic disparities in health care

Table 3.1: Median state-level funding (in dollars) by contraceptive use status

	Overall Population N =3,681 WtdN=29,850,016	Consistent Contraceptive Use N = 2,844 WtdN = 23,055,475	Inconsistent Contraceptive Use N = 837 WtdN = 6,794,541
	Median (Interquartile Range)	Median (Interquartile Range)	Median (Interquartile Range)
Total funding for public family planning in dollars per woman	$86.23 ($58.54-$132.66)	$93.49 ($59.27-$132.89)	$72.86 ($56.98-$130.50)
Medicaid funding for family planning in dollars per woman	$57.31 ($26.85-$100.12)	$63.86 ($28.14-$100.13)	$43.78 ($24.19-$96.49)
Other Funding for public family planning in dollars per woman	28.02 ($25.13-$33.11)	$27.96 ($24.74-$32.91)	$28.7 ($25.92-$33.29)

Table 3. 2: Association between respondent characteristics and consistent contraceptive use

	Consistent Contraceptive Use N = 2,844 WtdN =23,055,475	Inconsistent Contraceptive Use N = 837 WtdN = 6,794,541	Adjusted Odds Ratio* n = 3,681 WtdN = 29,850,016
	Weighted Percentages		(95% Confidence Interval)
Sociodemographic Variables			
Age at Interview			
15-19years	12.5	10.5	1.01 (.59-1.74)
20-34 years	59.8	65.0	1.00 (referent)
35-45 years	27.7	24.5	1.25 (.80-1.93)
Education			
Less than High School	14.2	24.7	1.00 (referent)
High School Graduate	22.3	26.7	1.39 (.82-2.36)
At Least Some College	63.5	48.6	1.64 (1.03-2.59)
Race/Ethnicity			
White, Non-Hispanic	65.8	57.2	1.00 (referent)
Black, Non-Hispanic	12.5	18.1	.76 (.49-1.17)
Hispanic	14.4	19.1	.96 (.69-1.33)
Other, Non-Hispanic	7.3	5.6	1.05 (.55-2.02)
Marital Status			
Married	42.5	49.6	1.00 (referent)
Cohabitating	14.3	15.4	1.61 (1.06-2.43)
Formerly Married	6.8	10.0	1.10 (.66-1.84)
Never Married	36.4	25.0	2.06 (1.25-3.40)
Income/Insurance Variables			
Poverty Level			
<100% FPL	15.6	27.8	1.00 (referent)
100-199% FPL	21.3	26.3	1.29 (.80-2.09)
>=200% FPL	63.1	45.9	1.65 (1.11-2.47)
Insurance Status			
Private Insurance	70.5	53.6	1.20 (.87-1.64)
Medicaid	10.4	21.9	.76 (.46-1.26)
No Coverage	19.1	24.5	1.00 (referent)

	Consistent Contraceptive Use	Inconsistent Contraceptive Use	Adjusted Odds Ratio*
Sexual History Factors			
Age at First intercourse			
<15 years	11.3	20.5	1.00 (referent)
15-17 years	46.3	49.4	1.40 (.91-2.16)
18+years	42.4	30.1	1.58 (.99-2.52)
Lifetime Partners			
1 to 4	57.0	48.5	1.42 (.98-2.05)
5 +	43.0	51.5	1.00 (referent)
Reproductive History Factors			
Future Pregnancy Intentions			
Intends Future Pregnancy/Does not know intent	60.5	60.9	1.00 (referent)
Does Not Intend Future Pregnancy	39.5	39.1	1.50 (1.07-2.12)
Total Number of Induced Abortions			
At least one abortion	14.2	16.4	1.37 (.99-1.89)
Never had an abortion	41.7	64.3	0.37 (.25-.54)
Never Pregnant	44.1	19.3	1.00 (referent)

*Adjusted for all the variables on the table.

Table 3.3: Association between public funding for family planning and consistent contraceptive use

	Total public funding dollars per woman in need (per $25 increase)	Medicaid dollars per woman in need (per $25 increase)	Other public funding dollars per woman in need (per $25 increase)
Whole Sample (n = 3,681)		Odds Ratio (95% Confidence Interval)	
Crude Model	1.05 (0.98-1.12)	1.07 (0.99-1.15)	0.79 (0.60-1.05)
Partially Adjusted for Demographic Variables†	1.03 (0.97-1.10)	1.05 (0.98-1.12)	0.82 (0.61-1.10)
Partially Adjusted for Income & Insurance‡	1.03 (0.96-1.10)	1.05 (0.98-1.12)	0.78 (0.60-1.02)
Partially Adjusted for Sexual History Variables§	1.05 (0.98-1.12)	1.06 (0.99-1.14)	0.83 (0.63-1.08)
Partially Adjusted for Reproductive History Variables‖	1.03 (0.97-1.09)	1.04 (0.98-1.11)	0.84 (0.63-1.12)
Partially Adjusted for Contextual Factors**	1.01 (0.94-1.09)	1.03 (0.96-1.11)	0.75 (0.55-1.03)
Women with income **≤ 250% of the Federal Poverty Level (n = 2,087)**			
Crude Model	1.06 (0.96-1.17)	1.08 (0.97-1.20)	0.70 (0.50-0.99)
Partially Adjusted for Demographic Variables†	1.06 (0.97-1.16)	1.09 (1.00-1.18)	0.71 (0.49-1.03)
Partially Adjusted for Insurance	1.05 (0.96-1.15)	1.07 (0.98-1.18)	0.73 (0.53-0.99)
Partially Adjusted for Sexual History Variables§	1.07 (0.97-1.18)	1.09 (0.99-1.21)	0.76 (0.55-1.05)
Partially Adjusted for Reproductive History Variables‖	1.06 (0.96-1.16)	1.08 (0.98-1.19)	0.75 (0.53-1.07)
Partially Adjusted for Contextual Factors**	1.02 (0.93-1.11)	1.04 (0.95-1.13)	0.71 (0.51-0.99)
Women with income >250% of the Federal Poverty Level (n=1,594)			
Crude Model	1.01 (0.89-1.14)	1.02 (0.89-1.16)	0.85 (0.50-1.44)
Partially Adjusted for Demographic Variables†	1.00 (0.90-1.12)	1.01 (0.90-1.13)	0.89 (0.57-1.39)
Partially Adjusted for Insurance	1.01 (0.89-1.14)	1.02 (0.89-1.16)	0.84 (0.50-1.42)
Partially Adjusted for Sexual History Variables§	1.01 (0.89-1.14)	1.01 (0.89-1.15)	0.87 (0.51-1.49)
Partially Adjusted for Reproductive History Variables‖	0.98 (0.89-1.09)	0.99 (0.88-1.11)	0.87 (0.54-1.40)
Partially Adjusted for Contextual Factors**	1.00 (0.89-1.12)	1.00 (0.89-1.14)	0.83 (0.46-1.49)

*Fully adjusted models could not be shown as they produced unstable model estimates.

† Demographic variables = age at interview, education, race/ethnicity, and marital status.

‡ Income/Insurance = Income as a percentage of Federal Poverty Level & insurance coverage status

§ Sexual History variables = Age at first intercourse & number of lifetime sex partners.

‖ Reproductive history variables = Pregnancy and abortion history and future pregnancy intentions.

** Contextual factors = Percent of county population non-Hispanic black, percent of county population Hispanic, Gini Index, 2005 per capita income, 2005 unemployment rate and 2004 crime rate (number of index crimes: willful homicide, forcible rape, robbery, burglary, aggravated assault, larceny over $50, motor vehicle theft and arson , reported to police per 100,000 persons)

Table 3.4: Association between county-level factors and consistent contraceptive use

	Adjusted Odds Ratio* (95% Confidence Interval)
Log Percent of County Population Non-Hispanic Black†	1.37 (0.84-2.25)
Log Percent of County Population Hispanic†	1.12 (0.58-2.14)
County-level Gini Index‡	0.13 (0.00-37.8)
County-level per capita income, 2005§	1.18 (1.09-1.29)
County-level Index Crime Rate, 2004‖ ,**	0.94 (0.90-0.98)
County-level Unemployment rate, 2005‡	1.02 (0.91-1.15)
At least one population designated as a health provider shortage population‡	1.05 (0.84-1.30)

*Adjusted for all variables in the table.

† per 5 unit change in the log percent.

‡ per one unit change.

§ per $5,000 increase in county-level per capita income.

‖ per 500 unit increase in crime rate.

**Number of index crimes (willful homicide, forcible rape, robbery, burglary, aggravated assault, larceny over $50, motor vehicle theft and arson) reported to police per 100,000 persons.

Chapter 4: Contraceptive insurance mandates and consistent contraceptive use among privately insured women

Abstract

Introduction: Half of the states in the US mandate that health insurers cover contraceptives. Health care reform may extend these mandates through standardization of coverage provided in the, yet to be finalized, essential benefits package. This study evaluates the association of state-level insurance mandates and consistent contraceptive use among privately insured women aged 15-44.

Study Design: The National Survey of Family Growth (2006-2008) included 2,276 privately insured women at risk for unintended pregnancy. Multi-level logistic regression provided estimates of the association between state-level insurance coverage mandates and consistent contraceptive use.

Results: Gaps in contraceptive use were common with 18% of privately insured women reporting ≥1 month gap. Comprehensive mandates increased the likelihood of consistent contraceptive use for privately insured women (Adjusted Odds Ratio: 1.64; 95% Confidence Interval: 1.08-2.50). Partial mandates were not associated with consistent contraceptive use. No association was observed among uninsured women (Adjusted Odds Ratio: 0.77; 95% Confidence Interval: 0.38-1.55).

Discussion: Consistent contraceptive use among women with private insurance is higher in states with mandates compared to those without mandates.

Introduction

Consistent contraceptive use among women who do not desire a pregnancy is essential to reproductive control as it enables women to achieve desired birth spacing and family size. Family planning is lauded as one of the 10 great public health achievements in the 20th century.[76] Despite this success, each year one-quarter of sexually active, fertile women who are at risk for unintended pregnancy experience a gap in contraceptive use lasting at least one month.[11,31,32] Gaps in contraceptive use are more common among women who are economically or educationally disadvantaged and among women of minority race or ethnicity.[31] However, women with health insurance have increased rates of contraceptive use overall and increased rates of more effective prescription methods.[77-79]

A woman's ability to access reproductive health services and to obtain contraceptive supplies may be impacted by the presence and extent of health insurance coverage.[77,80] The majority of U.S. women are covered by private insurance, but not all insurance plans provide comprehensive coverage for contraceptive drugs and devices.[81] Since the 1990's many policy makers and advocates have attempted to improve coverage of contraceptive services through state policies mandating that insurance companies which cover prescription drugs also cover the full-range of FDA approved contraceptive drugs and devices. The Patient Protection and Affordable Care Act (ACA) includes provisions that, if implemented, may extend these mandates nationally through the "essential benefits package".[82]

State-level insurance mandates increase the proportion of insurance companies who cover contraceptives and expand the level of coverage some insurance plans offer.[81] However, to date no study has examined the association between state-level mandates and consistent use of contraceptives among women. This study uses a national probability sample to examine the association between state-level insurance mandates and use of contraceptives in the year prior to interview. Specifically, we will examine if living in a state with a mandate increases the odds of consistent contraceptive use among privately insured women. We will also examine the association between state mandate status and contraceptive use among uninsured women to assess whether any observed association among privately insured women is likely attributable to policy impact or to processes and social norms of the state, unrelated to the policy.

Methods

Study Design

The National Survey of Family Growth (NSFG) is a national probability survey which gathers information on reproductive health for men and women.[35,36] Using the 2006-2008 continuous cycle cross-linked to the NSFG contextual file containing county-level indicators and to state-level insurance mandates compiled by the Alan Guttmacher Institute (AGI), we conducted a cross-sectional study including 2,276 privately insured and 765 uninsured, sexually active, fecund (i.e. not surgically or medically sterile) women at risk for unintended pregnancy. Women reporting Medicaid insurance were not eligible for this study.

The NSFG contextual file includes data from the 2000 US Census, the American Community Survey 2006-2008 3-Year Estimates Summary File and County Characteristics from 2000-2007. State-level data on contraceptive coverage mandates is compiled by AGI and published monthly as *State Policies in Brief*.[83] The National Center for Health Statistics (NCHS) Research Data Center (RDC) staff in Hyattsville Maryland linked the contextual file and the AGI data on contraceptive coverage mandates to the NSFG public use file under a data use agreement with NCHS, with 100% match. All analyses were conducted on-site at the RDC. The Virginia Commonwealth University Human Subjects Review Board approved this study as exempt.

Contraceptive use

Consistent with previous research, [11] we constructed variables representing contraceptive use in the year before interview using self-reported information on sexual activity and contraceptive use. For each month, women reported if they had at least one episode of intercourse and if they had used any form of contraception in sexually active months. We categorized women as 1) being consistent contraceptive users or 2) inconsistent/nonusers. Consistent users were women who reported use of any method of contraception in each month for which intercourse was reported. Women experiencing a gap in contraceptive use of at least one sexually active month were considered inconsistent users.

State Insurance Mandates

Each month, the Guttmacher Institute compiles a report on state laws and policies that have ability to impact reproductive health, including contraceptive use.[83] State insurance mandate status in January 2006 was used to represent policies in place before the NSFG data collection. Respondents were classified into three categories based on the policy status of their state of residence: 1) living in states with comprehensive insurance coverage mandates for contraceptives; 2) living in states with partial insurance coverage mandates; and 3) living in states with no mandates (reference category). Comprehensive insurance mandates require all insurers who provide prescription drug coverage to cover contraceptives. Partial mandates are those that only apply to a segment of the insurance population, such as HMOs or small and individual market insurers. In January 2006, 23 states had comprehensive mandates and 10 had partial mandates.[83] Among states with partial mandates, 7 applied only to HMOs subject to state policies, 2 states had policies that applied to insurers offering drug coverage to individuals or small employers and 1 state had policies that applied to both HMOs and individual or small market insurers.

Potential Confounder

We used Andersen's 1995 behavioral model on access to medical care[38] to identify predisposing and enabling factors that may affect the relationship between insurance mandates and contraceptive use. We considered factors associated with contraceptive use including sociodemographic, sexual history and reproductive history factors as potential predisposing factors.[11,50] Specifically, we considered respondent's

age at interview (15-19, 20-34, 35-45 years), marital status (married, cohabitating, formerly married, or never married), education (less than high school, high school graduate or equivalent, or at least some college), and self-reported race and ethnicity (white, non-Hispanic; black, non-Hispanic; Hispanic; or other non-Hispanic).

Sexual history factors included respondent's self-reported age at first intercourse (<15 years, 15-17 years, and 18+ years) and number of lifetime sexual partners (1-4 partners vs. 5 or more partners). Reproductive history was comprised of future pregnancy intentions, pregnancy and abortion history. Future pregnancy intention was assessed by the question, "Looking to the future, do you, yourself want to have a baby (or another baby)?" Women were considered to intend a future pregnancy if they answered yes or undecided to this question, and these categories were considered together as we hypothesized that women undecided about their intentions for future childbearing were more similar to those desiring to preserve fertility with respect to contraceptive decision making. Prior pregnancy and abortion history were considered as dichotomous variables (yes/no) and were analyzed using a nested coding approach, which enabled evaluation of abortion history only among women who had experienced at least one pregnancy.[39] We considered income based on the percentage of the federal poverty level (<100%, 100-199% or >200%) as a possible enabling factor under Anderson's model.

We considered several county-level confounders as markers of economic disadvantage, which may represent county-level enabling factors. Specifically, we considered the 2005 per capita income, the 2004 crime rate, the 2005 unemployment

rate, the Gini index of income inequality, the percentage of the county population that was non-Hispanic Black, and the percentage of county population that was Hispanic, each as a continuous variable. The Gini index measures income inequality on a scale of 0 to 1. Perfect equality is represented by an index score of 0, while maximum inequality is represented as 1.[41] We also examined the impact of having at least one population in the county designated by the Health Resources and Services Administration as having significant barriers to primary medical care.[42]

Across all observations, approximately 11% of the sample has data missing on one of three contextual factors. We used mean imputation for missing data for normally distributed variables (per capita income) and median imputation for variables with a slightly skewed distribution (Gini and crime rate).[43] We assessed the impact of imputation through sensitivity analyses using only respondents with no missing data. In no case were the results different, therefore we present the results from the data with imputations.

Statistical Analysis

Descriptive analyses compared the characteristics of women and the county-level contextual variables according to their state's insurance mandate status (comprehensive, partial or no mandate (referent)) as a preliminary evaluation of confounding. No statistical tests were conducted at this phase as evaluation of confounding is not grounded in hypothesis testing.[60] Next, multi-level logistic regression models using SUDAAN with NSFG sample weights[35] were used to estimate the

association between state insurance mandate status and consistent contraceptive use among privately insured women. Consistent with a parsimonious modeling approach to adjust for confounding, [45] we employed an iterative process of modeling by individually introducing potential individual- and county-level confounders into the model. Variables whose inclusion resulted in a greater than 10% change in the odds ratio for the association between insurance mandates and consistent contraceptive use were retained in the model.[45] Variables that did not alter the estimates were not retained in the model as doing so would have resulted in a loss of precision, with no material gain in reduction of bias due to confounding.

We hypothesized that insurance mandates would only have an impact among women with private insurance coverage. To evaluate the extent to which the observed association was likely attributable to the mandates rather than some unmeasured state-level factor, we conducted an analysis among women reporting no insurance coverage. If no association between mandates and consistent contraceptive use among women without insurance was observed, the findings would support the idea that the observed association in privately insured women was likely related to insurance mandates. If a similar association was found among women without insurance, we could not rule out the likelihood that the observed association in privately insured women was attributable to state-level differences rather than the insurance mandates.

Results

Approximately 45% of privately insured women lived in a state with a comprehensive insurance coverage mandate and 19% lived in a state with a partial

mandate. A contraceptive use gap of at least one month was reported by 18% of women (14% of women in states with comprehensive mandates, 22% of women in states with partial or no mandates). In the month before interview, the most common contraceptive methods were the oral contraceptive pill (34%), condoms (21%) and various forms of long-acting reversible contraceptives (i.e. injectables, implants or IUDs) (9%). Among oral contraceptive pill users and long-acting reversible users, approximately 66% used this method in all sexually active months

Table 4.1 summarizes the characteristics of privately insured women by state insurance mandate. Age distributions, marital status and future pregnancy intentions were similar by state insurance mandate status. In states with comprehensive mandates, 68% of the population was non-Hispanic white relative to 82% in states with partial mandates and 72% in states with no mandates. In states without insurance mandates 13.5% of women had incomes <100% FPL, compared to approximately 7% in states with partial or comprehensive mandates. Additionally, 48% of women in states with comprehensive mandates reported never having been pregnant, compared to 40% and 43%, respectively, in partial and no mandate states.

Table 4.2 shows that the county-level contextual variables were similar across insurance mandate groups. The confidence intervals for the means of all variables overlapped; however, a few trends emerged. States with comprehensive mandates had average 2005 per capita income of $38,320 (Standard Error (SE): $1,160), higher than states with no insurance mandate (mean: $32,192; SE: $858). The crime rate was slightly higher in states without insurance mandates and the unemployment rate was

slightly lower. Women living in states with partial insurance mandates were least likely to have one population in their county designated as having significant barriers to primary medical care (26%) compared to those with comprehensive (40%) and no insurance mandate (39%).

Association between mandates and consistent contraceptive use

Table 4.3 shows the association between insurance mandates and consistent contraceptive use. Overall, 81.7% of privately insured women reported consistent contraceptive use. Among women with private insurance, those living in states with comprehensive mandates had 70% increased likelihood of consistent contraceptive use (OR: 1.70; 95% CI: 1.16-2.51) compared to women living in states with no mandates. The association did not materially change with adjustment for confounding (adjusted OR: 1.64; 95% CI: 1.08-2.50). Partial mandates were not associated with increased consistent contraceptive use in privately insured women.

The results of the analysis among women without insurance are shown on Table 4.3. The proportion of uninsured women reporting consistent contraceptive use was 72.6%. For the comprehensive insurance mandates, there was no effect of insurance mandates on consistent contraceptive use among uninsured women (Adjusted OR: 0.77; 95% CI: 0.38-1.55). There was no association between partial insurance mandates and consistent contraceptive use among women without insurance (Adjusted OR: 0.84; 95% CI: 0.48-1.46).

Conclusions

We found that privately insured women living in states with a comprehensive mandate had an increased likelihood of consistent contraceptive use compared to privately insured women living in states with no mandates. This suggests that comprehensive insurance mandates are associated with higher rates of consistent contraceptive use among women with private health insurance coverage. The association between state insurance mandates and consistent contraceptive use did not extend to women without insurance coverage. This supports the notion that the observed association is due to differences in mandates across states and not in unobservable cross-state differences.

A majority of non-elderly U.S. women have private health insurance. Approximately 59% of non-elderly women have health coverage through their own or a relative's employer and an additional 6% have an individually purchased insurance plan.[84] In the early 1990's nearly all private health plans covered prescription drugs, but half provided no coverage for contraceptive drugs or devices and only one-third covered the oral contraceptive pill.[81] State-level insurance mandates are associated with increases in the proportion of insurers who offer contraceptive coverage, which may increase consistent contraceptive use, and our study supports this.[81]

As of March 2011, 28 states had comprehensive insurance mandates requiring insurance companies to cover contraception.[85] Although progress has been made, limitations of state policies mean that many American women are not directly affected by these mandates. Under the Employee Retirement Income Security Act (ERISA) self-

insured employers are governed by federal policy and therefore not subject to state-level mandates. Approximately 59% of employees receive health coverage from self-insured employers.[86] The Affordable Care Act (ACA) passed in 2010[82] promises a standardization of insurance plans at a federal level which will impact all types of insurers and reach all insured Americans. Although not completely specified, the ACA is expected to include a full range of family planning and reproductive health services by 2013 under the "essential benefits package".[87] Based on our findings, such standardization of family planning services may improve the consistent use of contraceptive methods among privately insured women.

This study's findings must be considered in light of several limitations. The observed association between mandates and consistent contraceptive use may be diluted, as women in our sample may have worked for large employers who were self-insured and thus not affected by the state insurance mandates. Information on the type of employers (fully insured vs. self-insured) was not available in the NSFG. While we were unable to evaluate the extent to which this may have biased our findings, this is likely to have attenuated the estimate of effect. While our study suggests that consistent use of contraceptives is higher among privately insured women in states with mandates, we were unable to evaluate the impact of high prescription copayments, deductibles or prescription dispensing practices.[74, 88] We were also unable to evaluate the extent to which contraceptives were used correctly, consistently, or with every episode of intercourse. Other factors such as, pregnancy ambivalence, partner preferences or knowledge deficits about correct contraceptive use or pregnancy

prevention, may contribute to gaps in contraceptive use, but were not captured by the NSFG.[89]

The use of contraceptives saves approximately $19 billion annually in direct medical costs.[90] The cost of providing reversible contraceptive coverage is approximately $22 per employee per year, representing <1% of coverage costs.[3] These costs are easily offset by the health care expenditure savings of averted births. As the content of the essential benefits package and other provisions of the health care reform act are debated, understanding the potential magnitude of effect associated with mandated insurance benefits is important. Our study suggests that continued expansion of insurance coverage of contraceptives through state-level mandates is likely to increase consistent contraceptive use among privately insured women. Further, inclusion of contraception coverage in the essential benefit package defined under federal provisions of the ACA would expand coverage of contraceptives to insured women of reproductive age not currently affected by state-level mandates, and could significantly increase consistent contraception use.

Table 4.1: Characteristics of privately insured women by state-level insurance coverage for contraception mandates

	Comprehensive Insurance Mandate	Partial Insurance Mandate	No Insurance Mandate
	n = 1,110	n = 394	n = 772
	WtdN = 8,944,071	WtdN = 3,716,017	WtdN = 7,232,028
	Weighted Percentages		
Sociodemographic Factors			
Age at Interview			
15-19years	11.0	10.3	10.0
20-34 years	57.1	60.7	61.0
35-45 years	31.9	29.0	29.0
Education			
Less than High School	8.6	11.0	7.9
High School Graduate	19.0	19.1	16.5
At Least Some College	72.4	69.9	75.6
Race/Ethnicity			
White, Non-Hispanic	67.7	82.1	71.8
Black, Non-Hispanic	11.4	8.5	12.6
Hispanic	11.6	5.3	10.2
Other, Non-Hispanic	9.3	4.0	5.4
Marital Status			
Married	47.8	53.6	53.6
Cohabitating	10.4	8.1	10.9
Formerly Married	6.0	6.7	7.6
Never Married	35.8	31.6	27.8
Income			
Poverty Level			
<100% FPL	7.2	7.3	13.5
100-199% FPL	16.8	18.2	15.9
>=200% FPL	76.0	74.5	70.6
Sexual History Factors			
Age at First Intercourse			
<15 years	8.6	10.3	11.5
15-17 years	47.0	49.0	41.0
18+years	44.4	40.7	47.5
Lifetime Partners			
1 to 4	59.2	50.3	55.3
5 +	40.8	49.7	44.7

	Comprehensive Insurance Mandate	Partial Insurance Mandate	No Insurance Mandate
Reproductive History Factors			
Future Pregnancy Intentions			
Intends Future Pregnancy/Does not know intent	60.9	59.6	60.5
Does Not Intend Future Pregnancy	39.1	40.4	39.5
Total Number of Induced Abortions			
At least one abortion	14.2	10.0	11.0
Never had an abortion	37.7	51.3	46.1
Never Pregnant	48.1	38.8	42.9

Table 4.2: County-level characteristics by insurance coverage of contraceptives mandates

	Comprehensive Insurance Mandate n = 1,110 WtdN = 8,944,071 Mean (95% Confidence Interval)	Partial Insurance Mandate n = 394 WtdN = 3,716,017 Mean (95% Confidence Interval)	No Insurance Mandate n = 772 WtdN = 7,232,028 Mean (95% Confidence Interval)
Percent of County Population Non-Hispanic Black	10.6 (7.7-13.5)	9.58 (6.10-13.06)	14.15 (9.62-18.69)
Percent of County Population Hispanic	15.2 (11.0-19.4)	6.54 (4.62-8.45)	12.75 (9.33-16.17)
County-level Gini Index	0.45 (0.44-0.46)	0.43 (0.42-0.44)	0.45 (0.44-0.46)
County-level per capita income, 2005	$38,320 ($36,007-$40,631)	$34,054 ($32,003-$36,104)	$32,192 ($30,482-$33,902)
County-level Index Crime Rate, 2004*	3,878 (3,468-4,229)	3,299 (2,747-3,852)	4,415 (4,017-4,813)
County-level Unemployment rate, 2005	5.06 (4.53-5.60)	5.38 (5.01-5.75)	4.64 (4.31-4.97)
		Weighted Percentages	
Percent of Counties with at least one population designated as a health provider shortage population.	40.4	25.5	39.2

*Number of index crimes (willful homicide, forcible rape, robbery, burglary, aggravated assault, larceny over $50, motor vehicle theft and arson) reported to police per 100,000 persons.

Table 4.3: Association between Insurance Mandates and Consistent Contraceptive Use*

	Privately Insured	Uninsured
	n = 2,276	n = 765
	WtdN = 19,892,116	WtdN = 6,065,009
Percentage Consistent Users	81.7%	72.6%
	Odds Ratio (95% Confidence Interval)	
Comprehensive State Insurance Mandates	n = 1,110	
Crude Association†	1.70 (1.16-2.51)	0.99 (0.52-1.87)
Adjusted for Education, Per capita income and crime rate‡	1.64 (1.08-2.50)	0.77 (0.38-1.55)
Partial Mandates	n = 394	
Crude Association†	0.95 (0.64-1.43)	1.32 (0.68-2.54)
Adjusted for Education, Per capita income and crime rate‡	0.94 (0.62-1.44)	0.84 (0.48-1.46)

* Models shown are the result of an iterative approach which identified and included only material confounders whose presence in the model altered the association between mandates and consistent contraceptive use.

† Unadjusted model, compared to "no insurance mandate."

‡ No other variables considered altered the odds ratio materially.

Reference List

Reference List

1. Finer LB, Henshaw SK. Disparities in rates of unintended pregnancy in the United States, 1994 and 2001. *Perspect Sex Reprod Health.* 2006 ;38(2) :90-6.
2. Magnusson BM, Masho SW, Lapane KL. Adolescent and sexual history factors associated with reproductive control in US women aged 18-44. *Sex Health.* 2011;8(1):95-101.
3. Trussell J. The cost of unintended pregnancy in the United States. *Contraception*. 2007;75(3):168-70.
4. Kost K, Landry DJ, Darroch JE. Predicting maternal behaviors during pregnancy; does intention status matter? Fam Plann Perspect. 1998; 30(2):79-88.
5. Than LC, Honein MA, Watkins ML, Yoon PW, Daniel KL, Correa A. Intent to become pregnant as a predictor of exposures during pregnancy: is there a relation? *J Reprod Med*. 2005; 50(6):389-96.
6. Kost K, Landry DJ, Darroch JE. The effects of pregnancy planning status on birth outcomes and infant care. *Fam Plann Perspect*. 1998;30(5):223-30.
7. Bhutta AT, Cleves MA, Casey PH, Cradock MM, Anand KJ. Cognitive and behavioral outcomes of school-aged children who were born preterm: a meta-analysis. *JAMA.* 2002;,14;288(6):728-37.

8. Klepinger DH, Lundberg S, Plotnick RD. Adolescent fertility and the educational attainment of young women. Fam Plann Perspect. 1995; 27:23-8.

9. Baydar N. Consequences for children of their birth planning status. Fam Plann Perspect 1995;27:228-34,45.

10. Guttmacher Institute. Facts on publicly funded contraceptive services in the United States. 2010. Available at: www.guttmacher.org/pubs/fb_contraceptive_serv.pdf. Accessed May 20, 2010.

11. Wu J, Meldrum Sm Dozier A, Stanwood N, Fiscella K. Contraceptive nonuse among US women at risk for unplanned pregnancy. *Contraception*. 2008;78(4):284-9.

12. Wulf D, Donovan P. Women and societies benefit when childbearing is planned: issues in brief. New York, NY: The Alan Guttmacher Institute; 2002.

13. Raine T, Minnis AM, Padian NS. Determinants of contraceptive method among young women at risk for unintended pregnancy and sexually transmitted infections. *Contraception.* 2003 Jul;68(1):19-25.

14. Soler H, Quadagno D, Sly DF, Riehman KS, Eberstein IW, Harrison DF. Relationship dynamics, ethnicity and condom use among low income women. *Fam Plann Persepct.* 2000 Mar-Apr;32(2):82-8, 101.

15. Betrand JT, Hardee K, Magnani RJ, Angle MA. Access, quality of care and medical barriers in family planning programs. *Intl Fam Plann Perspect.* 1995:21(2):64-74.

16. Bernstein S, Edouard L. Targeting access to reproductive health: giving contraception more prominence and using indicators to monitor progress. *Reprod Health Matters.* 2007;15(29):186-91.

17. Sonfield A. Summer price spike: a case study about publicly funded clinics and the cost of contraceptive supplies. *Guttmacher Policy Rev.* 2006:9(4):2-5.
18. Gold RB, Sonfield A, Richards CL and Frost JJ, *Next Steps for America's Family Planning Program: Leveraging the Potential of Medicaid and Title X in an Evolving Health Care System,* New York: Guttmacher Institute, 2009.
19. Guttmacher Institute, Contraceptive needs and services, 2006. 2009. Available at: http://www.guttmacher.org/pubs/win/index.html. Accessed Apr 12, 2009.
20. Sonfield A, Alrich C, Gold RB, Public funding for family planning, sterilization and abortion services, FY 1980–2006, *Occasional Report,* New York: Guttmacher Institute, 2008, No. 38.
21. Alrich C. Public funding for family planning reaches new heights, propelled by state efforts to expand Medicaid eligibility. Guttmacher Policy Rev. 2008;11(1).
22. Guttmacher Institute. Contraception counts, in brief. 2006. Available at: http://www.guttmacher.org/pubs/2006/02/28/IB2006n1.pdf. Accessed on Jan 7,2010.
23. Guttmacher Institute, State Medicaid family planning eligibility expansions, *State Policies In Brief*, Apr 1,2010. Available at: http://www.guttmacher.org/statecenter/spibs/spib_SMFPE.pdf. Accessed on Apr 12, 2010.
24. Guttmacher Institute. Insurance coverage of contraceptives, *State Policies in Brief,* Apr 1, 2010. Available at: http://www.guttmacher.org/statecenter/spibs/spib_ICC.pdf. Accessed on Apr 12, 2010.

25. Guttmacher Institute. Emergency contraception. *State Policies in Brief,* Apr. 1, 2010. Available at: http://www.guttmacher.org/statecenter/spibs/spib_EC.pdf. Accessed on Apr 12, 2010.

26. Guttmacher Institute. Minors' access to contraceptive services, *State Policies in Brief,* Apr 1, 2010. Available at: www.guttmacher.org/statecenter/spibs/spib_MACS.pdf. Accessed on Apr 12, 2010.

27. Guttmacher Institute. Sex and STI/HIV education, *State Policies in Brief,* Apr 1, 2010. Available at: http://www.guttmacher.org/statecenter/spibs/spib_SE.pdf. Accessed Apr 12, 2010.

28. Guttmacher Institute. State family planning funding restrictions, *State policies in brief,* Apr 1, 2010. Available at: http://www.guttmacher.org/statecenter/spibs/spib_SFPFR.pdf. Accessed Apr 12, 2010.

29. Guttmacher Institute. Refusing to provide health services, *State Policies in Brief,* Apr 1, 2010. Available at: http://www.guttmacher.org/statecenter/spibs/spib_RPHS.pdf. Accessed on Apr 12, 2010.

30. Chin MH, Walters AE, Cook SC, Huang ES. Interventions to reduce racial and ethnic disparities in health care. *Med Care Res Rev.* 2007;64(5 Suppl):7S-28S.

31. Frost JJ, Darroch JE, Remez L. *Improving contraceptive use in the United States, In Brief*. New York: Guttmacher Institue; 2008, No.1.

32. Frost JJ, Singh S, Finer LB. U.S. women's one-year contraceptive use patterns, 2004. *Perspect Sex Reprod Health.* 2007 Mar;39(1):48-55.

33. Sonfield A, Frost JJ,Gold RB. *Estimating the Impact of Expanding Medicaid Eligibility for Family Planning Services: 2011 Update,* New York: Guttmacher Institute, 2011.

34. Kearny MS, Levine PB. Subsidized contraception, fertility and sexual behavior. *Rev Econ Stat.* 2009 Oct 1;91(1):137.

35. Groves RM, Mosher WD, Lepkowski J, Kirgis NG. Planning and development of the continuous National Survey of Family Growth. National Center for Health Statistics. Vital Health Stat 1(48). 2009.

36. Lepkowski JM, Mosher WD, Davis KE, Groves RM, Van Hoewyk J. The 2006–2010 National Survey of Family Growth: Sample design and analysis of a continuous survey. National Center for Health Statistics. Vital Health Stat 2(150). 2010.

37. Guttmacher Institute. Medicaid Family Planning Eligibilty Expansion. *State Policies in Brief.* 2006 Jan 19.

38. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health and Soc Behav.* 1995. 36:1-10.

39. Rothman K, Greenland S, Lash T. Modern Epidemiology. Philadelphia, PA: Lippincott Williams and Wilkins; 2008:407-409.

40. US Department of Health and Human Services, National Center for Health Statistics. National Survey of Family Growth , 2006-08 Codebook. Available: http://www.icpsr.umich.edu/webdocs/jsp/documents/recode_specs/fem/POVERTY.pdf. Accessed April 20, 2011.

41. US Census Bureau. Household income for states 2008-2009. *American Community Survey Briefs.* Available at: http://www.census.gov/prod/2010pubs/acsbr09-2.pdf. Accessed March 20, 2011.
42. Health Resources and Services Administration. Shortage designations: health professional shortage areas. HPSA designation criteria for primary medical care. Available at: http://bhpr.hrsa.gov/shortage/hpsacritpcm.htm. Accessed February 15, 2011.
43. Fewell Z, Davey Smith G, Sterne JA. The impact of residual and unmeasured confounding in epidemiologic studies: a simulation study. *Am J Epidemiol.* 2007 Sep 15;166(6):646-55.
44. Research Triangle Institute (2004). *SUDAAN User's Manual, Release 9.0.* Research Triangle Park, NC: Research Triangle Institute.
45. Maldonado G, Greenland S. Simulation study of confounder-selection strategies. *Am J Epidemiol.* 1993. 138(11):923-936.
46. Dow WH, Harris DM, Liu Z. Differential effectiveness in patient protection laws: what are the causes? An example from the drive-through delivery laws. J Health Polit Policy Law. 2006 Dec; 31(6):1107-27.
47. Liu Z, Dow WH, Norton EC. Effect of drive-through delivery laws on postpartum length of stay and hospital charges. J Health Econ. 2004 Jan;23(1):129-55.
48. Mosher WD, Jones J. Use of contraception in the United States: 1982–2008. National Center for Health Statistics. *Vital Health Stat* 23(29). 2010.

49. Piccinino LJ, Mosher WD. Trends in contraceptive use in the United States: 1982-1995. *Fam Plann Perspect.* 1998 Jan –Feb;30(1):4-10, 46.

50. Upson K, Reed SD, Prager SW, Schiff MA. Factors associated with contraceptive nonuse among US women ages 35-44 years at risk of unwanted pregnancy. *Contraception.* 2010; 81:427-434.

51. Sawhill I, Thomas A, Monea E. An ounce of prevention: policy prescriptions to reduce the prevalence of fragile families. *Future Child.* 2010 Fall;201(2):133-155.

52. Lindrooth RC, McCullough JS. The effect of Medicaid family planning expansions on unplanned births. *Womens Health Issues.* 2007 Mar-Apr;17(2):66-74.

53. Frost JJ, Finer LB, Tapales A. The impact of publicly funded family planning clinic services on unintended pregnancy and government cost savings. J Health Care Poor Underserved. 2008 Aug;19(3):778-796.

54. Gold RB. Doing more for less: study says state Medicaid family planning expansions are cost-effective. *Guttmacher Rep Public Policy.* 2004 March.

55. Forrest JD, Singh S. Public-sector savings resulting from expenditures for contraceptive services. *Fam Plann Perspect.* 1990 Jan-Feb;22(1):6-15.

56. Sonfield A, Alrich C and Gold RB, Public funding for family planning, sterilization and abortion services, FY 1980–2006, *Occasional Report,* New York: Guttmacher Institute, 2008, No. 38.

57. Dryfoos JG. Family planning clinics—a story of growth and conflict. Fam Plann Perspect. 1988 Nov/Dec. 20(6):282-287.

58. Rothman K, Greenland S, Lash T. Modern Epidemiology. Philadelphia, PA: Lippincott Williams and Wilkins; 2008: 392-393.

59. Zheng H. Rising U.S. income inequality, gender and individual self-rated health, 1972-2004. Soc Sci Med. 2009 Nov;69(9):1333-42.

60. Rothman K, Greenland S, Lash T. Modern Epidemiology. Philadelphia, PA: Lippincott Williams and Wilkins; 2008:216-217.

61. Dehlendorf C, Rodriguez MI, Levy K, Borrero S, Steinauer J. Disparities in family planning. *Am J Obstet Gyncol.* 2010 Mar;202(3):214-20.

62. Frost JJ, Darroch JE. Factors associated with contraceptive choice and inconsistent method use, United States, 2004. Perspect Sex Reprod Health. 2008; 40(2):94-104.

63. Ranjit N, Bankole A, Darroch JE, Singh S. Contraceptive failure in the first two years of use: differences across socioeconomic subgroups. Fam Plann Perspect. 2001;33:19-27.

64. Trussell J, Vaughan B. Contraceptive failure, method-related discontinuation and resumption of use: results from the 1995 national survey of family growth. Fam Plann Perspect. 1999;31:64-72, 93.

65. Vaughan B, Trussell J, Kost K, Singh S, Jones R. Discontinuation and resumption of contraceptive use: results from the 2002 national survey of family growth. Contraception. 2008;78:271-83.

66. Meneses LM, Orrell-Valente JK, Guendelman SR, Oman D, Irwin CE Jr. Racial/ethnic differences in mother-daughter communication about sex. J Adolesc Health 2006;39:128-31.

67. Lefkowitz ES, Romo LF, Corona R, Au TK, Sigman M. How Latino American and European American adolescents discuss conflicts, sexuality and AIDS with their mothers. Dev Psychol 2000;36:315-25.

68. Guendelman S, Denny C, Mauldon J, Chetkovich C. Perceptions of hormonal contraceptive safety and side effects among low-income Latina and non-Latina women. Matern Child Health J. 2000;4:233-9.

69. Gilliam ML, Warden M, Goldstein C, Tapia B. Concerns about contraceptive side effects among young Latinas: a focus-group approach. Contraception 2004;70:299-305.

70. Kulper H, Miller S, Martinez E, Loeb L, Darney P. Urban adolescent females' views on the implant and contraceptive decision making: a double paradox. Fam Plann Perspect. 1997;29:167-72.

71. Magnusson BM, Sabik LM, Chapman DA, Masho SW, Elston Lafata J. Bradley C, Lapane KL. Contraceptive insurance mandates and consistent contraceptive use among privately insured women. *In preparation.*

72. Magnusson BM, Sabik L, Chapman DA, Masho SW, Elston Lafata J. Bradley C, Lapane KL. The impact of Medicaid family planning eligibility expansion on contraceptive use. *In preparation*.

73. Lindberg LD, Orr M. Neighborhood-level influences on young men's sexual and reproductive health behaviors. Am J Public Health. 2011 Feb;101(2):271-4.

74. Foster DG, Huleet D, Bradsberry , Darney P, Piolicar M. Number of oral contraceptive pill packages dispensed and subsequent unintended pregnancy. *Obstet and Gynecol.* 2011. 117(3):566-572.

75. Frost JJ, Henshaw SK and Sonfield A. Contraceptive needs and services: national and state data, 2008 update, New York: Guttmacher Institute, 2010.

76. Centers for Disease Control and Prevention. Achievement in public health, 1900–1999: Family planning. MMWR Weekly. 1999 Dec 3;48(47):1073-80.

77. Nearns J. Health insurance coverage and prescription contraceptive use among young women at risk for unintended pregnancy. Contraception. 2009. 79:105-110.

78. Cullwell KR, Feinglass J. Changes in prescription contraceptive use 1995-2002 the effect of insurance status. Obstet Gynecol. 2007. 116 (6):1371-1378.

79. Cullwell KR, Feinglass J. The association of health insurance with use of prescription contraceptives. Perspect Sex Reprod Health. 2007. 39(4):226-230.

80. Singh R, Frost J, Jordan B, Wells E. Beyond a prescription: strategies for improving contraceptive care. *Contraception.* 2009. 79:1-4.

81. Sonfield A, Gold RB, Frost JJ, Darroch JE. U.S. insurance coverage of contraceptives and the impact of contraceptive coverage mandates, 2002. *Perspect Sex Reprod Health.* 2004;36(2):72-79.

82. Office of Legislative Counsel. Patient protection and affordable care act health-related portions of the health care and education reconciliation act of 2010. U.S.

House of Representatives. As amended through May 1, 2010. Available at: http://docs.house.gov/energycommerce/ppacacon.pdf. Accessed February 1, 2011.

83. Guttmacher Institute. Insurance Coverage of Contraceptives. *State Policies in Brief.* 2006 Jan 1.

84. The Kaiser Family Foundation. Women's health insurance fact sheet. 2010. 2010. Available at: http://www.kff.org/womenshealth/upload/6000-09.pdf. Accessed April 15, 2011.

85. Guttmacher Institute. Insurance Coverage of Contraceptives. State Policies in Brief. 2011 March 1.

86. The Kasier Family Foundation & Health Education Research and Trust. Employer health benefits annual survey. 2010. Available at: http://ehbs.kff.org/pdf/2010/8085.pdf. Accessed April 15, 2011.

87. Sonfield A, Gold RB. Holding on to health reform and what we have gained for reproductive health [editorial]. *Contraception.* 2011. *In press, available online 31 January 2011.*

88. Espey E, Cosgrove E, Ogburn T. Family planning American style: why it's so hard to control birth in the US. *Obstet Gynecol.* 2007. 34:1-17.

89. Frost JJ, Singh S, Finer LB. Factors associated with contraceptive use and nonuse, United States, 2004. *Perspect Sex Reprod Health.* 2007. 39(2):90-99.

90. Trussell J, Lalla AM, Doan QV, Reyes E, Pinto L, Gricar J. Cost effectiveness of contraceptives in the United States. *Contraception.* 2009 Jan;79(1):5-14).

Vita

Brianna Michele Magnusson was born November 9, 1979 at Camp Pendleton, San Diego County, California. She is a United States Citizen. She received her Bachelor of Science in Community Health Education from Brigham Young University, Provo, Utah in 2002. She received her Master of Public Health from Virginia Commonwealth University, Richmond Virginia in 2005.

HONORS AND AWARDS

2008 Honors Society, Phi Kappa Phi
2010-11 Dissertation Assistantship $20,000, Virginia Commonwealth University.

RESEARCH POSITIONS

Graduate Research Assistantships—Virginia Commonwealth University, Richmond VA

2008 Community Health Research Initiative, VCU
Mentor: Judy Bradford, Ph.D. & Betsy Turf, Ph.D.

2009 Department of Epidemiology and Community Health, Research Assistant
Mentor: Resa M. Jones, Ph.D.

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TEACHING ACTIVITIES

Teaching Assistantships—Virginia Commonwealth University, Richmond VA

Fall 2007 EPID 571, *Principles of Epidemiology.*
Instructor: Saba Masho, MD, DrPH

Spring 2009 EPID 606, *Epidemiology II.*
Instructor: Hongjie Liu, PhD

PUBLICATIONS-PEER REVIEWED ARTICLES

Magnusson BM, Masho SW, Lapane KL. Adolescent and sexual history factors influencing reproductive control among US women aged 18-44. *Sex Health.* 2011. 8(1):95-101.

PUBLICATIONS – LETTERS AND COMMENTARIES

Magnusson BM, Lapane KL. Father's pregnancy intentions. *Perspect Sex Reprod Health.* 2009:41(2):131-2.

PEER REVIEWED RESEARCH PRESENTATIONS

Magnusson, BM., Lanier, JO, Masho, SW (October 2005). Predictors of Early Onset of Sexual Intercourse in Male and Female Residents of the United States. Poster Presentation. Virginia Public Health Association Annual Meeting, Charlottesville, VA.

Magnusson, BM., Lanier, JO, Masho, SW. (March 2006). Predictors of Early Onset of Sexual Intercourse in Male and Female Residents of the United States. Poster Presentation. Virginia Commonwealth Univeristy, Women's Research Day. Richmond, VA

Magnusson, BM, Lapane KL. (December 2008). Father's pregnancy intentions. Poster presentation. Public Health Research Forum. Virginia Commonwealth University. Richmond, VA.

Magnusson BM, Lapane KL. (May 2009). Multiple unintended pregnancy. Poster presentation. Public Health Research Forum. Virginia Commonwealth University. Richmond, VA.

Magnusson BM, Lapane KL. (June 2009). The impact of unwanted childbearing in reducing father involvement with young children. Poster presentation. Society for Pediatric and Perinatal Reproductive Epidemiologic Research, Annual Meeting. Orange, CA.

Magnusson BM, Masho SW, Lapane KL. (June 2010). Racial disparities in reproductive control. Poster presentation. Society for Epidemiologic Research, Annual Meeting. Seattle, WA.

Magnusson BM, Masho SW, Lapane KL. (June 2010). Early and adverse sexual experiences as a predictor for lack of reproductive control. Poster Presentation. Society for Pediatric and Perinatal Epidemiologic Research, Annual Meeting, Seattle, WA.