Distribution Agreement

In presenting this thesis or dissertation as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis or dissertation in whole or in part in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this thesis or dissertation. I retain all ownership rights to the copyright of the thesis or dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Signature:

_____

Alia Bayatti Date

The Effect of Medicaid Expansion on Family Planning Outcomes for Low-Income Women

By

Alia Bayatti
Master of Science in Public Health

Health Policy and Management

_____

Kathleen Adams, PhD
Committee Chair

_____

Peter Joski, MSPH
Committee Member

_____

Silke von Esenwein, PhD
Committee Member

The Effect of Medicaid Expansion on Family Planning Outcomes for Low-Income Women

By

Alia Bayatti

Bachelor of Science in Economics
George Mason University
2016

Thesis Committee Chair: Kathleen Adams, PhD

An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Science in Public Health
in Health Policy and Management
2020

Abstract

The Effect of Medicaid Expansion on Family Planning Outcomes for Low-Income Women

By: Alia Bayatti

A women's ability to choose if and when she wants to become pregnant has a direct impact on her health and well-being [1]. Currently the US trails behind other highly economically developed countries in terms of maternal health. Ensuring women have the resources and knowledge to have reproductive autonomy will help ensure that women and children have the best opportunity to continue and begin healthy lives.

The 2010 Patient Protection and Affordable Care Act (ACA) established many health care reforms in order to expand access to health insurance, protect patients, and reduce costs. A mechanism to increase access to health insurance was the expansion of Medicaid eligibility for low-income adults, especially low-income reproductive aged women, however, many states have still not adopted expansions. While there has been research that examines Medicaid expansion on access to pre-pregnancy insurance as well as studies that examined elements of the ACA on family planning outcomes there has yet to be a study that examines Medicaid expansion on a variety family planning outcomes for low-income women. The purpose of this investigation is to examine the effects of the ACA's Medicaid expansion on family planning outcomes, measured by the proportion of unintended pregnancies, postpartum contraception use, and postpartum Medicaid coverage. This study utilized Pregnancy Risk Assessment Monitoring System 2011-2017 data and a difference in difference logistic regression analysis approach to test the effect of Medicaid expansion on the proportion of unintended pregnancies, postpartum contraception use, and postpartum Medicaid coverage for low-income reproductive aged women. Low-income women in Medicaid expansion states were 9 percentage points more likely to have postpartum Medicaid coverage post expansion than non-expansion states, however there was no effect found on unintended pregnancy or postpartum contraception use, which remained at 47% and 80% respectively.

While the general analysis did not find significant effects' beyond Medicaid coverage postpartum, the sensitivity analysis's conducted revealed additional findings. By adhering to a more strict definition of expansion vs. non-expansion states, the results found previously were strengthen such that there was a 16 percentage point increase in likelihood that low-income women in expansion states would be more likely to have Medicaid coverage postpartum (from 42.8% to 58.9%). An additional sensitivity analysis restricted women to 100% FPL and utilized the strict definition of expansion vs. non-expansion found that the likelihood of unintended pregnancies decreased by 8 percentage points (from approximately 53% to 45%) and postpartum Medicaid coverage increased by 15 percentage points (from approximately 46% to 61%). While an additional sensitivity analysis, which restricted to 100% FPL held the strict definition, and omitted those aged 18-19 found that the same 15 percentage point increase in postpartum Medicaid coverage, and a 10 percentage point decrease in unintended pregnancies (from approximately 53% to 44%).

These findings suggest that Medicaid expansion is an element in improving access to reproductive planning and maternal health postpartum but it is not sufficient. These findings also suggest the need to protect these eligibility expansions, especially in the face of political uncertainty when ACA repeal, work requirements, and block grants are being discussed.

The Effect of Medicaid Expansion on Family Planning Outcomes for Low-Income Women

By

Alia Bayatti

Bachelor of Science in Economics
George Mason University
2016

Thesis Committee Chair: Kathleen Adams, PhD

A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Science in Public Health
in Health Policy and Management
2020

Contents

1 INTRODUCTION 1
2 BACKGROUND AND LITERATURE REVIEW 4
Family Planning and Effects of Insurance 4
The Interaction of Medicaid, The ACA, Medicaid Expansion, and Family Planning 4
Women and Medicaid, a History 4
Legacy of Family Planning Policy in Medicaid 4
Introduction of ACA, Medicaid Expansion & Family Planning 5
Expansion and Non-Expansion States, Systematic Differences 6
Current Literature and Gaps 7
The effects of Medicaid Expansion on insurance coverage and access to care 7
The effects of ACA Mandate Provisions on Family Planning Outcomes 9
3 METHODOLOGY: CONCEPTUAL FRAMEWORK 13
Focal Relationship 14
Mediators 15
Contextual level confounders and their association with constructs in the focal relationship 16
Individual level confounders and their association with constructs in the focal relationship 17
TESTABLE HYPOTHESIS 19
DATA DESCRIPTION 20
CONSTRUCT MEASUREMENT 21
ANALYTIC PLAN 25
4. Results 29
Descriptive Statistics 29
Descriptive Results 31
Data Analysis of Model A 33
Results of Model A 33
Sensitivity Analysis, Results of Model B 37
Sensitivity Analysis Model C, D, E, & F 40
5. Discussion 42
Key Findings 42
Limitations and Strengths 43

Policy Implications 45
Future Challenges 47
Conclusion 47
APPENDIX 48
Model B: Sensitivity Analysis Strict Definition Tables and Figures 5A to 5D 48
Model C: Sensitivity Analysis FPL<100% and Generous Definition Tables and Figures 6A to 6D 52
Model D: Sensitivity Analysis FPL<100% and Strict Definition Tables and Figures 7A to 7D 57
Table 6. Summary of Predicated Probability Estimates of Models 64

1 INTRODUCTION

Research Question: Has Medicaid Expansion improved Family Planning outcomes for women of reproductive age?

A women's ability to choose if and when she wants to become pregnant has a direct impact on her health and well-being [2]. Family planning (FP) helps women anticipate and attain their desired number and spacing of children. This is achieved through the education and use of contraceptive methods and the treatment of involuntary infertility [2, 3]. FP services are so significant to women's health that the CDC named FP one of the ten great public health achievements of the 21st century [3, 4]. This significance is perhaps due to the fact that the clinical context of FP has expanded over time, now including preventative services and risk management in addition to contraception and assistance planning and spacing pregnancies [2] [5]. Because of the expanded clinical context, FP may serve as a vital touch point for many low income women; it may even be their primary source of healthcare [3]. Numerous studies have shown the benefits of FP as it helps reduce the risk of unintended pregnancies, which have numerous implications later discussed including mitigating HIV transmission from mother to child, improved birth spacing, and reducing abortions rates, especially unsafe abortions [6]. In addition to the health benefits, studies have found that investing in family planning is cost saving. In 2010, every dollar invested in family planning services saved Medicaid $7.09 in related costs due to medical costs of pregnancy, delivery, and early childhood care [6] [7].

Unintended Pregnancy (UP) is defined as unwanted, mistimed, or unplanned pregnancy at the time of conception [8-10]. In 2011, it was reported that 45% of all births

in the US for women aged 15-44 were categorized as unintended [11]. This is higher than the world average of 41% [12]. The burden of UP is three-fold and includes significant adverse health outcomes for both the child and mother [8], as well as a significant financial burden on states as Medicaid programs pay for almost half of all births annually [13].

Children born from UP have notable disadvantages compared to those born of intended pregnancies. First, women with UP are 30% more likely to smoke or expose the fetus to other harmful substances, which increases the likelihood low birth weight, preterm birth, and birth defects of the mouth and lip [8, 9, 14]. In addition, UP have increased odds of low birth weight and preterm infants [15-18]. Evidence also notes lower rates of breast-feeding in UP compared to intended pregnancies, which is essential for fighting infectious diseases in infancy and reducing risk for sudden infant death syndrome, asthma, and certain allergic diseases [8, 19-21]. This evidence suggests the significant disadvantages children of UP face in comparison to children of intended pregnancies.

UP are associated with poor health outcomes among woman as well. Women with UP have increased levels of stress, depression, and post postpartum depression compared to women with intended pregnancies [8, 22-26]. In addition to these adverse health outcomes, women who have UP achieve lower levels of income post pregnancy compared to women who have intended pregnancies [19]. Furthermore, these adverse outcomes may be exacerbated when stratified by maternal income, race/ethnicity, or educational attainment [27].

While these adverse outcomes are burdensome on individuals, they also come at a cost to the state. Medicaid covers 51% of all US births and paid for 68% of the total 1.5 million unplanned births in 2010 which resulted in a total cost of $21 billion to Medicaid programs [13].

The Affordable Care Act (ACA) marked a landmark shift in the insurance landscape. Specifically for women's health, it increased access to FP services and no-cost contraception and expanded dependent coverage eligibility, which allowed women to remain on their family's health insurance until age 26. Leaders in the field speculate about the potential decrease in UP, as research has found that pre-pregnancy insurance coverage reduces the likelihood of UP [28, 29]. Early evidence suggests that the ACA has increased insurance coverage for women of reproductive age with low income [30]. The greatest effects of ACA have been on women without dependent children and women residing in states with relatively lower pre-ACA Medicaid eligibility levels or in states with no FP waiver prior to the ACA [31, 32].

This study will be the first, to my knowledge, to use the nationally representative survey Pregnancy Risk Assessment Monitoring System [33], and a significant post policy time period, to investigate the effect of Medicaid Expansion on FP outcomes as measured by the diverse proxies; 1) unintended pregnancies, 2) postpartum Medicaid coverage, and 3) postpartum contraception (PPC). These measurements will better explain the impact and sustainability of Medicaid expansion for low-income women as they capture family planning outcomes by using both outcome measurements, UP, and nuanced process measurements (PPC use and postpartum Medicaid coverage).

2 BACKGROUND AND LITERATURE REVIEW

Family Planning and Effects of Insurance

Health insurance serves as a mechanism to lower out of pocket costs for individuals. Reduced costs play an especially important role for low-income populations who may be unable to afford health services without the assistance of insurance [34]. Studies have found an association between health insurance, family planning service utilization, and contraception use where health insurance has been found to improve access and use of family planning services [35] [36, 37].

The Interaction of Medicaid, The ACA, Medicaid Expansion, and Family Planning

Women and Medicaid, a History

Medicaid is a joint federal and state program that serves to assist low-income populations with medical cost and is the largest insurance provider for low-income populations [38]. Within the Medicaid population, women make up a significant proportion of recipients. This is perhaps due to the history of eligibility requirements that stem from the welfare program formally known as Aid to Families with Dependent Children and efforts in the 1980's to expand insurance coverage to low-income pregnant women [5]. Prior to the ACA, women aged 15 to 49 (reproductive years) accounted for 70% of Medicaid enrollment nationwide, with the proportion significantly varying state to state due to state different eligibility criteria. Since the ACA's implementation, there has been a 22% increase in enrollment for reproductive aged women living below the Federal Poverty Level (FPL) [5, 39].

Legacy of Family Planning Policy in Medicaid

Medicaid and family planning are deeply intertwined. For years there has been a growing awareness of the importance of access to FP. Since 1972 it has been mandatory for all state Medicaid programs to provide some form of FP services to beneficiaries who

obtain full coverage Medicaid, however prior to the ACA, it was largely at the discretion of the states to define the specific services and benefits covered in their program. Strong incentives exist for the states to provide a robust variety of services and benefits under FP, since the federal government covers 90% of states' expenditures on FP. However, we still do not see comparable programs state to state [5]. In addition, many states, noting the importance of access to FP services have established FP programs using 1115 waivers. These programs essentially provide FP services to women, and in some instances men, who are not eligible for full Medicaid coverage. Studies have found that use of these narrow scope FP programs are associated with reduced number of births and furthermore, reduced rates of UP [40, 41].

Introduction of ACA, Medicaid Expansion & Family Planning

The ACA has decreased the number of uninsured Americans by establishing a number of policies. Most notably, for reproductive aged women, this included increasing Medicaid insurance eligibility to 138% of FPL, expanded dependent coverage eligibility to age 26, and established subsidies for marketplace insurance. The ACA has also allowed states to amend FP programs with a State Plan Amendment (SPA), which has decreased the administrative barriers for states to provide expanded FP services for non-eligible Medicaid, low income populations. The ACA also required insurers to cover preventative services and FDA approved contraceptive methods with little or no cost sharing which has been shown to increase use of preventative services and prescription contraception among privately insured women [42-45].

Because of the expansion of eligibility and the movement away from categorical requirements, such as parenthood, low-income reproductive aged women have benefited the most from the ACA [46]. Nearly 5 million women of reproductive age (19-44 years)

gained insurance coverage between 2010 and 2015 [47], with 10% of this increase due to women obtaining insurance through Medicaid expansion or marketplace subsidies.

A natural experiment has been created after the 2012 US Supreme Court National Federation of Independent Business v. Sebelius ruling [48]. The verdict left Medicaid expansion decisions up to the state without the consequences of reduced federal program funding. Since the verdict has been implemented, the gap in insurance coverage for childless adults, an important population to consider with regards to FP, has shrunk as many states have chosen to expand Medicaid coverage under the ACA. Although there is early evidence on the different effects of state Medicaid expansions on insurance coverage, access to care, and contraceptive use, there has yet to be a full evaluation using a nationally representative sample of the impact of state Medicaid expansion on different FP outcomes for low-income women. As of August 2019, 37 states (including the District of Columbia) have adopted Medicaid expansion while 14 have not. This study will benefit from PRAMS state specific survey and three years post policy data [33] to evaluate the influence of Medicaid expansion on the FP outcomes for low income women of reproductive age.

Expansion and Non-Expansion States, Systematic Differences

There have been notable geographic distinctions between expansion and non-expansion states, with non-expansion states generally located in the south and midwest, and expansion in the north and west [49]. In addition to these geographic differences, there are important systematic differences as well. Expansion states, especially early adopters, tend to be more affluent than non-expansion states [50]. Expansion states also tend to have had more FP coverage for women prior to the ACA and Medicaid expansion, with 17 of the 28 states having had previous FP programs [51]. This divide is

especially apparent as three of the five states with the highest uninsured individuals - Texas, Florida, and Georgia - have yet to participate in Medicaid expansion (while Florida and Georgia do offer limited FP services, a gap in coverage none-the-less remains). In addition to systematic differences in insurance availability in expansion vs. non-expansion states, there are clear demographic differences. The majority of non-expansion states are in the south, which has a larger population of ethnic and racial minorities [52]. These systematic differences are noted and controlled for in this investigation as they may affect FP outcomes as well.

Current Literature and Gaps

The effects of Medicaid Expansion on insurance coverage and access to care

The Johnston et al. study investigates whether Medicaid Expansion improved insurance coverage and access to care for low-income women of reproductive age. 2012 to 2015 data from the Behavioral Risk Factor Surveillance System (BRFSS) was utilized to establish a two-way fixed effects difference-in-difference model. The analytic sample was limited to 100% of the FPL in order to minimize the effect of subsidies given to women between 100-138% of the FPL in non-expansion states, a unique practice not utilized in other studies with this population. The study concludes that the ACA Medicaid expansions decreased un-insurance among low-income women of reproductive age by 13.2 percentage points with the greatest improvements seen in women without dependent children and those residing in states with relatively lower pre-ACA Medicaid eligibility levels [53].

Due to limitations in the data this study was unable to distinguish between the type of health insurance held. The methodology accounted for this limitation by utilizing

a sample that would be Medicaid eligible had they lived in expansion states, however it must be understood that this study could not directly attribute the decrease in uninsured to an increase in Medicaid coverage. Despite this limitation the study provides a foundation to pursue the implications of Medicaid Expansion on improvements in FP outcomes for low-income women. Such an investigation would be particularly notable for previously childless reproductive aged women, as the study indicates they had the largest insurance effect (i.e., those in the coverage gap in non-expansion states).

Similar to Johnston, Mark Clapp's study investigated the effect of Medicaid expansion on insurance coverage. However, Clapp specifically focused on the subpopulation of women who had given birth within the study year. The study ultimately found that Medicaid expansion was associated with increased enrollment in Medicaid prior to pregnancy for low-income women; however, in contrast to Johnston, the study notes there were no changes in the un-insurance rate [30]. There were two major limitations to this study; first, the analytic time period for post policy was limited to one year. This short time period may underestimate the policy's ultimate effect as it does not allow adequate time for awareness or behavioral change to occur. Second, although Clapp appears to have used the same criteria for selecting treatment and control groups as other studies, which involves excluding states with prior Medicaid expansion like features, compared to Johnston et al. Clapp is less restrictive in adhering to his criteria. This looser adherence may underestimate results. So, while the study presents interesting findings, the limited analytic horizon, and liberal criteria for study state selection are limitations.

My investigation will build upon Clapp et al. findings and will use similar data and methodology to expand their previous scope and address the shortcomings by expanding the post policy time and adhering to Johnston's criteria of categorizing states. This investigation will also control for a state abortion rate, which is an essential factor as the working definition of UP in this investigation includes those that carried the baby to term and had a live birth.

A recent study examined the effects of Medicaid Expansion on Postpartum Coverage and Outpatient Utilization between Colorado, an expansion state, and Utah, a non-expansion state. Medicaid claims data from 2013-2015 were utilized and found in comparison to Utah, Colorado's Medicaid expansion was associated with 1.4 months of postpartum Medicaid coverage among women who reported maternal morbidity at delivery and .9 months of postpartum Medicaid coverage among all women. This study will build upon these findings and expand the scope by examining more expansion and non-expansion states as well as additional pre and post policy years in order to better examine the question on whether Medicaid expansion improved postpartum Medicaid coverage. In contrast to the previous study, which examined months of coverage, this study will examine whether women maintained coverage 2-4 months postpartum. Thus capturing the true effect of Medicaid expansion as those with Medicaid coverage for pregnancy would lose coverage 2 months postpartum.

The effects of ACA Mandate Provisions on Family Planning Outcomes

MacCallum and Margerison's study uses a nationally representative sample of sexually active women, aged 18-44, from the National Survey of Family Growth, with all incomes and insurance types, to investigate the implications of the ACA contraception mandate. The hypothesis was that the contraception mandate would reduce UP through

improved affordability and access to contraceptive resources. The authors utilized logistic regression to compare the odds of UP pre-mandate 2008-2010 vs. post mandate 2013-2015. The results found that there was evidence that the mandate was associated with greater use of contraception, however, the mandate alone was not associated with a reduction in the UP rate for reproductive aged women two years following its implementation. However, when the authors conducted a subgroup analysis of women with 'government sponsored' insurance they found a significant 37% decrease in the odds of UP, which suggests that there was a "joint-effect of the mandate with other ACA provisions (e.g. Medicaid expansion and the healthcare insurance marketplace)" [54]. The latter results are particularly insightful for my investigation, which examines the population of women with government insurance i.e. Medicaid.

While this study had interesting findings, there were several limitations. First, it utilized cross-sectional data, thus authors were unable to prove causality. Second, the study was limited by its short follow up length. With the contraception mandate implementation effective August 1, 2012 only 3 years of post data were analyzed. This may be an insufficient amount of time to analyze a behavioral change, and consequently may underestimate the overall effect of the contraceptive mandate. Moreover, although this study aimed to examine the contraception mandate, the study inherently could not differentiate between the various other provisions of the ACA such as Medicaid expansion, dependent coverage, and the insurance marketplace. In contrast, my investigation will more accurately examine the effect of Medicaid expansion as it will use a difference in difference approach to analyze FP outcomes for low income women,

restricting the analytic sample to women who would have been Medicaid eligible had they lived in expansion states.

Another provision in the ACA was established to reduce a states burden of renewing 1115 family planning waivers[1] by allowing states to institute a State Plan Amendment[2] (SPA). Sara Redd investigated the effect of state Medicaid family planning programs transitioning from a Section 1115 waiver to a SPA on reproductive health outcomes. She found that transitioning to a SPA increased the likelihood of postpartum contraception use, but did not significantly impact unintended pregnancy rates among low income women [55]. Redd justifies this result by describing UP as a long-term outcome. Influencing a long-term outcome through public health policy takes time, and while she notes this, a major limitation to her investigation was that it analyzed a brief post-policy period. Another limitation was her small study state population. With only two study states, the validity of the standard errors attained in her analysis is low.

While Redd's investigation is not without its limitations, her findings are important to consider for this investigation, the reason is two fold. First, we both examine similar populations, low-income women. This allows confidence in the expectations of similar effects as women in this population would likely have similar exposure to information, and resources. Second, Redd's independent variable is quite similar to my investigation of measuring the effect of Medicaid expansion, i.e. expanded individual eligibility, in that the primary difference between providing family planning services via a SPA rather than a waiver is also due to expanded eligibility for individuals.

---

[1] 1115 Family Planning Waivers are budget neutral programs that expand limited insurance coverage (only covering family planning services, defined differently state to state) to those that are not-eligible for full Medicaid coverage. States must renew these programs every 5 years.

[2] A state plan amendment for family planning is a permanent change to the state's Medicaid program which utilizes an income-based eligibility approach.

Conversely, our investigations have inherent differences as well. Due to the limited nature of an individual's coverage through a SPA (family planning services are the only service provided), beneficiaries are inherently well aware of their benefits, while a newly eligible full Medicaid beneficiary might not fully understand all their benefits. Thus, my investigation's contribution will be examining the effects of full Medicaid coverage due to Medicaid expansion on family planning outcomes. If findings are different than Redd's it could suggest newly eligible Medicaid beneficiaries are not aware of coverage benefits and or that additional barriers exist.

This investigation aims to examine whether Medicaid expansion has improved family planning outcomes, proxied by unintended pregnancies, postpartum Medicaid coverage, and postpartum contraception use. Literature shows that pre-pregnancy insurance coverage is associated with lower probability of unintended pregnancies and improvements with family planning access and use [28]. The current literature on the ACA and Medicaid expansion provides a foundation to build upon for this research question as early reports have found that expansion decreased the un-insurance rate among low-income women, and a sub-analysis suggests that there was a decrease in the rate of unintended pregnancies among low-income women on Medicaid. However, conflicting evidence found that expanded family planning eligibility for individuals, through State Plan Amendments (SPA), increased postpartum contraception use, but not unintended pregnancies. All three studies show that there have been significant effects regarding access to insurance as well as reproductive outcomes since the ACA and Medicaid expansion have taken place.

The current evidence is beneficial in that they clearly define the populations of interest and examine the policy of interest using national data, which increases their generalizability and validity. However, the evidence thus far falls weak in that the majority of the studies where unable to successfully isolate their independent variable/construct of interest. Johnston's capture of the un-insurance rate, rather than Medicaid coverage, MacCallum and Margerison's inability to distinguish between the contraception mandate and Medicaid expansion, and Redd's reliance of state-level effects to identify family planning access through a SPA rather than a direct measure. The inability, thus far, to distinguish the effect of Medicaid expansion on family planning outcomes demonstrates that there remains a major gap in the literature and is the primary contribution of this investigation. This understanding will help direct state policy conversations about the effectiveness of expansion and the gaps that may remain. Since Medicaid expansion works to somewhat standardize coverage and benefits, understanding effects on key outcomes of FP can drive further policy on standardizing FP services and benefits as they currently vary state to state and plan to plan. This investigation will benefit from a quasi-experimental difference in difference methodology study design to isolate the effect of Medicaid expansion on low-income women and will benefit from the ability to compare to the control states.

3 METHODOLOGY: CONCEPTUAL FRAMEWORK

The Anderson Behavioral Model for Health Care Utilization was utilized in order to conceptualize the framework I will draw on for this investigation. The structural foundation of the Anderson Model serves to identify conditions that may facilitate or

impede health care service utilization [56]. The evolved model accomplishes this by identifying both individual and contextual level characteristics that are determinants of access to care. These are classified as, predisposing, enabling, and need factors. Predisposing factors are existing conditions, biological or social, that may influence health care service utilization. Enabling factors are external factors that may enhance, or impede the ability to obtain health care services; these are often financial or policy related. Need factors are generally the health conditions that the individual, medical professional, or society evaluate, or perceive, as requiring medical treatment [56].

Focal Relationship

The focal relationship examined in this investigation is state *Medicaid expansion status* and its influence on *Family Planning Outcomes*. Medicaid expansion refers to the 2010 provision of the Affordable Care and Patient Protections Act in which states had the option of expanding Medicaid eligibility to all those with incomes under 138% of the FPL and providing subsidies for marketplace coverage for those with incomes between 100% to 400% of the FPL [57]. The Family Planning Outcomes studied here include UP, PPC use, and postpartum Medicaid coverage (PPMC). As referenced previously, UP is defined as unwanted, mistimed, or unplanned pregnancy at the time of conception, PPC is a women's self indication of contraception use 2 to 4 months after she has given birth, and PPMC is a women's self identification of health insurance 2 to 4 months after delivery [8-10].

Health insurance reduces financial barriers to access to care, and increases access to information about and access to contraception [57]. That is to say, Medicaid expansion reduces the financial barriers for access to FP services and increases family planning. In order to be considered Medicaid expansion for the purposes of this study, the state must

have expanded in January 2014 and had no prior expansion-like programs. This definition is standard in the literature, however a sensitivity analysis will be conducted in order to consolidate the existing literature in which states are classified slightly differently concerning prior expansion like programs.

Mediators

Pre-pregnancy Medicaid coverage, Family Planning (FP) service utilization and *reproductive autonomy* are mediators in this framework. *Pre-pregnancy* Medicaid coverage is defined as Medicaid coverage one month before pregnancy, as asked in the PRAMS survey. Family planning service utilization is defined as a visit prior to pregnancy that involved consultation regarding pregnancy intentions, or contraception use. Reproductive autonomy is defined as the ability to have the power and resources to decide and control contraceptive use, pregnancy, and childbearing intentions [58, 59]. These enabling constructs help explain the relation between Medicaid expansion and family planning outcomes and thus are proposed as a mediator of the focal relationship. *Pre-pregnancy* Medicaid coverage will be measured as Medicaid coverage pre-pregnancy by using the result of the PRAMS question "during the month before you got pregnant with your new baby, were you covered by any of these health insurance plans?" or "during the month before you got pregnant with your new baby, what kind of health insurance did you have?" based on if the question was asked between 2011 or 2012-2017 respectively. A dichotomous variable will be constructed whereas 0=no pre-pregnancy Medicaid coverage and 1=Medicaid pre-pregnancy coverage. This mediator will only be applied to the unintended pregnancy outcome. Omitting this mediator on postpartum outcomes is necessary, as women insured pre-pregnancy would likely not have their postpartum eligibility affected by the Medicaid expansion. Additionally, due to

limitations of accurately capturing family planning service utilization and reproductive autonomy, these constructs are unmeasured, represented by italics in Figure 1.

Contextual level confounders and their association with constructs in the focal relationship

The following are the hypothesized contextual-level confounders of the focal relationship.

Enabling Characteristics

1115 FP Waivers/SPAs are policies that increase the eligibility of health insurance for specific reproductive needs for low-income women, and sometimes men. These policies enable women to obtain FP services and contraception at zero or reduced costs. Research has found a positive relationship between 1115 waiver use and Medicaid expansion, as well as a positive association between family planning outcomes and 1115 waiver use [40].

State Abortion Rate is the third contextual enabling factor. State laws may hinder or support women's ability to obtain abortions. This construct determines the abortion rate of the states. A higher abortion rate is associated with a positive correlation with Medicaid expansion, and improved family planning outcomes as proxied by UP, PPMC, and PPC [63].

Unemployment Rate is the last contextual enabling factor. This is defined by the states unemployment rate defined by those willing and able to seek work but without jobs. Based on current landscape states with lower unemployment are associated with Medicaid Expansion and positive family planning outcomes.

Individual level confounders and their association with constructs in the focal relationship

The following are the hypothesized individual-level characteristics to be confounders of the focal relationship.

Predisposing Characteristics

The construct *number of previous live births* is defined as the number of times a woman has given birth to a fetus that has had a gestational age of 24 weeks or more, regardless of whether the child was born alive or was stillborn [64]. Finer and Zolna's research indicated that the number of previous children affects UP [61, 65]. For this reason, the relationship between previous live births and family planning outcomes will depend on a women's number of previous births.

The construct *race/ethnicity* is defined as a self identification of biological, genetic, or cultural population differences [66]. Studies have shown that the incidence of UP is higher among minority ethnicities/races than non-Hispanic whites [27, 67, 68]. Medicaid expansion is lower among states with higher minority ethnicities/races [67].

The construct *age* refers to the number of years lived [69]. As age increases, there is a positive relationship with Medicaid Expansion, due to a older demographic in the northeast, much of which have expanded Medicaid [70]. There is a positive relationship with increased age and family planning outcomes as noted extensively in the literature [68].

Enabling Characteristics

This conceptual model will utilize the construct *social economic status* modeled after Oakes and Rossi's definition of SES. Oakes and Rossi define SES as "differential access, both realized and potential, to desired resources" [71]. Furthermore, they

underscore this construct by identifying that SES is not only a measure of access to desired resources, but a function of material capital, human capital, and social capital. Material capital refers to observable, tangible, easily convertible owned materials [71]. In this conceptual model material capital will be proxied by self identified pre-pregnancy health insurance status as noted above in mediators. *Health insurance* acts as a wealth/income transfer. This enables people access to medical care, services and medication. This investigation will employ a dichotomous classification of Medicaid insurance status. There is a positive association between material capital and Medicaid expansion [28, 49, 72] and a positive association between material capital and family planning outcomes [35, 67].

Human capital refers to "fixed endowments of an individual, including skills, stamina, innate cognitive function, as well as skills that may be developed or acquired through investment of time and labor" [71]. In this conceptual model, *educational attainment*, the highest level of education women has obtained, will be operationalized as human capital. Based on the previous knowledge in the literature it can be suggested that there is a positive correlation between educational attainment and Medicaid expansion and a positive association with family planning outcomes [65].

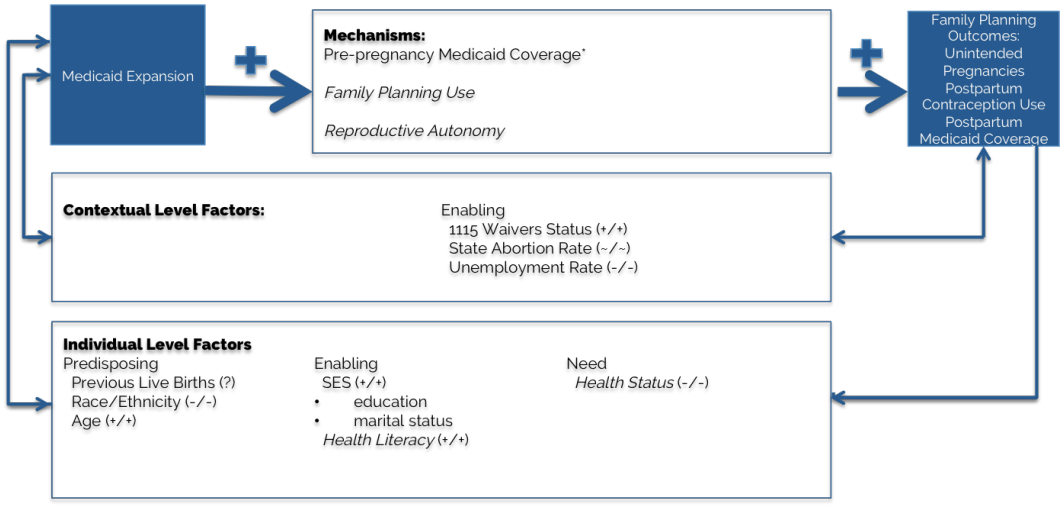
Social capital is the third domain of SES and may be defined as relationships with others and potential of those relationships [71]. In this conceptual model, *marital status* will be categorized as social capital, defined as identification of legalized marriage [73, 74]. While there isn't significant literature to identify a directional relationship with Medicaid expansion, there is significant literature to support a positive association with family planning outcomes [14, 40, 75].

The last enabling construct is *health literacy.* This refers to the knowledge to make informed health decisions. This construct will remain unmeasured due to the inability to standardize an individual's health literacy.

Need Characteristics

The construct *health status* attempts to encapsulate an individual's relative level of wellness, which includes biological or physiological dysfunction, symptoms, and functional impairment prior to pregnancy [76]. This construct both encapsulates perceived health status as well as diagnosed health status. There is an expected positive correlation between improved health and living in a state that has expanded Medicaid and a positive correlation with family planning outcomes [77, 78]. Health status is unmeasured as we are unable to get an accurate representation of the perceived and diagnosed health status for all women.

Figure 1. Conceptual Framework

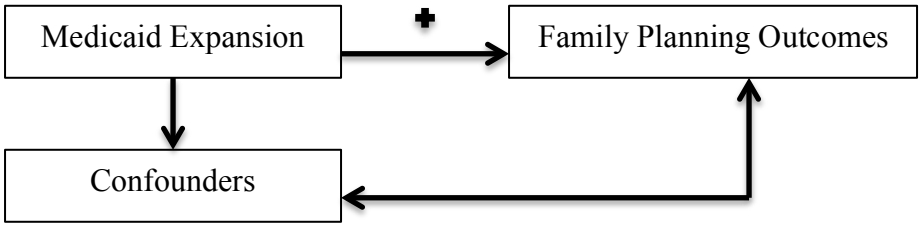


TESTABLE HYPOTHESIS

This investigation will test the following hypothesis, which is derived from the conceptual model:

H1: After controlling for confounders, Medicaid expansion is positively associated with family planning outcomes.

Figure 2. Hypothesis



The primary hypothesis follows economic theory and is grounded in Anderson's Behavioral Model for Health Care Utilization. The hypothesized relationship reflects the increased ability of women who have health insurance, to access and gain vital knowledge and services to better plan their pregnancies than women who do not have health insurance. And is reflected in the outcome measures, UP, PPC, and PPMC. This hypothesis is also grounded in the current literature, including studies that demonstrate improved elements of family planning outcomes when insurance mechanisms are expanded [31, 40].

DATA DESCRIPTION

The Pregnancy Risk Assessment Monitoring System [33] dataset will be used for this investigation [79]. PRAMS is a national surveillance project conducted in partnership between the CDC and state health departments beginning in 1987. The project collects state-specific information on health behaviors, access to care, and receipt of services among women who have recently had a live birth [79]. Every year the participating 47 states collect state level data on a sample of women who have had a recent live birth, based on the states birth certificate files. Selection is made through a stratified systematic sampling scheme based on two of the following six variables: birth weight, maternal

race/ethnicity, maternal education, maternal age, geographic area, and Medicaid status. Some high-risk groups are sampled at a higher rate in order to ensure there is enough data on smaller, risker populations. Roughly 1,300 to 3,400 women are sampled per state per year. In 2015, PRAMS set a minimum response rate, which stated that in order for data to be released, the majority of the states must meet at least 55% response rate. This leads to some states being excluded from year to year [79]. States are responsible for survey distribution. States distribute the survey monthly, primarily through the mail. Incentives, such as prepaid gift cards, may be used to increase participation, and vary by state [79]. This investigation will utilize all available data from all available states between the years 2011 to 2017 in order to examine the effects of Medicaid expansion. Because the survey only samples women that have given birth to a live child, this excludes women who have had a miscarriage, or abortion. The analytic sample for this investigation will be limited to low-income women under 138% of the FPL who would may have been affected by Medicaid expansion.

Other data sources utilized in this investigation include the Kaiser Family Foundation (KFF), Guttmacher Institute, Mediciad.gov, and the Gallup poll. Data from KFF informs the state Medicaid expansion status classification [49]. The CDC's Morbidity and Mortality Weekly Report was utilized to gather state Abortion rates. Medicaid.gov data is utilized for 1115 Waiver Status/SPAs status while the Gallup poll will provide static political affiliation of states, based on annual state averages in order to conceptualize the construct political affiliation [80].

CONSTRUCT MEASUREMENT

Measures

Unintended Pregnancy. The construct UP will be assessed using the self-reported intention indicated on the PRAMS survey question "Thinking back to just before you got pregnant with your new baby, how did you feel about becoming pregnant? Check ONE answer." [81]. Responses are limited to "I wanted to be pregnant later, I wanted to be pregnant sooner, I wanted to be pregnant then, I didn't want to be pregnant then or at any time in the future, I wasn't sure what I wanted." With the last option, 'I wasn't sure' being introduced in 2012. From these responses I will construct a dichotomous variable to classify pregnancies as intended and unintended. Intended will include the respondents who answered I wanted to be pregnant sooner, or I wanted to be pregnant then. The unintended category will include responses; I wanted to be pregnant later, I didn't want to be pregnant then or at any time in the future. These categories are consistent with those used in the literature [40].

Postpartum Contraception Use. The construct PPC will be assessed using the self-reported indication of birth control use from the PRAMS survey question "What kind of birth control are you or your husband or partner using now to keep from getting pregnant? Check ALL that apply." [81] Responses including 'Tubes tied or blocked, (female sterilization, Essure® , Adiana®) Vasectomy, (male sterilization) Birth control pill, Condoms Injection, (Depo-Provera®) Contraceptive implant, (Implanon®) Contraceptive patch, (OrthoEvra®) or vaginal ring, (NuvaRing®), Natural family planning (including rhythm method).' ." From these responses I will construct a dichotomous variable to classify PPC as yes and no.

Postpartum Medicaid Coverage. The construct PPMC will be assessed using the self reported insurance indication women select on the PRAMS survey question "What

kind of health insurance do you have now?" As the question is asked 2-4 months postpartum this indicates that this is the Medicaid coverage postpartum. A dichotomous variable, coverage, no coverage will be utilized.

1115 Waiver Status/SPAs. To measure FP Waiver and SPA adoption, a dichotomous variable of yes or no will be created using information from the Medicaid.gov website. I will identify which states adopted a FP waiver/SPA and categorize the state as either yes, adopted a 1115 waiver or SPA, or no, not having adopted a 1115 waiver or SPA in each particular year.

State Abortion Rate. The state abortion rate will be operationalized using a continuous variable based on state and year using data from the CDC's Morbidity and Mortality Weekly Reports. The rate is women abortions per 1,000 women aged 15-44 years old with data originating from the USDC, Census Bureau.

Number of Previous Live Births. This construct will be operationalized using the birth certificate data PRAMS merges with survey data. A categorical variable, will be utilized defined by the following five categories: none, 1, 2, 3-5 previous children, 6+ previous children.

Age. Women will be categorized into 6 age groups. These categories include less than 18-19 years of age, 20-24 years of age, 25-29 years of age, 30-34 years of age, 35+ years of age, and 40+.

Race. The construct race will be measured by using a categorical variable with 5 distinct groups. The data is based on official birth certificate information and are categorized as White, Black, Native American/Alaskan Native, Asian, and Other.

Ethnicity. The construct ethnicity will be measured using official birth certificate information and will be categorized as the following, Hispanic, or Non-Hispanic.

Social Economic Status. SES will be assessed using measures of human capital, and social capital. Human capital is measured by educational attainment. This is measured using a categorical variable. Women will be categorized into 3 education levels: grade school, high school, college or post high school.

The last dimension of SES is Social Capital, which will be measured by the dichotomous variable marital status. Married is defined by the birth certificate indicator married, while responses "other", and "never married" will be grouped as single.

Table 1. Table of Constructs and their associated measure

Construct	**Measures Available**	**Hypothesized Relationship to the DV**
UP	**Self –reported pregnancy intention.** Categorized as: • Intended • Unintended	Pregnancy intention will be the dependent variable
PPC	**Self-reported ppc use.** Categorized as: • Yes • No	PPC will be the dependent variable.
PPMC	**Self-reported PPMC.** Categorized as: • Yes • No	PPMC will be the dependent variable
1115 Waiver Status	**1115 FP Waiver Status.** States will be categorized by their adoption of any 1115 FP Waiver: • Yes • No	(+) States with adoption of 1115 FP Waivers will have improved family planning outcomes
Abortion Rate	**Abortion Rate.** Rate per 1,000 women aged 15-44. • Continuous	(+) States with higher abortion rates will have improved family planning outcomes
Unemployment Rate	**Unemployment Rate.** States will have a continuous measure of unemployment rate based on state and year. • Continuous	(-) States with higher unemployment rates will have decreased family planning outcomes
Pre-pregnancy Medicaid Coverage	**Pre-pregnancy Medicaid Coverage.** Women will be categorized into dichotomous category of pre-pregnancy Medicaid coverage or not • Yes • No	(+) Individuals with pre-pregnancy Medicaid insurance will have improved family planning outcomes
FP Service	**Unmeasured**	(+) Women who had a FP service have improved family planning outcomes compared to women who did not have a FP visit
Reproductive Autonomy	**Unmeasured**	(+) Family planning outcomes improve as reproductive autonomy increases
Number of Previous Live Births	**Number of Previous Live Births.** Women will be categorized by the number of children previously birthed. • 0 children • 1 child • 2 children	(+/-) Women with no previous births will have a lower family planning outcomes. As number of children increases from 1 to 3+ there will be a negative association with family planning outcomes

	• 3-5 children • 6> children	
Age	**Age group.** Women will be categorized into 4 age groups. • 18-19 years of age • 20-24 years of age • 25-29 years of age • 30- 34 years of age • 35-39 years of age • 40 + years of age	(+) Family planning outcomes will improve as age group increases
Race	**Race.** Women will be classified into 6 race groups. • White • Black • Native American/Alaskan Native • Asian • Other	(-) Minority races will have lower family planning outcomes than nonminority
Ethnicity	**Ethnicity.** Women will be classified into 2 distinct ethnicity groups, as well as a unknown group • Non-hispanic • Hispanic • Unknown	(-) Hispanic ethnicity will have lower family planning outcomes than non Hispanic
Social Economic Status	**Human Capital, Educational Attainment.** Women will be categorized into five education levels. • Grade School • High School • College or post High School **Social Capital, Material status.** • Currently Married • Not Currently Married	(+) As SES increases family planning outcomes improves
Health Literacy	**Unmeasured**	(+) Women with higher health literacy will have improved family planning outcomes
Health Status	**Unmeasured**	(+) Women with improved health status will have improved family planning outcomes

ANALYTIC PLAN

This investigation will use a difference in difference analysis of pooled PRAMS data from 2011-2017 with the transition year, 2014, omitted. A two-way, state and year, fixed effects, modeled with robust standard errors clustered at the state-year level model will be implemented. Appropriate survey-weights will be used with the STATA Version 16 software package. PRAMS survey weights were utilized in order to adjust for unequal selection probability, non-coverage bias, as well as nonresponse bias in PRAMS data.

This investigation will analyze three analytic samples in its analysis. This is due to the outcomes of interest UP, PPC, and PPMC not being consistently asked in the

PRAMS questionnaire. Notably PPMC is not asked in phase 6, years 2009-2011 thus the analytic sample for this outcome will be notably smaller as it will be missing the 2011 years observations.

In addition, women having given birth between September through December of 2013 could have experienced ACA affects during their postpartum period, as the survey is asked 2-4 months postpartum. In order to ensure that this investigation captures the full extent of policy implications, women having given birth between September to December of 2013 will be excluded from all the models examining postpartum outcomes (PPC and PPMC).

Analytic Sample

The analytic sample, diagrammed in Figure 1 below, is intended to represent a sample that would most likely be affected by the ACA Medicaid expansion. This criteria excludes the transition year 2014. To more clearly capture the effect of Medicaid expansion this study will limit to women with income less than 138% of the FPL. It will also limits states to those that expanded on January 1, 2014, did not have prior expansion like programs, and were consistently represented by PRAMS data between 2011-2017. While this definition is standard in the literature, a sensitivity analysis using a liberal/generous vs strict definition of state classification will be conducted in order to consolidate the existing literature in which states are classified slightly differently concerning prior expansion like programs.

Using a more liberal definition of expansion vs. non-expansion, there are five expansion states which include Illinois, Maryland, New Jersey, Washington, and West

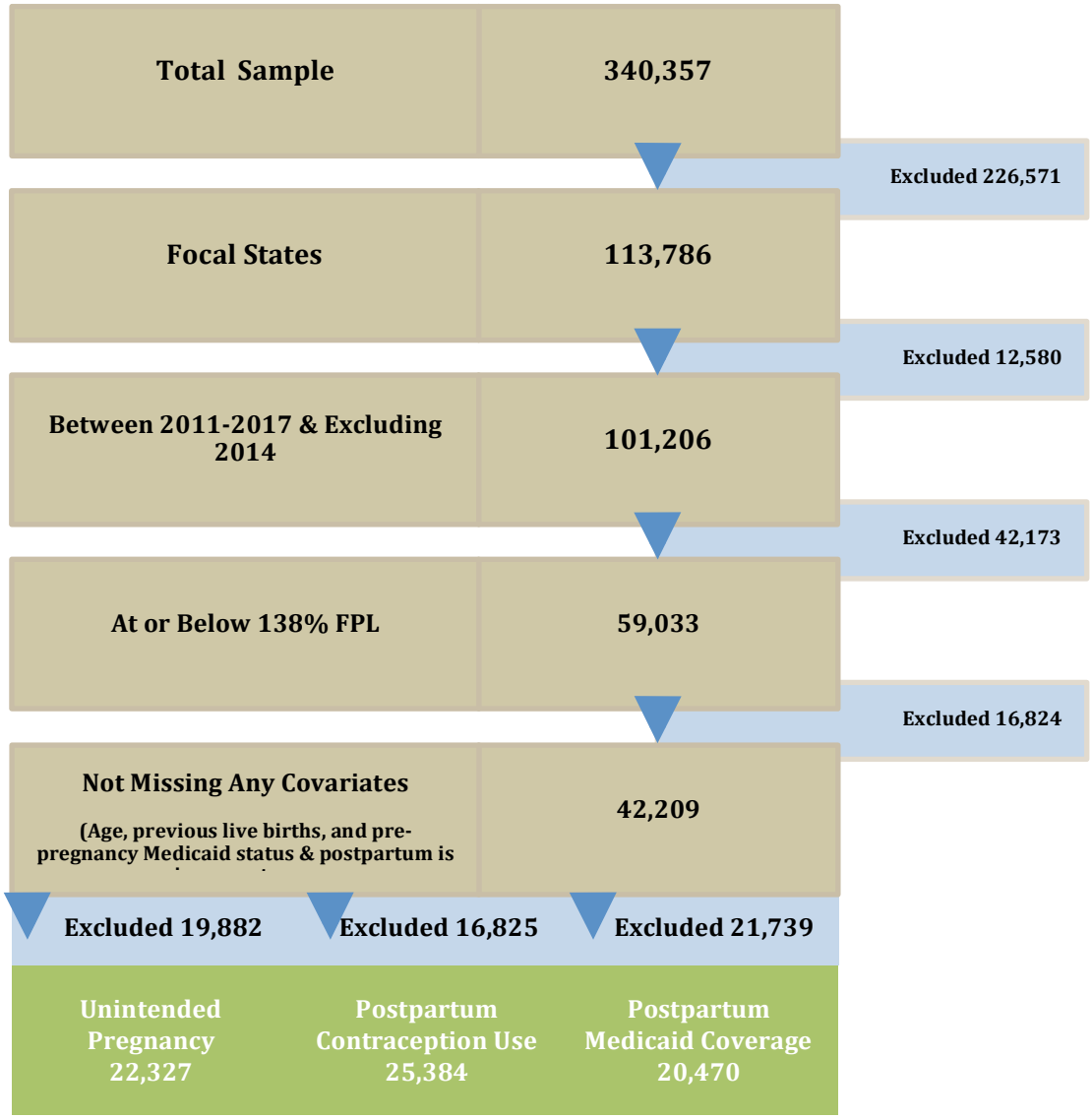
Virginia. There are also five non-expansion states, which include: Maine, Missouri, Oklahoma, Utah, and Wyoming.

Using a more strict definition, expansion states include Illinois, Maryland, and West Virginia. While non-expansion states include Oklahoma, Utah, and Wyoming. The distinction between generous and strict definition is due to the Clapp and Johnston's studies differing on their determination of prior Medicaid expansion like features.

New Jersey was dropped in Johnston's study, likely attributed to the 1115 waiver for benefiting childless adults with household incomes up to 24 percent of the federal poverty level during the years April 15, 2011 - October 2, 2012. Washington was dropped in Johnston's study likely because of the 1115 waiver "Transitional Bridge" early expansion for 133% of the FPL. In addition Washington also had "Washington "Take Charge" Family Planning Demonstration" for Women and men, of childbearing age, who have family income at or below 250 percent of the Federal poverty level (FPL) between July 1, 2001 - December 31, 2013.

Maine was excluded from non-expansion in Johnston's study likely due to the MaineCare for Childless Adults section 1115(a) Demonstration, which was applied October 1, 2002 through December 31, 2013. Similarly Johnston excluded Missouri from non-expansion status as they had 'gateway to better health', which expired December 31, 2013.

Figure 3. Analytic Samples



This investigation acknowledges that there are several limitations of this analysis, including endogeneity derived from unmeasured and approximated constructs, missing data due to low response rates from particular states, and age of the data.

Moreover, based on the requirements of the survey, any state with response rates below 65% will be omitted from the data. This may lead to inconsistencies of state data year to year.

Additionally, although this investigation utilizes the current data, the most recent collection year is 2017. Future research would benefit from more recent data, especially from states that more recently implemented Medicaid expansion. This will allow for stronger estimates as it will account for the time lag between policy implantation and uptake.

In spite of these limitations, this will be the first study to examine the effects of Medicaid expansion on several family planning outcomes.

In conclusion, results of this research can be used to provide additional information about the effect of Medicaid expansion to women prior to pregnancy and postpartum. Further understanding the implications of greater access to health insurance prior to pregnancy can help identify gaps in the health insurance and literacy landscape, and it can inform polices on insurance access for women of reproductive age.

4. Results

Descriptive Statistics

Table 1A displays the key demographics of women having had a live birth during the pre-policy years (2011-2013 for UP, and 2011-August 2013 for postpartum outcomes) by state Medicaid Expansion status.

Table 2A: Weighted Individual Level Descriptive Statistics of Women with live births during Pre-policy years by state Medicaid expansion status Generous Definition

	Unintended Pregnancies Control states	Unintended Pregnancies Treatment states	Postpartum Contraception Use Control States	Postpartum Contraception Use Treatment States	Postpartum Medicaid Coverage Control States	Postpartum Medicaid Coverage Treatment States
Observations	6217	6226	7145	6958	4609	4295
Race						

White	0.7026	0.6179	0.7086	0.6139	0.7089	0.6113
Black	0.1183	0.2203	0.1198	0.2248	0.1241	0.2253
AI/AN	0.0427	0.0069	0.0432	0.0073	0.0425	0.0071
Asian	0.0162	0.0439	0.0140	0.0440	0.0126	0.0464
Other	0.1202	0.1110	0.1143	0.1099	0.1118	0.1099
Ethnicity						
non-hispanic	0.8538	0.6494	0.8653	0.6642	0.8766	0.6519
hispanic	0.1462	0.3506	0.1347	0.3358	0.1234	0.3481
Marital Status						
married	0.4549	0.3991	0.4329	0.3887	0.4266	0.3934
not married	0.5451	0.6009	0.5671	0.6113	0.5734	0.6066
Age						
18-19	0.1111	0.0847	0.1134	0.0842	0.1087	0.0764
20-24	0.3898	0.3003	0.3905	0.3089	0.3867	0.3004
25-29	0.2769	0.2908	0.2747	0.2866	0.2821	0.2939
30-34	0.1542	0.2060	0.1510	0.1986	0.1478	0.2071
35-39	0.0557	0.0969	0.0568	0.0976	0.0587	0.0974
40+	0.0123	0.0213	0.0136	0.0239	0.0161	0.0247
Education						
Grade School	0.0456	0.0819	0.0447	0.0772	0.0421	0.0821
High School	0.5524	0.5380	0.5510	0.5454	0.5540	0.5449
College or Post High School	0.4020	0.3801	0.4043	0.3774	0.4038	0.3731
Previous Live Births						
0 previous births	0.3423	0.3274	0.3388	0.3280	0.3419	0.3224
1 previous births	0.2911	0.3057	0.2894	0.3046	0.2879	0.3104
2 previous births	0.1963	0.1946	0.1970	0.1952	0.1903	0.1877
3-5 previous births	0.1621	0.1578	0.1624	0.1549	0.1663	0.1612
6 or more previous births	0.0083	0.0144	0.0123	0.0173	0.0136	0.0184
Pre-pregnancy Medicaid Coverage						
yes	0.2895	0.3770	N/A	N/A	N/A	N/A

**Expansion states include: Illinois, Maryland, New Jersey, Washington, West Virginia*
***Non-expansion states include Maine, Missouri, Oklahoma, Utah, Wyoming*
****Pre-policy years include 2011-2013 for UP*
***** Pre-policy years include 2011-August 2013 for Postpartum contraception use & Postpartum Medicaid coverage*

Table 2B.
Weighted Contextual Level Descriptive Statistics during Pre-policy years by State Medicaid expansion status
Generous Definition

	Unintended Pregnancies Control states	Unintended Pregnancies Treatment states	Postpartum Contraception Use Control States	Postpartum Contraception Use Treatment States	Postpartum Medicaid Coverage Control States	Postpartum Medicaid Coverage Treatment States
Observations	6217	6226	7145	6958	4609	4295
waiver	0.0000	0.3905	0.0000	0.3763	0.0000	0.3788
unemployment	6.4176	8.5670	6.4365	8.5864	5.9647	8.2822
abortion rate	5.5407	16.1402	5.5267	16.0508	5.3611	15.6411

**Expansion states include: Illinois, Maryland, New Jersey, Washington, West Virginia*
***Non-expansion states include Maine, Missouri, Oklahoma, Utah, Wyoming*
****Pre-policy years include 2011-2013 for UP*
***** Pre-policy years include 2011-August 2013 for Postpartum contraception use & Postpartum Medicaid coverage*

As shown by Table 1A during the pre-policy time period expansion and non-expansion states had very similar demographics and proportions were consistent with the current literature. Notably, prior to Medicaid expansion women in expansion and non-expansion states were majority white, non-married, mostly young, and approximately one third were first time mothers, again consistent with the literature [30, 55]. All expansion states had family planning waivers prior to expansion, and had higher rates of unemployment, and higher rates of abortion rates compared to non-expansion states. These demographic characteristics were consistent throughout the various sensitivity analysis's with descriptive summary tables available in the appendix.

Descriptive Results

The line graphs below demonstrate the similar trends of family planning outcomes, as defined by this study, during the pre-policy period between expansion and non-expansion states.

Figure 4. Unintended Pregnancy Rates Pre-Policy Trends

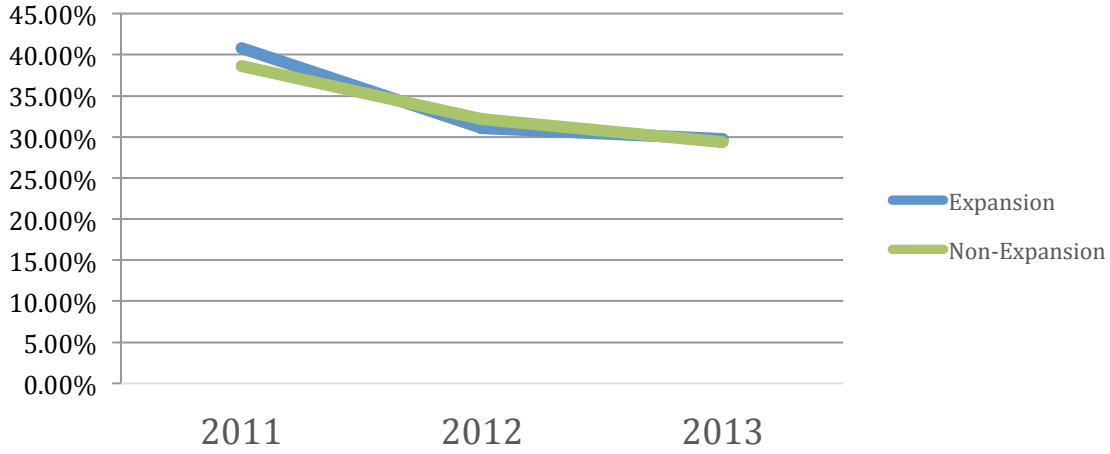


Figure 5. Postpartum Contraception Use Pre-policy Trends

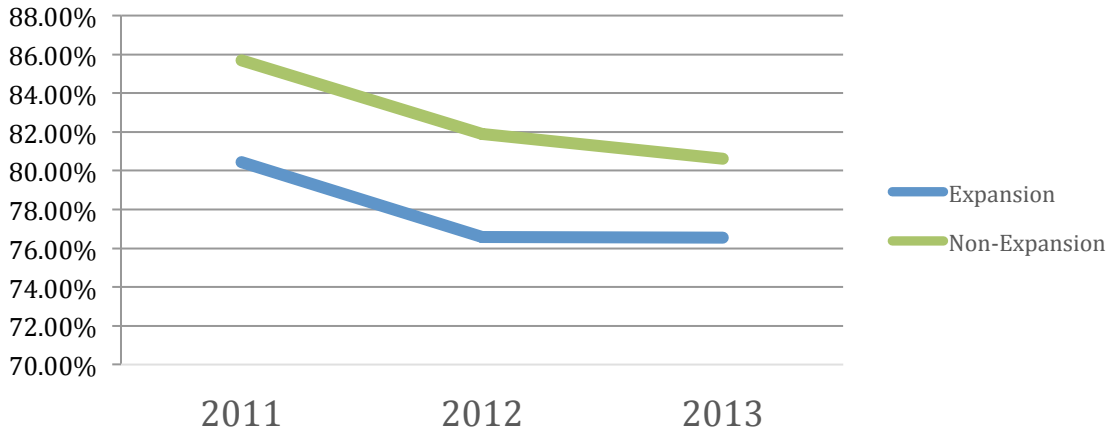
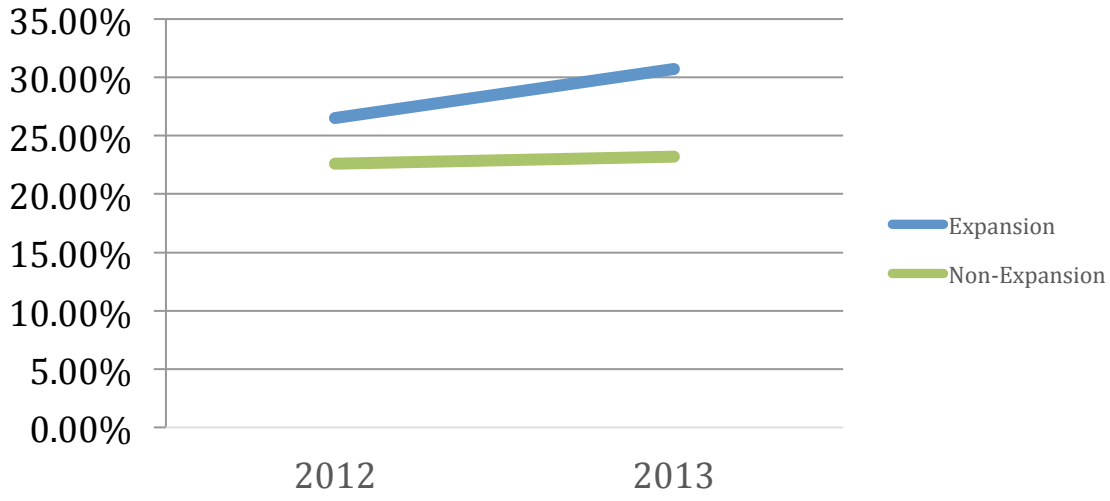


Figure 6. Postpartum Medicaid Coverage Pre-Policy Trends



Data Analysis of Model A

$y_{ist} = \lambda(\gamma_0 + \gamma_1(\text{Expansion}_{st}) + \gamma_2(\text{Expansion}_{st} * \text{Post}_{st}) + \gamma_3\text{Post}_{st} + \gamma_4 X_{ist} + \gamma_5 \text{State}_s + \gamma_6\text{Year}_t) + \omega_{ist}$

Model A represents that the particular family planning outcome, either UP, PPC, or PPMC, for person I in state S at time t is equal to the logistic function of expansion of state s at time t plus the interaction of the expansion of state s at time t and post implementation of state s at time t plus post implementation of state s at time t plus the other covariates of individuals I and state s at time t plus the effect of state s plus the time at time t plus the error term.

In order to conduct a difference in difference logistic regression analysis one must ensure that the parallel lines assumption holds. A parallel lines test was conducted for each model using the generous definition of expansion vs non expansion. As shown in figures 3-5 above, the only model that did not met this assumption was for UP for the year 2013.

Data Analysis of Model B (Sensitivity Analysis)

Model B utilizes the same equation as models A, however references the more strict definition of expansion vs. non-expansion states. All the models pass the parallel lines assumption, making the difference in difference logistic regression an appropriate method to analyze the impact of Medicaid expansion on family planning outcomes.

Results of Model A

Model A

Table 3. Difference-in-Difference Estimates for Impact of Medicaid Expansion on Family Planning Outcomes for Low-Income Women

	Unintended Pregnancies	Postpartum Contraception Use	Postpartum Medicaid Coverage
Observations	22,327	25,384	20,470
Expansion	0.01	0.03	0.09***
	(0.55)	(0.11)	(0.00)

Race			
White	Ref	Ref	Ref
	(.)	(.)	(.)
Black	0.09***	-0.02	0.09***
	(0.00)	(0.08)	(0.00)
AI/AN	-0.02	-0.04	0.01
	(0.52)	(0.06)	(0.56)
Asian	-0.01	-0.09***	-0.06**
	(0.53)	(0.00)	(0.01)
Other	0.01	-0.02	-0.01
	(0.36)	(0.08)	(0.38)
Ethnicity			
non-hispanic	Ref	Ref	Ref
	(.)	(.)	(.)
hispanic	-0.03*	0.04***	-0.23***
	(0.04)	(0.00)	(0.00)
Marital Status			
married	Ref	Ref	Ref
	(.)	(.)	(.)
Not married	0.19***	0.01	0.12***
	(0.00)	(0.36)	(0.00)
Age			
18-19	Ref	Ref	Ref
	(.)	(.)	(.)
20-24	-0.11***	-0.02	-0.09***
	(0.00)	(0.11)	(0.00)
25-29	-0.24***	-0.03	-0.12***
	(0.00)	(0.06)	(0.00)
30-34	-0.30***	-0.04**	-0.18***
	(0.00)	(0.01)	(0.00)
35-39	-0.35***	-0.06***	-0.21***
	(0.00)	(0.00)	(0.00)
40+	-0.30***	-0.09**	-0.21***
	(0.00)	(0.00)	(0.00)
Education			
Grade School	-0.06**	-0.04*	-0.23***
	(0.00)	(0.03)	(0.00)
High School	Ref	Ref	Ref
	(.)	(.)	(.)
College or Post High School	0.05***	0.02*	-0.03**
	(0.00)	(0.01)	(0.00)
Previous Live Births			
0 previous births	Ref	Ref	Ref
	(.)	(.)	(.)
1 previous birth	0.03*	0.01	0.09***
	(0.02)	(0.39)	(0.00)
2 previous births	0.12***	0.04***	0.13***
	(0.00)	(0.00)	(0.00)
3-5 previous births	0.20***	0.05***	0.19***
	(0.00)	(0.00)	(0.00)
6 or more previous births	0.18***	-0.11***	0.21***
	(0.00)	(0.00)	(0.00)

Pre-pregnancy Medicaid Insurance			
yes	0.00	N/A	N/A
	(0.85)		
SPA/Waiver Status			
yes	0.00	-0.04*	0.07***
	(0.99)	(0.01)	(0.00)
Unemployment Rate			
unemployment	0.01	0.01	0.05***
	(0.26)	(0.11)	(0.00)
Abortion Rate			
abortion rate	0.01**	0.00	0.00
	(0.00)	(0.29)	(0.35)

** p < 0.05, ** p < 0.01, *** p < 0.001*
**Expansion states include: Illinois, Maryland, New Jersey, Washington, West Virginia*
***Non-expansion states include Maine, Missouri, Oklahoma, Utah, Wyoming*

The results of Model A can be found in Table 3 above. After controlling for individual and contextual level confounders, we find that Medicaid expansion did not explain a significant effect in the probability of having an unintended pregnancy (where, after controlling for other confounders, the predicted probabilities of UP in non-expansion states post ACA was 47% and in expansion states it was 47.9%) or postpartum contraception use (where, after controlling for other confounders, the predicted probabilities of PPC use in non-expansion states post ACA was 79% and in expansion states 81.4%), however there was a significant 9 percentage point increase in the probability of having postpartum Medicaid coverage in expansion states (an increase in postpartum Medicaid coverage from 48.55% in non-expansion states post ACA to 52.46% in expansion states post ACA after controlling for all other confounders).

This model controlled for several variables, some of which are significantly associated with the likelihood of having an unintended pregnancy, postpartum contraception use, and postpartum Medicaid coverage. Increasing age, and fewer previous live births are positively associated with the unintended pregnancy, but increasing age was negatively associated with postpartum contraception use, while

increasing number of previous births was positively associated with postpartum contraception use, until 6 more previous births occurred. Increasing age had a negative associate with postpartum Medicaid coverage, while increasing number of previous births had a positive association with postpartum Medicaid coverage. Interestingly, while Hispanic ethnicity was found to significantly reduce the likelihood of having unintended pregnancy, it was also an indicator of reduced likelihood of postpartum Medicaid coverage. Likewise, race found interesting findings and differed on each specific outcome. As expected, minority races, particularly low-income black women had a significant increase in unintended pregnancies, however, fortunately, had significantly improved likelihood of postpartum Medicaid coverage compared to their white counterparts.

As expected marital status had a significant effect on family planning outcomes. With unmarried women having a 19 percentage points increase in the probability of an unintended pregnancy. Interestingly, unmarried women also had a 12 percentage points increase in the probability of having postpartum Medicaid coverage, meaning that low income unmarried women are more likely to have Medicaid coverage than their low income married counterpart.

Education proved interesting findings as well. It would be expected that as education increases there would be an improvement of family planning outcomes. However, the results found that an increase in education status was associated with a negative association with unintended pregnancies. For example, low-income women with college or greater education had a 5 percentage point increase in the probability of unintended pregnancy compared to women with high school education, significant at the

99% level. Moreover, grade school low-income women were 6 percentage points less likely to have an unintended pregnancy than high school graduates, results were statistically significant. When examining education status on family planning outcomes in the postpartum period, results found that increased education attainment was positively associated with improvements in postpartum contraception use and postpartum Medicaid coverage.

Sensitivity Analysis, Results of Model B

The sensitivity analysis, using a more strict definition of expansion vs. non-expansion states limited the sample sizes for UP, PPC, and PPMC 14,821, 16,638, and 13,465 respectively. Below are the results of the difference in difference when utilizing the more strict definition of expansion vs. non-expansion states.

Table 4. Model B
Difference-in-Difference Estimates for Impact of Medicaid Expansion on Family Planning Outcomes for Low-Income Women, Strict Definition

	Unintended Pregnancies	Postpartum Contraception Use	Postpartum Medicaid Coverage
Observations	14,821	16,638	13,465
Expansion	-0.04	0.00	0.16***
	(0.15)	(0.99)	(0.00)
Race			
White	Ref	Ref	Ref
	(.)	(.)	(.)
Black	0.08***	-0.06***	0.09***
	(0.00)	(0.00)	(0.00)
AI/AN	-0.02	-0.05*	-0.01
	(0.62)	(0.05)	(0.80)
Asian	-0.06	-0.12***	-0.03
	(0.11)	(0.00)	(0.46)
Other	0.02	-0.03	-0.02
	(0.33)	(0.07)	(0.27)
Ethnicity			
non-hispanic	Ref	Ref	Ref
	(.)	(.)	(.)
hispanic	-0.04*	0.00	-0.23***
	(0.02)	(0.82)	(0.00)
Marital Status			
married	Ref	Ref	Ref
	(.)	(.)	(.)
Not married	0.19***	-0.01	0.12***
	(0.00)	(0.44)	(0.00)

Age			
18-19	Ref	Ref	Ref
	(.)	(.)	(.)
20-24	-0.10***	-0.03	-0.09***
	(0.00)	(0.07)	(0.00)
25-29	-0.23***	-0.04*	-0.11***
	(0.00)	(0.02)	(0.00)
30-34	-0.30***	-0.06**	-0.18***
	(0.00)	(0.00)	(0.00)
35-39	-0.32***	-0.07**	-0.19***
	(0.00)	(0.01)	(0.00)
40+	-0.30***	-0.12**	-0.20***
	(0.00)	(0.00)	(0.00)
Education			
Grade School	-0.03	-0.01	-0.21***
	(0.29)	(0.65)	(0.00)
High School	Ref	Ref	Ref
	(.)	(.)	(.)
College or Post High School	0.06***	0.02	-0.00
	(0.00)	(0.08)	(0.76)
Previous Live Births			
0 previous births	Ref	Ref	Ref
	(.)	(.)	(.)
1 previous birth	0.01	0.02	0.08***
	(0.44)	(0.16)	(0.00)
2 previous births	0.13***	0.05***	0.10***
	(0.00)	(0.00)	(0.00)
3-5 previous births	0.21***	0.06***	0.19***
	(0.00)	(0.00)	(0.00)
6 or more previous births	0.22***	-0.05	0.18***
	(0.00)	(0.22)	(0.00)
Pre-pregnancy Insurance			
yes	-0.02	N/A	N/A
	(0.26)		
SPA/Waiver			
yes	0.03	-0.05**	0.02
	(0.12)	(0.01)	(0.25)
Unemployment Rate			
unemployment	-0.01	0.00	0.09***
	(0.38)	(0.66)	(0.00)
abortion rate	0.02*	-0.01	0.02
	(0.05)	(0.16)	(0.17)

** $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*
**Expansion states include: Illinois, Maryland, West Virginia*
***Non-expansion states include: Oklahoma, Utah, Wyoming*

The majority of the confounders in this model behaved similarly in direction, strength, and significance to Model A. The main difference between the two models is that the effect found in the first model is magnified in this model. Thus, adhering to a more rigid strategy of excluding states with prior Medicaid expansion like programs,

through the use of a more strict criteria of expansion vs. non-expansion states, found that expansion had a stronger association with postpartum Medicaid coverage (16 percentage points, significant at the 99% CI level).

Table 5. Summary Estimates of all Models

Model	Model Description	**Unintended Pregnancies**	**Postpartum Contraception Use**	**Postpartum Medicaid Coverage**
A	**Generous Definition**	0.01	0.03	.09***
B	**Strict Definition**	-0.04	0	0.16***
C	**FPL<100 & Generous Definition**	-0.02	0.03	0.07**
D	**FPL<100 & Strict Definition**	- 0.08**	0.01	0.15***
E	**Generous Definition- Omit aged 18-19 & pre-Medicaid Insurance**	0.01	0.02	0.11***
F	**FPL<100 & Strict- Omit aged 18-19 & pre-Medicaid Insurance**	-0.10***	0.01	0.15***

Table 6. Summary of Predicated Probability Estimates of Selected Models

	Unintended Pregnancy		**Postpartum Contraception Use**		**Postpartum Medicaid Coverage**	
	Non-expansion state Predicted Probability	**Expansion states Predicted Probability**	**Non-expansion state Predicted Probability**	**Expansion states Predicted Probability**	**Non-expansion state Predicted Probability**	**Expansion states Predicted Probability**
Generous Definition- Omit aged 18-19 & pre-Medicaid Insurance	47.00%	47.90%	79.00%	81.40%	48.55%***	52.46%***
FPL<100 & Strict- Omit aged 18-19 & pre-Medicaid Insurance	53.00%***	44.00%***	80.4%	81.40%	46.00%***	61.00%***

** $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

**Note only those with an asterisk were found to be statistically significant in regression analysis. A full table summary of predicted probability estimates can be found in the appendix.*

Sensitivity Analysis Model C, D, E, & F

Model C and D carried out sensitivity analyses restricting the analytic sample to women giving birth within the identified year with incomes at or below 100% of the FPL. This was conducted in order to more precisely understand the effect of expansion, as those in non-expansion states would be able to benefit from marketplace subsidies if their incomes were within 100 to 400% of the FPL. Model C and D were further differentiated by their use of generous vs. strict definition of expansion and non-expansion respectively. Both models had similar descriptive statistics compared to previous models and were consistent with the current literature. The parallel trends assumption was met for all outcomes in both models. Tables and figures of all tests conducted may be found in the appendix.

The difference in difference analysis revealed that while both models behaved similarly to previous models in terms of confounders, restricting income level and expansion categorization had significant effects on family planning outcomes.

More specifically, Model C (FPL<100 & generous definition) found no changes in unintended pregnancies and postpartum contraception use, but a 7 percentage point increase in likelihood of postpartum Medicaid coverage in expansion states post policy (a smaller increase than the previous models revealed). Model D (FPL<100 & strict definition) found an 8 percentage point reduction in probability of unintended pregnancies in expansion states, post policy, significant at the 95% CI level and 15 percentage point increase in likelihood of postpartum Medicaid coverage, significant at the 99% CI level.

Models E and F are sensitivity analyses conducted in order to omit those aged 18-19 who might have also benefited from CHIP and or other provisions that benefit minors. In addition, these models also omit the confounder pre-Medicaid insurance, as those that benefit from pre-Medicaid insurance prior to Medicaid expansion would likely be non-categorically eligible for Medicaid, thus Medicaid expansion benefits would not affect them.

Model E introduced these restrictions to the main analysis, which used the generous definition of expansion vs. non-expansion. Model E found that trends persisted, such that there was no change in unintended pregnancy or postpartum contraception use which remained around 47% 80% respectively. There was an increase in postpartum Medicaid coverage from the original model of 9 percentage points to 11 percentage points, significant at the 99% CI (in context the predicated probability of postpartum Medicaid coverage in non-expansion states was 48.55%).

Model F introduced these omissions of age and pre-Medicaid insurance to the model that restricted FPL<100% and utilized the strict definition of expansion vs. non-expansion. This sensitivity analysis found that the same trends from Model D persisted but were strengthen such that there was a 10 percentage point decrease in the likelihood of unintended pregnancies in expansion states post expansion significant at a 99% CI. In context, after controlling for other confounders, the predicted probability of a woman having an unintended pregnancy in non-expansion states post ACA was 53%, while it was 44% in expansion states. Model F also found the same results as Model D in terms of postpartum contraception use and postpartum Medicaid coverage, such that there was an increase of 15 percentage points in postpartum Medicaid coverage in expansion states. In

context, after controlling for all other confounders, the predicted probability of a woman having postpartum Medicaid coverage in non-expansion states post ACA was 46%, while it was 61% in expansion states.

5. Discussion

Key Findings

The main objective of this investigation was to examine the effect of the ACA's Medicaid expansion on family planning outcomes, as indicated by unintended pregnancies, postpartum contraception use, and postpartum Medicaid coverage. This study employed a difference-in-difference logistic regression approach to compare the likelihood of having these family planning outcomes in expansion and non-expansion states pre and post policy represented in Model A. This study also employed several sensitivity analyses. The first was conducted in order to consolidate the discrepancies in the literature as to what constitutes prior 'Medicaid-like-expansions.' This sensitivity analysis, with a more strict adherence to the state selection, criteria drops the study states to 3 expansion states and 3 non-expansion states (Model B). The next set of sensitivity analyses paired this categorization of generous vs. strict definitions of expansion vs. non-expansion along with limiting observations to <100%FPL (Model C and D respectively).

The stepwise sensitivity analyses found on average, low-income women in expansion states were more likely to have improved family planning outcomes. With the final sensitivity analysis model (<100%FPL with strict definition) displaying the strongest identification of this association. However, despite these improved family planning outcomes, we fail to reject the null hypothesis. The findings found in the first model are not significant enough to confidently support the alternative hypothesis that

there is a significant positive relationship between Medicaid expansion and family planning outcomes. Therefore, it can be concluded that Expansion is necessary but not sufficient for improving family planning outcomes. The reason is threefold, barriers still exist in terms of health insurance literacy, behavioral habits, and reproductive health literacy.

Limitations and Strengths

It is important to address the limitations of this study. First, this study uses cross-sectional data, which limits ability to prove causation. There was also endogeneity derived from unmeasured and approximated constructs such as health literacy, health status, and family planning service visit. Second, any state with less than a 65% response rate were omitted from PRAMS for the given year. This factor may limit the generalizability of this study as study states may not reflect the nation as a whole. In addition, the results for the unintended pregnancy model will only partially represent the effect of unintended pregnancy, as the study does not capture the proportion of women who were successful in averting pregnancy. However, the use of PRAMS data is common method when evaluating unintended pregnancies, and the usefulness of the difference-in-difference approach work to minimize this issue.

Lastly, this study may be unable to fully attribute family planning outcomes to Medicaid expansion as there were several key policies that worked simultaneously, and it would be difficult to disentangle these policies and identify the cause and effect for each. Notably, low-income reproductive aged women would most benefit from; the dependent coverage policy, in which women may be covered by parental insurance until age 26, no copay for contraception (with insurance), and subsidies to the insurance marketplace for those with 100-400% FPL. Although this study aimed to address marketplace subsidies

through the use of the sensitivity analysis, ultimately, this study may have underestimated the full effect of Medicaid expansion as the above policies mentioned affected both expansion and non-expansion states.

Despite these limitations this study had several strengths. It was the first study, to my knowledge, to examine Medicaid expansion on a range of family planning outcomes. Expanding beyond examining unintended pregnancy, this study includes postpartum outcomes of contraception use and Medicaid coverage. These outcomes illuminate the cyclical nature of reproductive health and may help indicate breakdowns in the continuum of reproductive health.

This study also benefited in that it used CDC PRAMS data. A well respected, and utilized source on pregnancy health behaviors for recent mothers. The source represents a

nationally representative sample with recent data from 2017.

Lastly, and perhaps most importantly, this study conducted several sensitivity analyses. The first allowed this study to consolidate the literature, which have grouped expansion vs. non-expansion states differently. This investigation strengthens the literature by establishing that including states with pre-policy, 'Medicaid-like-features' works to minimize the effect of Medicaid expansion. The second sensitivity analysis builds upon this, and also narrowly focused the income level to more accurately determine expansion effects. This sensitivity analysis strengthens the literature by establishing that this narrow focus on expansion eligibility and eliminating pre-policy like features enhances the effect of Medicaid expansion on family planning outcomes.

Policy Implications

In contrast to some smaller studies, specifically Sarah Redd's examination of SPA transition, this study found no significant effect on postpartum contraception use. This suggests that the nature of SPAs (which work to expand insurance coverage to low-income persons specifically for family planning purposes) are inherently better equipped to ensure beneficiaries are knowledgeable about benefits of the program. In contrast, a woman benefiting from full Medicaid insurance may not have the knowledge of all family planning insured benefits. There is evidence that demonstrates this idea, that those newly insured have poor knowledge/awareness of preventive service benefits through the ACA [82]. This indicates that merely providing insurance is not sufficient and that additional efforts must be made to ensure that those newly insured are aware of the benefits of insurance and the ACA.

In addition, it takes time to change health care seeking behavior and other behavioral habits. Several studies suggest that expansion was not associated with significant changes in the likelihood of a doctor visit, utilization of specialists, or use of mammography and Pap tests [83, 84]. This is likely why we saw that unintended pregnancies and postpartum contraception use did not significantly change post expansion in several of the models. An element here may also be an element of provider quality. If providers are not providing quality care, such that they help women navigate their reproductive health through holistic consultations that engage women properly in order to ensure that they have all the necessary information and motivation to make a knowledge decision for their own health then no amount of insurance access will improve family planning elements. Physicians are a vital element to reproductive health and we must ensure that providers are instituting appropriate care to all women within their care.

Additional research should examine provider responsibility and communication between providers and women in order to alleviate any barriers with providers instituting good care.

Lastly, reproductive health literacy poses a significant barrier to family planning outcomes. Evidence has shown that high reproductive health literacy is associated with care seeking, however there are also significant disparities in reproductive health literacy [85]. Which suggests that improving reproductive health literacy is essential for improvements to family planning outcomes.

While we can liken the lack of significant findings in unintended pregnancies, and postpartum contraception use to poor insurance and reproductive health literacy, as well as slow behavioral habit change, greater consistency in Medicaid coverage, may help alleviate the severity of these issues in the long run. Additionally, since health insurance churning still remains a problem, especially among low-income women, it would be interesting to see further studies evaluate family planning outcomes with this greater stability of Medicaid coverage and educational campaigns tackling some of the primary barriers noted here.

This study's findings suggest that Medicaid expansion is necessary but not sufficient in terms of improving family planning outcomes. It is vital that we address other barriers such as health insurance literacy, behavioral habits, reproductive health literacy, cultural barriers, and economical barriers that may impede women's ability to achieve reproductive autonomy and overall improve family planning outcomes. Educational campaigns could be an essential tool to address these barriers. For example, a campaign could help inform the public about ACA benefits, such as preventative

services at no cost sharing, provide accurate information about reproductive health that would help alleviate misinformation, stigma and cultural barriers regarding reproductive health and behavioral changes associated thereof. In addition, further understanding the economical barriers, such as child-care, and or transportation needs, would be an essential element to shape policy to better address the needs of low-income women.

Future Challenges

While several key states, like Utah, have campaigned hard to put the choice of Medicaid Expansion on the voting ballot, there are also policy discussions that will have major concessions on the improvements of women's reproductive health. One such example is the fundamental shift in payment systems. On January 30, 2020 the Trump Administration announced that it would allow block grants, which essentially move the funding grant match system to a capped Medicaid expenditures. It would allow states to designate eligibility criteria, and health benefits. This could effect the millions who gained coverage through the ACA, by eliminating them from coverage or reducing their coverage benefits [86]. It is a critical time for states to ensure that their health care policy promotes a sustainable option especially for low-income women to ensure steady access to health-insurance to prevent 'churn' and allow for behavioral changes to occur and thus improve family planning outcomes.

Conclusion

This study examined the impact of Medicaid expansion on family planning outcomes, specifically unintended pregnancy, postpartum contraception use, and postpartum Medicaid coverage. There was not sufficient evidence to reject the null, and confirm that Medicaid expansion was positively associated with each aspect of the family planning outcomes. However, the majority of the models did determine that Medicaid

expansion was positively associated with increased likelihood of postpartum Medicaid coverage, and one of the sensitivity models found a reduction in the likelihood for unintended pregnancy. This is to suggest that expansion is necessary but not sufficient in terms of improving family planning outcomes. While studies can build upon these findings, and investigate the implications of improved postpartum Medicaid coverage, additional studies should also investigate the additional barriers that exist.

APPENDIX

Model B: Sensitivity Analysis Strict Definition Tables and Figures 5A to 5D

Table 5A. Weighted Individual Level Descriptive Statistics of Women with live births and responding to PRAMS during Pre-policy years 2011-2013 by state Medicaid expansion status Strict Definition

	Unintended Pregnancies Control states	Unintended Pregnancies Treatment states	Postpartum Contraception Use Control States	Postpartum Contraception Use Treatment States	Postpartum Medicaid Coverage Control States	Postpartum Medicaid Coverage Treatment States
Observations	4198	4095	4792	4564	3156	2862
Race						
White	0.6980	0.6367	0.7049	0.6312	0.7071	0.6211
Black	0.0436	0.2595	0.0453	0.2665	0.0481	0.2632
AI/AN	0.0715	0.0016	0.0747	0.0014	0.0740	0.0022
Asian	0.0168	0.0322	0.0147	0.0314	0.0133	0.0320
Other	0.1701	0.0700	0.1605	0.0696	0.1574	0.0815
Ethnicity						
non-hispanic	0.7778	0.6838	0.7972	0.7064	0.8167	0.6871
hispanic	0.2222	0.3162	0.2028	0.2936	0.1833	0.3129
Marital Status						
married	0.5282	0.3700	0.5107	0.3668	0.5031	0.3626
not married	0.4718	0.6300	0.4893	0.6332	0.4969	0.6374
Age						
18-19	0.1012	0.0852	0.1032	0.0877	0.0969	0.0831
20-24	0.3820	0.3042	0.3795	0.3111	0.3744	0.3008
25-29	0.2740	0.2956	0.2741	0.2909	0.2870	0.3023
30-34	0.1699	0.2057	0.1698	0.1986	0.1574	0.2067
35-39	0.0594	0.0917	0.0593	0.0921	0.0672	0.0892
40+	0.0135	0.0176	0.0141	0.0195	0.0170	0.0180
Education						
Grade School	0.0555	0.0786	0.0513	0.0706	0.0492	0.0766
High School	0.5363	0.5392	0.5360	0.5476	0.5327	0.5475

College or Post High School	0.4082	0.3822	0.4127	0.3818	0.4181	0.3759
0 previous births	0.3165	0.3164	0.3162	0.3189	0.3312	0.3173
Previous Live Births						
1 previous births	0.2862	0.3083	0.2871	0.3038	0.2805	0.3012
2 previous births	0.2099	0.2047	0.2067	0.2057	0.1874	0.2013
3-5 previous births	0.1798	0.1592	0.1805	0.1580	0.1917	0.1669
6 or more previous births	0.0076	0.0114	0.0095	0.0136	0.0093	0.0133
Medicaid Status Pre-pregnancy						
yes	0.2179	0.4172	N/A	N/A	N/A	N/A

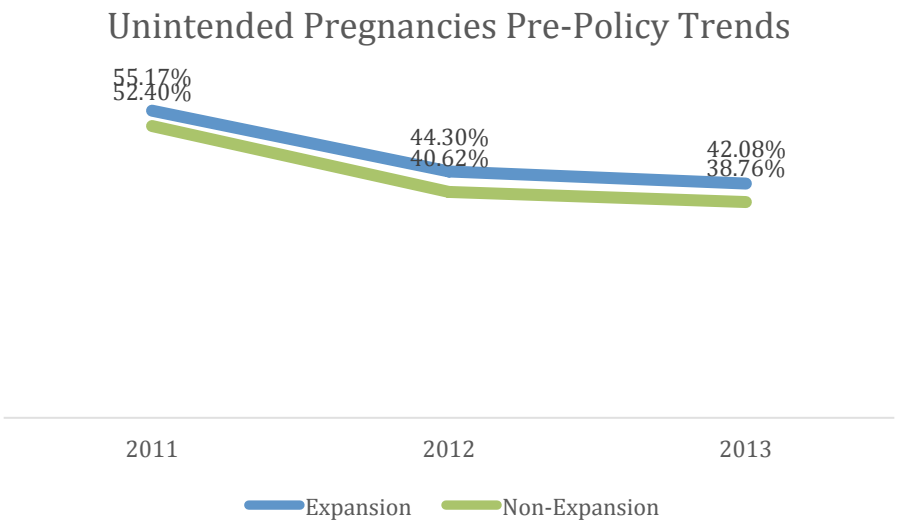
**Expansion States: Illinois, Maryland, and West Virginia*
***Non-expansion States: Oklahoma, Utah, and Wyoming*
****Pre-policy years include 2011-2013 for UP*
***** Pre-policy years include 2011-August 2013 for Postpartum contraception use & Postpartum Medicaid coverage*

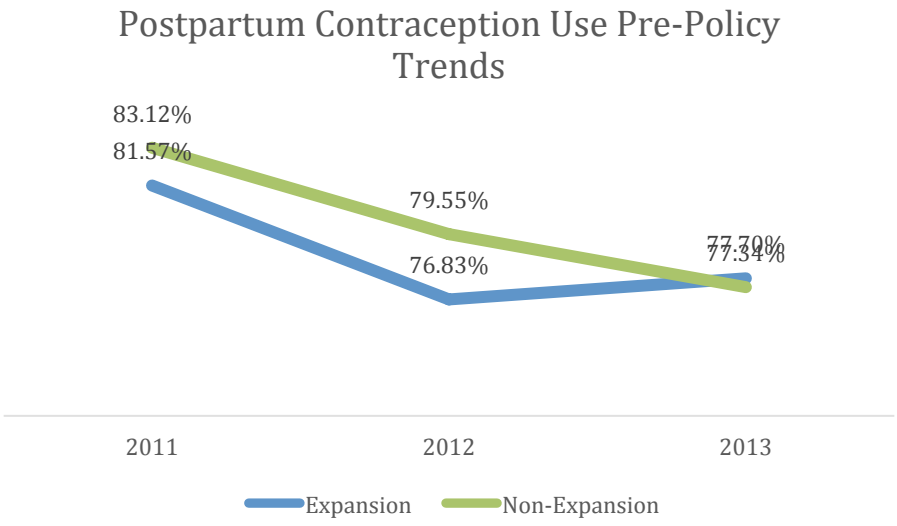
Table 5B. Weighted Contextual Level Descriptive Statistics during Pre-policy years by State Medicaid expansion status
Strict Definition

	Unintended Pregnancies Control states	Unintended Pregnancies Treatment states	Postpartum Contraception Use Control States	Postpartum Contraception Use Treatment States	Postpartum Medicaid Coverage Control States	Postpartum Medicaid Coverage Treatment States
Observations	4198	4095	4792	4564	3156	2862
waiver	0.0000	0.6521	0.0000	0.6449	0.0000	0.6423
unemployment	5.5703	8.5142	5.5776	8.5150	5.1814	8.2688
Abortion rate	5.9800	17.6403	5.9894	17.6072	5.8118	17.4328

**Expansion States: Illinois, Maryland, and West Virginia*
***Non-expansion States: Oklahoma, Utah, and Wyoming*
****Pre-policy years include 2011-2013 for UP*
***** Pre-policy years include 2011-August 2013 for Postpartum contraception use & Postpartum Medicaid coverage*

Figure 5C. Pre-Policy Parallel Lines Trends Strict Definition


Unintended Pregnancies Pre-Policy Trends
55.17%
52.40%
44.30%
40.62%
42.08%
38.76%
2011
2012
2013
Expansion
Non-Expansion


Postpartum Contraception Use Pre-Policy Trends
83.12%
81.57%
79.55%
76.83%
77.70%
77.34%
2011
2012
2013
Expansion
Non-Expansion

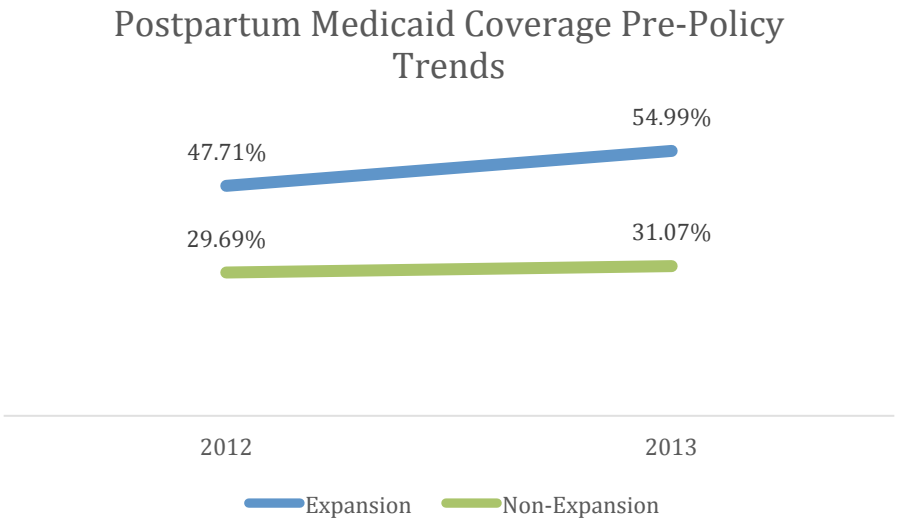


Table 5D. Difference-in-Difference Estimates for Impact of Medicaid Expansion on Family Planning Outcomes for Low-Income Women, Strict Definition

	Unintended Pregnancies	Postpartum Contraception Use	Postpartum Medicaid Coverage
Observations	14,821	16,638	13,465
Expansion	-0.04	0.00	0.16***
	(0.15)	(0.99)	(0.00)
Race			
White	Ref	Ref	Ref
	(.)	(.)	(.)
Black	0.08***	-0.06***	0.09***
	(0.00)	(0.00)	(0.00)
AI/AN	-0.02	-0.05*	-0.01
	(0.62)	(0.05)	(0.80)
Asian	-0.06	-0.12***	-0.03
	(0.11)	(0.00)	(0.46)
Other	0.02	-0.03	-0.02
	(0.33)	(0.07)	(0.27)
Ethnicity			
non-hispanic	Ref	Ref	Ref
	(.)	(.)	(.)
hispanic	-0.04*	0.00	-0.23***
	(0.02)	(0.82)	(0.00)
Marital Status			
married	Ref	Ref	Ref
	(.)	(.)	(.)
Not married	0.19***	-0.01	0.12***
	(0.00)	(0.44)	(0.00)
Age			
18-19	Ref	Ref	Ref
	(.)	(.)	(.)
20-24	-0.10***	-0.03	-0.09***

	(0.00)	(0.07)	(0.00)
25-29	-0.23***	-0.04*	-0.11***
	(0.00)	(0.02)	(0.00)
30-34	-0.30***	-0.06**	-0.18***
	(0.00)	(0.00)	(0.00)
35-39	-0.32***	-0.07**	-0.19***
	(0.00)	(0.01)	(0.00)
40+	-0.30***	-0.12**	-0.20***
	(0.00)	(0.00)	(0.00)
Education			
Grade School	-0.03	-0.01	-0.21***
	(0.29)	(0.65)	(0.00)
High School	Ref	Ref	Ref
	(.)	(.)	(.)
College or Post High School	0.06***	0.02	-0.00
	(0.00)	(0.08)	(0.76)
Previous Live Births			
0 previous births	Ref	Ref	Ref
	(.)	(.)	(.)
1 previous birth	0.01	0.02	0.08***
	(0.44)	(0.16)	(0.00)
2 previous births	0.13***	0.05***	0.10***
	(0.00)	(0.00)	(0.00)
3-5 previous births	0.21***	0.06***	0.19***
	(0.00)	(0.00)	(0.00)
6 or more previous births	0.22***	-0.05	0.18***
	(0.00)	(0.22)	(0.00)
Pre-pregnancy Insurance			
yes	-0.02	N/A	N/A
	(0.26)		
SPA/Waiver			
yes	0.03	-0.05**	0.02
	(0.12)	(0.01)	(0.25)
Unemployment Rate			
unemployment	-0.01	0.00	0.09***
	(0.38)	(0.66)	(0.00)
abortion rate	0.02*	-0.01	0.02
	(0.05)	(0.16)	(0.17)

** $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*
**Expansion states include: Illinois, Maryland, West Virginia*
***Non-expansion states include: Oklahoma, Utah, Wyoming*

Model C: Sensitivity Analysis FPL<100% and Generous Definition Tables and Figures 6A to 6D

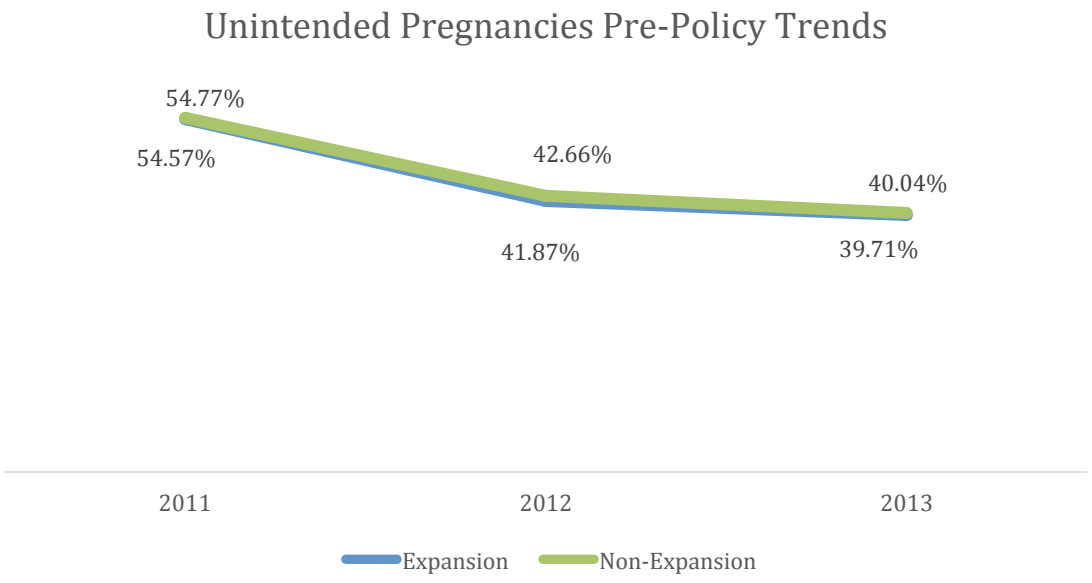
Table 6A. Weighted Individual Level Descriptive Statistics of Women with live births and responding to PRAMS during Pre-policy years 2011-2013 by state Medicaid expansion status FPL<100% & Generous Definition

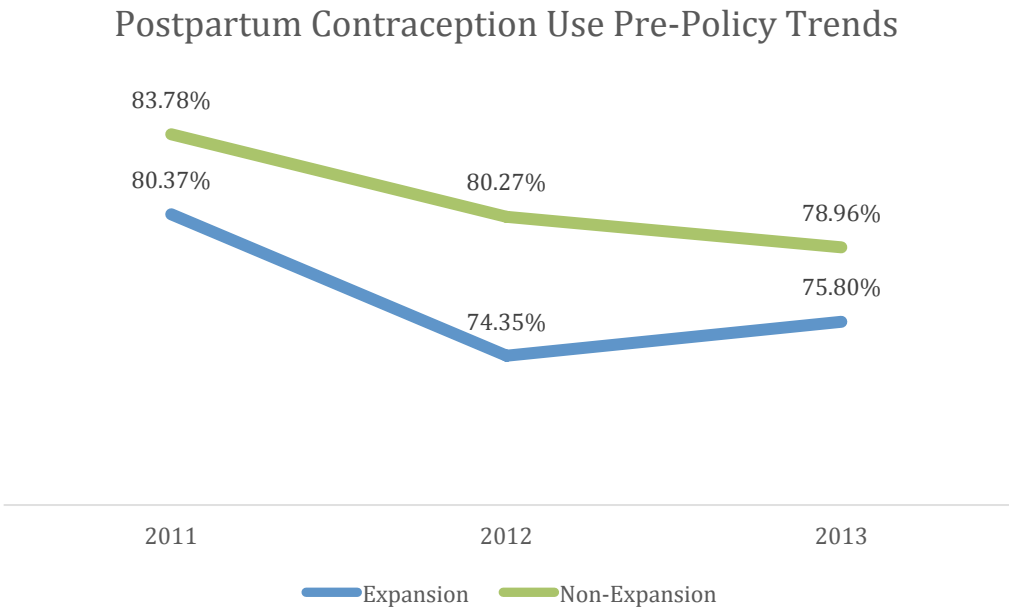
	Unintended Pregnancies Control states	Unintended Pregnancies Treatment states	Postpartum Contraception Use Control States	Postpartum Contraception Use Treatment States	Postpartum Medicaid Coverage Control States	Postpartum Medicaid Coverage Treatment States
Observations	4645	4887	5362	5474	3464	3353
Race						
White	0.6796	0.6124	0.6860	0.6047	0.6854	0.6011
Black	0.1373	0.2295	0.1380	0.2346	0.1450	0.2370
AI/AN	0.0448	0.0069	0.0466	0.0072	0.0455	0.0065
Asian	0.0169	0.0390	0.0136	0.0406	0.0112	0.0432
Other	0.1214	0.1121	0.1159	0.1129	0.1129	0.1122
Ethnicity						
non-hispanic	0.8529	0.6389	0.8671	0.6529	0.8805	0.6448
hispanic	0.1471	0.3611	0.1329	0.3471	0.1195	0.3552
Marital Status						
married	0.3948	0.3507	0.3703	0.3400	0.3735	0.3460
not married	0.6052	0.6493	0.6297	0.6600	0.6265	0.6540
Age						
18-19	0.1306	0.0926	0.1355	0.0933	0.1265	0.0837
20-24	0.4007	0.3116	0.4029	0.3213	0.3863	0.3113
25-29	0.2658	0.2864	0.2575	0.2817	0.2721	0.2909
30-34	0.1347	0.1963	0.1338	0.1877	0.1379	0.1950
35-39	0.0549	0.0928	0.0553	0.0922	0.0606	0.0959
40+	0.0134	0.0203	0.0150	0.0237	0.0166	0.0233
Education						
Grade School	0.0499	0.0934	0.0495	0.0882	0.0482	0.0933
High School	0.5959	0.5631	0.5954	0.5691	0.5946	0.5693
College or Post High School	0.3542	0.3435	0.3551	0.3426	0.3572	0.3374
Previous Live Births						
0 previous births	0.3539	0.3329	0.3514	0.3349	0.3462	0.3270
1 previous births	0.2886	0.2943	0.2860	0.2920	0.2702	0.2926
2 previous births	0.1841	0.1918	0.1838	0.1910	0.1889	0.1892
3-5 previous births	0.1651	0.1657	0.1662	0.1633	0.1798	0.1709
6 or more previous births	0.0085	0.0153	0.0126	0.0188	0.0149	0.0204
Pre-pregnancy Medicaid Insurance						
yes	0.3367	0.3941	N/A	N/A	N/A	N/A

Table 6B. Weighted Contextual Level Descriptive Statistics during Pre-policy years by State Medicaid expansion status
FPL<100% & Generous Definition

	Unintended Pregnancies Control states	Unintended Pregnancies Treatment states	Postpartum Contraception Use Control States	Postpartum Contraception Use Treatment States	Postpartum Medicaid Coverage Control States	Postpartum Medicaid Coverage Treatment States
Observations	4645	4887	5362	5474	3464	3353
waiver	0.0000	0.4006	0.0000	0.3869	0.0000	0.3910
unemployment	6.4722	8.5877	6.4830	8.6023	6.0128	8.3001
abortion rate	5.5165	16.1523	5.5032	16.0226	5.3568	15.6031

Figure 6C. Pre-Policy Parallel Lines Trends FPL<100% & Generous Definition





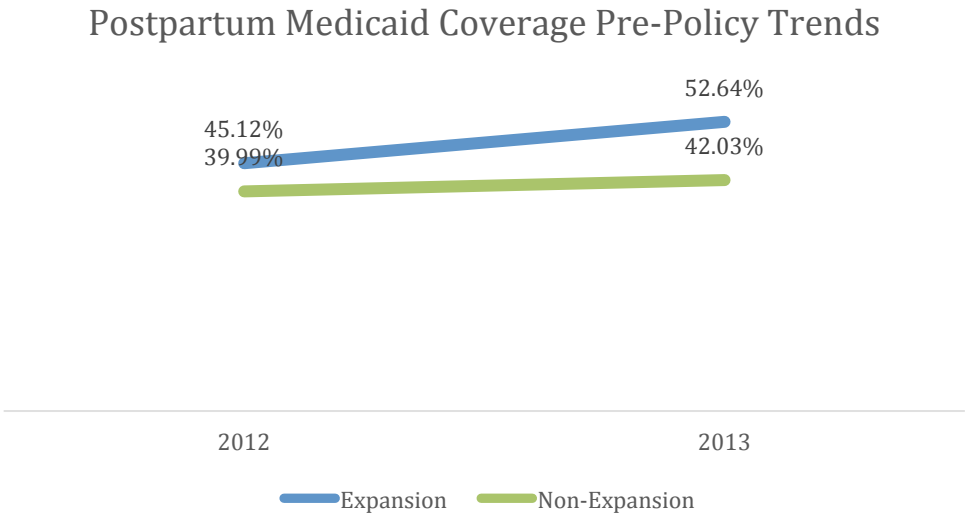


Table 6D. Difference-in-Difference Estimates for Impact of Medicaid Expansion on Family Planning Outcomes for Low-Income Women
FPL<100% & Generous Definition

	Unintended Pregnancies	Postpartum Contraception Use	Postpartum Medicaid Coverage
Observations	16,679	19,028	15,286
Expansion	-0.02	0.03	0.07**
	(0.47)	(0.13)	(0.00)
Race			
White	Ref	Ref	Ref
	(.)	(.)	(.)

Black	0.07***	-0.02	0.09***
	(0.00)	(0.11)	(0.00)
AI/AN	-0.04	-0.03	0.02
	(0.19)	(0.27)	(0.49)
Asian	-0.04	-0.07**	-0.09***
	(0.14)	(0.00)	(0.00)
Other	0.01	-0.02	-0.03
	(0.74)	(0.13)	(0.14)
Ethnicity			
non-hispanic	Ref	Ref	Ref
	(.)	(.)	(.)
hispanic	-0.03	0.04***	-0.25***
	(0.07)	(0.00)	(0.00)
Marital Status			
married	Ref	Ref	Ref
	(.)	(.)	(.)
Not married	0.19***	0.01	0.10***
	(0.00)	(0.14)	(0.00)
Age			
18-19	Ref	Ref	Ref
	(.)	(.)	(.)
20-24	-0.08***	-0.02	-0.07***
	(0.00)	(0.24)	(0.00)
25-29	-0.22***	-0.03	-0.11***
	(0.00)	(0.06)	(0.00)
30-34	-0.29***	-0.06**	-0.18***
	(0.00)	(0.00)	(0.00)
35-39	-0.32***	-0.06**	-0.22***
	(0.00)	(0.01)	(0.00)
40+	-0.29***	-0.07*	-0.21***
	(0.00)	(0.04)	(0.00)
Education			
Grade School	-0.07**	-0.05*	-0.23***
	(0.00)	(0.02)	(0.00)
High School	Ref	Ref	Ref
	(.)	(.)	(.)
College or Post High School	0.05***	0.02*	-0.03**
	(0.00)	(0.02)	(0.01)
Previous Live Births			
0 previous births	Ref	Ref	Ref
	(.)	(.)	(.)
1 previous birth	0.02	0.02	0.09***
	(0.24)	(0.13)	(0.00)
2 previous births	0.10***	0.04**	0.13***
	(0.00)	(0.00)	(0.00)
3-5 previous births	0.19***	0.07***	0.20***
	(0.00)	(0.00)	(0.00)
6 or more previous births	0.18***	-0.10**	0.23***
Pre-pregnancy Medicaid Insurance			
yes	-0.00	N/A	N/A

	(0.92)		
SPA/Waiver			
yes	-0.01	-0.05**	0.08***
	(0.51)	(0.00)	(0.00)
Unemployment Rate			
unemployment	0.01	0.02*	0.03*
	(0.34)	(0.04)	(0.04)
Abortion Rate			
abortion rate	0.00*	0.00	0.00
	(0.04)	(0.10)	(0.87)

Model D: Sensitivity Analysis FPL<100% and Strict Definition Tables and Figures 7A to 7D

Table 7A. Weighted Individual Level Descriptive Statistics of Women with live births and responding to PRAMS during Pre-policy years 2011-2013 by state Medicaid expansion status

FPL<100% & Strict Definition

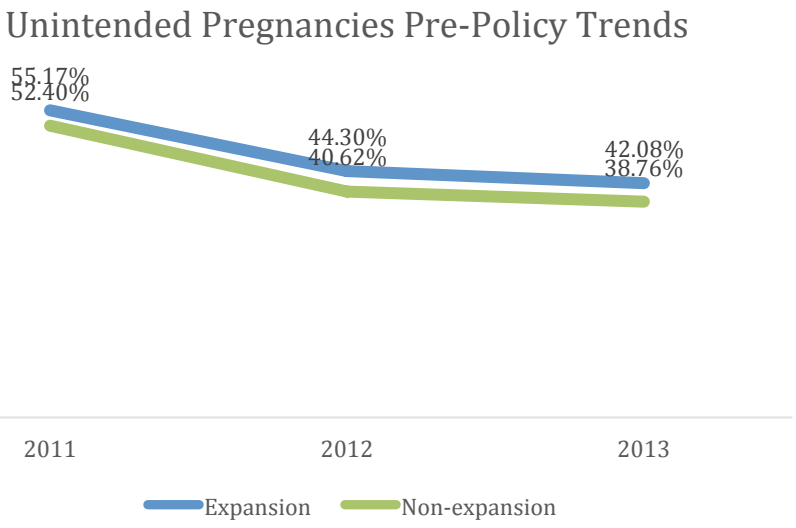
	Unintended Pregnancies Control states	Unintended Pregnancies Treatment states	Postpartum Contraception Use Control States	Postpartum Contraception Use Treatment States	Postpartum Medicaid Coverage Control States	Postpartum Medicaid Coverage Treatment States
Observations	3083	3241	3537	3623	2330	2255
Race						
White	0.6760	0.6342	0.6805	0.6239	0.6815	0.6076
Black	0.0498	0.2700	0.0504	0.2777	0.0542	0.2793
AI/AN	0.0782	0.0005	0.0846	0.0002	0.0831	0.0003
Asian	0.0190	0.0271	0.0157	0.0280	0.0139	0.0298
Other	0.1770	0.0682	0.1687	0.0703	0.1673	0.0830
Ethnicity						
non-hispanic	0.7699	0.6776	0.7938	0.6996	0.8161	0.6827
hispanic	0.2301	0.3224	0.2062	0.3004	0.1839	0.3173
married	0.4726	0.3233	0.4511	0.3210	0.4509	0.3110
not married	0.5274	0.6767	0.5489	0.6790	0.5491	0.6890
Age						
18-19	0.1221	0.0925	0.1265	0.0968	0.1138	0.0923
20-24	0.3925	0.3157	0.3892	0.3246	0.3640	0.3173
25-29	0.2619	0.2907	0.2616	0.2841	0.2889	0.2956
30-34	0.1452	0.1959	0.1458	0.1872	0.1426	0.1889
35-39	0.0617	0.0889	0.0601	0.0882	0.0714	0.0895
40+	0.0166	0.0164	0.0168	0.0190	0.0194	0.0164
Education						
Grade School	0.0626	0.0906	0.0567	0.0811	0.0564	0.0863
High School	0.5810	0.5664	0.5834	0.5741	0.5716	0.5746
College or Post High School	0.3564	0.3430	0.3599	0.3448	0.3720	0.3391
Previous Live Births						
0 previous births	0.3252	0.3249	0.3268	0.3290	0.3313	0.3335
1 previous births	0.2833	0.2977	0.2878	0.2922	0.2623	0.2799
2 previous births	0.2019	0.2017	0.1952	0.1992	0.1893	0.1965

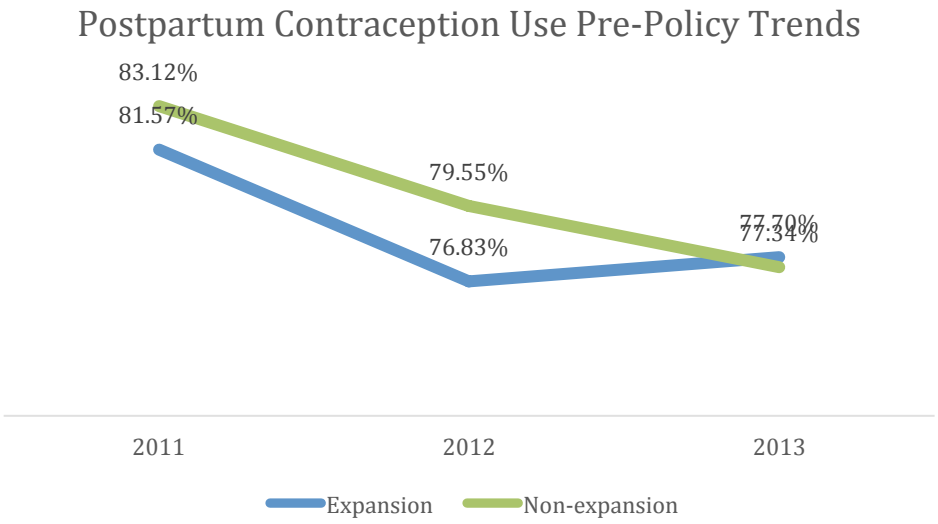
3-5 previous births	0.1817	0.1636	0.1820	0.1654	0.2098	0.1744
6 or more previous births	0.0079	0.0121	0.0082	0.0142	0.0074	0.0157
Pre-pregnancy Medicaid Insurance						
yes	0.2546	0.4303	N/A	N/A	N/A	N/A

Table 7B. Weighted Contextual Level Descriptive Statistics during Pre-policy years by State Medicaid expansion status
FPL<100% & Strict Definition

	Unintended Pregnancies Control states	Unintended Pregnancies Treatment states	Postpartum Contraception Use Control States	Postpartum Contraception Use Treatment States	Postpartum Medicaid Coverage Control States	Postpartum Medicaid Coverage Treatment States
Observations	3083	3241	3537	3623	2330	2255
waiver	0.0000	0.6585	0.0000	0.6530	0.0000	0.6533
unemployment	5.5612	8.5326	5.5589	8.5356	5.1759	8.2912
abortion rate	6.0102	17.5822	6.0246	17.4922	5.8720	17.3047

Figure 7C. Pre-Policy Parallel Lines Trends FPL<100% & Generous Definition





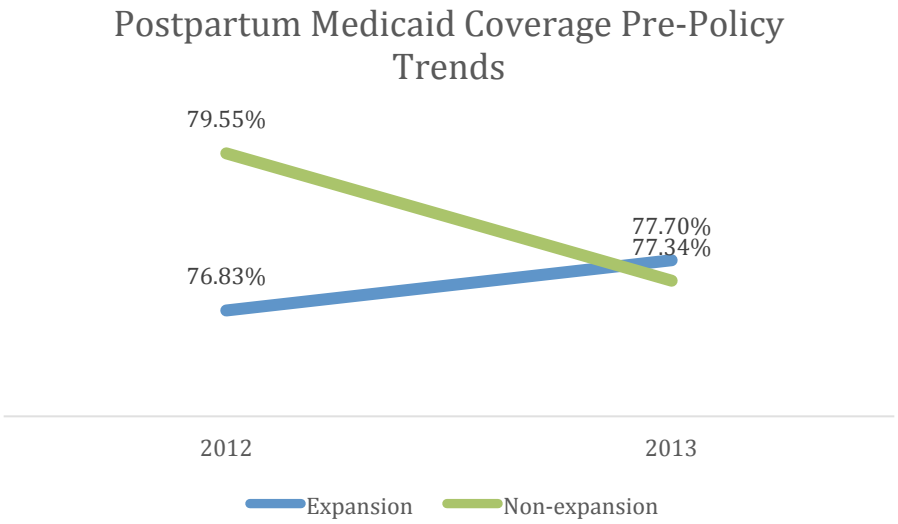


Table 7D. Difference-in-Difference Estimates for Impact of Medicaid Expansion on Family Planning Outcomes for Low-Income Women
FPL<100% & Generous Definition

	Unintended Pregnancies	Postpartum Contraception Use	Postpartum Medicaid Coverage
Observations	11058	12435	10018
Expansion	-0.08*	0.01	0.15***
Race			
White	Ref	Ref	Ref
	(.)	(.)	(.)

Black	0.06*	-0.06***	0.09***
	(0.01)	(0.00)	(0.00)
AI/AN	-0.04	-0.05	-0.01
	(0.27)	(0.11)	(0.78)
Asian	-0.09	-0.11**	-0.05
	(0.05)	(0.00)	(0.23)
Other	0.01	-0.03	-0.04
	(0.58)	(0.11)	(0.11)
Ethnicity			
non-hispanic	Ref	Ref	Ref
	(.)	(.)	(.)
hispanic	-0.05*	-0.00	-0.26***
	(0.02)	(0.80)	(0.00)
Marital Status			
married	Ref	Ref	Ref
	(.)	(.)	(.)
Not married	0.19***	0.00	0.10***
	(0.00)	(0.68)	(0.00)
Age			
18-19	Ref	Ref	Ref
	(.)	(.)	(.)
20-24	-0.07**	-0.03	-0.08**
	(0.00)	(0.11)	(0.00)
25-29	-0.22***	-0.05**	-0.10***
	(0.00)	(0.01)	(0.00)
30-34	-0.27***	-0.08***	-0.18***
	(0.00)	(0.00)	(0.00)
35-39	-0.29***	-0.07*	-0.20***
	(0.00)	(0.02)	(0.00)
40+	-0.26***	-0.10*	-0.20***
	(0.00)	(0.01)	(0.00)
Education			
Grade School	-0.03	-0.01	-0.20***
	(0.41)	(0.67)	(0.00)
High School	Ref	Ref	Ref
	(.)	(.)	(.)
College or Post High School	0.05***	0.03*	0.00
	(0.00)	(0.02)	(0.94)

Previous Live Births			
0 previous births	Ref	Ref	Ref
	(.)	(.)	(.)
1 previous birth	0.01	0.04*	0.08***
	(0.76)	(0.03)	(0.00)
2 previous births	0.11***	0.06***	0.10***
	(0.00)	(0.00)	(0.00)
3-5 previous births	0.21***	0.09***	0.20***
	(0.00)	(0.00)	(0.00)
6 or more previous births	0.23***	-0.04	0.21***
	(0.00)	(0.46)	(0.00)
Pre-pregnancy Medicaid Insurance			
yes	-0.01		
	(0.43)		
SPA/Waiver			
yes	0.02	-0.06**	0.03
	(0.43)	(0.00)	(0.21)
Unemployment Rate			
unemployment	-0.02	0.02	0.08***
	(0.27)	(0.18)	(0.00)
Abortion Rate			
abortion rate	0.02	-0.01	0.01
	(0.16)	(0.30)	(0.73)

** $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*
**Expansion states include: Illinois, Maryland, West Virginia*
***Non-expansion states include: Oklahoma, Utah, Wyoming*

Table 8A. Difference-in-Difference Estimates for Impact of Medicaid Expansion on Family Planning Outcomes for Low-Income Women
Generous Definition, omit aged 18-19 & pre-Medicaid Insurance

	Unintended Pregnancies	Postpartum Contraception Use	Postpartum Medicaid Coverage
Observations	20370	23168	18789
Expansion	0.01	0.02	0.11***
Race			
White	Ref	Ref	Ref
	(.)	(.)	(.)
Black	0.09***	-0.02	0.09***
	(0.00)	(0.09)	(0.00)
AI/AN	-0.01	-0.03	0.01

	(0.67)	(0.14)	(0.60)
Asian	-0.02	-0.09***	-0.07**
	(0.53)	(0.00)	(0.00)
Other	0.01	-0.03	-0.02
	(0.36)	(0.05)	(0.25)
Ethnicity			
non-hispanic	Ref	Ref	Ref
	(.)	(.)	(.)
hispanic	-0.02	0.04***	-0.25***
	(0.07)	(0.00)	(0.00)
Marital Status			
married	Ref	Ref	Ref
	(.)	(.)	(.)
Not married	0.19***	0.01	0.12***
	(0.00)	(0.43)	(0.00)
Age			
20-24	Ref	Ref	Ref
	(.)	(.)	(.)
25-29	-0.13***	-0.01	-0.04**
	(0.00)	(0.58)	(0.00)
30-34	-0.20***	-0.02	-0.09***
	(0.00)	(0.06)	(0.00)
35-39	-0.24***	-0.04**	-0.12***
	(0.00)	(0.01)	(0.00)
40+	-0.20***	-0.07*	-0.13***
	(0.00)	(0.01)	(0.00)
Education			
Grade School	-0.07**	-0.04*	-0.22***
	(0.00)	(0.03)	(0.00)
High School	Ref	Ref	Ref
	(.)	(.)	(.)
College or Post High School	0.04***	0.02**	-0.03**
	(0.00)	(0.01)	(0.00)
Previous Live Births			
0 previous births	Ref	Ref	Ref
	(.)	(.)	(.)
1 previous birth	0.03**	0.01	0.09***
	(0.01)	(0.58)	(0.00)
2 previous births	0.12***	0.04**	0.13***
	(0.00)	(0.00)	(0.00)
3-5 previous births	0.21***	0.05***	0.20***

	(0.00)	(0.00)	(0.00)
6 or more previous births	0.19***	-0.12***	0.22***
	(0.00)	(0.00)	(0.00)
Waiver/SPA Status			
yes	0.00	-0.04*	0.05*
	(0.85)	(0.03)	(0.01)
Unemployment Rate			
unemployment	0.01	0.01	0.06***
	(0.26)	(0.24)	(0.00)
Abortion Rate			
abortion rate	0.01**	0.00	0.00
	(0.00)	(0.42)	(0.17)

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

*Expansion states include: Illinois, Maryland, New Jersey, Washington, West Virginia

**Non-expansion states include Maine, Missouri, Oklahoma, Utah, Wyoming

Table 8B. Difference-in-Difference Estimates for Impact of Medicaid Expansion on Family Planning Outcomes for Low-Income Women
FPL<100%, Strict Definition, omit aged 18-19 & pre-Medicaid Insurance

	Unintended Pregnancies	Postpartum Contraceptior	Postpartum Medicaid Coverage
Observations	9925	11158	9045
Expansion	-0.10**	0.01	0.15***
	(0.00)	(0.72)	(0.00)
Race			
White	Ref.	Ref.	Ref.
	(.)	(.)	(.)
Black	0.05*	-0.06**	0.09***
	(0.03)	(0.00)	(0.00)
AI/AN	-0.04	-0.03	-0.01
	(0.38)	(0.32)	(0.75)
Asian	-0.09	-0.11**	-0.06
	(0.06)	(0.01)	(0.17)
Other	0.01	-0.04	-0.06*
	(0.59)	(0.07)	(0.04)
Ethnicity			
non-hispanic	Ref.	Ref.	Ref.
	(.)	(.)	(.)
hispanic	-0.05*	-0.00	-0.26***
	(0.03)	(0.85)	(0.00)
Marital Status			
married	Ref.	Ref.	Ref.
	(.)	(.)	(.)
Not married	0.20***	0.00	0.10***
	(0.00)	(0.80)	(0.00)
Age			
20-24	Ref.	Ref.	Ref.
	(.)	(.)	(.)
25-29	-0.14***	-0.02	-0.03
	(0.00)	(0.10)	(0.11)

30-34	-0.20***	-0.05**	-0.10***
	(0.00)	(0.00)	(0.00)
35-39	-0.22***	-0.04	-0.12***
	(0.00)	(0.12)	(0.00)
40+	-0.18***	-0.07	-0.13**
	(0.00)	(0.07)	(0.01)
Education			
Grade School	-0.02	-0.01	-0.19***
	(0.45)	(0.66)	(0.00)
High School	Ref.	Ref.	Ref.
	(.)	(.)	(.)
College or Post High School	0.05**	0.03*	0.01
	(0.00)	(0.02)	(0.58)
Previous Live Births			
0 previous births	Ref.	Ref.	Ref.
	(.)	(.)	(.)
1 previous birth	0.01	0.03*	0.09***
	(0.49)	(0.05)	(0.00)
2 previous births	0.12***	0.06***	0.10***
	(0.00)	(0.00)	(0.00)
3-5 previous births	0.21***	0.09***	0.21***
	(0.00)	(0.00)	(0.00)
6 or more previous births	0.23***	-0.04	0.22***
	(0.00)	(0.43)	(0.00)
Waiver/SPA status			
yes	0.02	-0.06**	0.01
	(0.39)	(0.01)	(0.63)
Unemployment Rate			
unemployment	-0.02	0.01	0.09***
	(0.16)	(0.38)	(0.00)
Abortion Rate			
abortion rate	0.02	-0.01	0.01
	(0.22)	(0.46)	(0.80)

** p < 0.05, ** p < 0.01, *** p < 0.001*

**Expansion states include: Illinois, Maryland, West Virginia*

***Non-expansion states include: Oklahoma, Utah, Wyoming*

Table 6. Summary of Predicated Probability Estimates of Models

	Unintended Pregnancy		**Postpartum Contraception Use**		**Postpartum Medicaid Coverage**	
	Non-expansion state Predicted Probability	**Expansion states Predicted Probability**	**Non-expansion state Predicted Probability**	**Expansion states Predicted Probability**	**Non-expansion state Predicted Probability**	**Expansion states Predicted Probability**
Generous Definition-Omit aged 18-19 & pre-Medicaid Insurance	47.00%	47.90%	79.00%	81.40%	48.55%***	52.46%***
Strict Definition	49.40%	44.60%	81.3%	81.30%	42.80%***	58.90%***

FPL<100 & Generous Definition	50.81%	48.60%	78.50%	80.80%	49.20%***	58.70%***
FPL<100 & Strict- Omit aged 18-19 & pre-Medicaid Insurance	53.00%***	44.00%***	80.4%	81.40%	46.00%***	61.00%***

** p < 0.05, ** p < 0.01, *** p < 0.001*

**Note only those with an asterisk were found to be statistically significant in regression analysis.*

Bibliography

1. WHO. *Family planning/Contraception*. 2018; Available from: https://www.who.int/news-room/fact-sheets/detail/family-planning-contraception.
2. *Family planning/contraception*. 2018 [cited 2019; Available from: https://www.who.int/en/news-room/fact-sheets/detail/family-planning-contraception.
3. Program, I.o.M.C.o.a.C.R.o.t.H.O.o.F.P.T.X., *A Review of the HHS Family Planning Program: Mission, Management, and Measurement of Results.* Overview of Famly Planning in the United States. 2009, Washington DC: National Academies Press.
4. *Achievements in Public Health, 1900-1999: Family Planning.* MMWR, 1999.
5. Usha Ranji, Y.B., and Alina Salganicoff, *Medicaid and Family Planning: Background and Implications of the ACA*. 2016: KAISER FAMILY FOUNDATION.
6. Tsui, A.O., R. McDonald-Mosley, and A.E. Burke, *Family planning and the burden of unintended pregnancies.* Epidemiologic reviews, 2010. **32**(1): p. 152-174.
7. Frost, J.J., et al., *Return on investment: a fuller assessment of the benefits and cost savings of the US publicly funded family planning program.* Milbank Q, 2014. **92**(4): p. 696-749.
8. Medicine, I.o., *The Best Intentions: Unintended Pregnancy and the Well-Being of Children and Families*, ed. S.S. Brown and L. Eisenberg. 1995, Washington, DC: The National Academies Press. 392.
9. Kost, K. and L. Lindberg, *Pregnancy intentions, maternal behaviors, and infant health: investigating relationships with new measures and propensity score analysis.* Demography, 2015. **52**(1): p. 83-111.
10. Campbell, A.A. and W.D. Mosher, *A history of the measurement of unintended pregnancies and births.* Matern Child Health J, 2000. **4**(3): p. 163-9.
11. Finer, L.B. and M.R. Zolna, *Declines in Unintended Pregnancy in the United States, 2008-2011.* N Engl J Med, 2016. **374**(9): p. 843-52.
12. Sedgh, G., S. Singh, and R. Hussain, *Intended and unintended pregnancies worldwide in 2012 and recent trends.* Studies in family planning, 2014. **45**(3): p. 301-314.
13. Sonfield, A., et al., *The Public Costs of Births Resulting from Unintended Pregnancies: National and State-Level Estimates.* Perspectives on Sexual and Reproductive Health, 2011. **43**(2): p. 94-102.
14. Mayer, J.P., *Unintended childbearing, maternal beliefs, and delay of prenatal care.* Birth, 1997. **24**(4): p. 247-52.
15. Shah, P.S., et al., *Intention to become pregnant and low birth weight and preterm birth: a systematic review.* Matern Child Health J, 2011. **15**(2): p. 205-16.
16. Mohllajee, A.P., et al., *Pregnancy intention and its relationship to birth and maternal outcomes.* Obstet Gynecol, 2007. **109**(3): p. 678-86.

17. Orr, S.T., et al., *Unintended pregnancy and preterm birth.* Paediatr Perinat Epidemiol, 2000. **14**(4): p. 309-13.
18. Kost, K., D.J. Landry, and J.E. Darroch, *The effects of pregnancy planning status on birth outcomes and infant care.* Fam Plann Perspect, 1998. **30**(5): p. 223-30.
19. Gipson, J.D., M.A. Koenig, and M.J. Hindin, *The effects of unintended pregnancy on infant, child, and parental health: a review of the literature.* Stud Fam Plann, 2008. **39**(1): p. 18-38.
20. *Women Saw Large Decrease In Out-Of-Pocket Spending For Contraceptives After ACA Mandate Removed Cost Sharing.* 2015. **34**(7): p. 1204-1211.
21. Heinig, M.J., *Host defense benefits of breastfeeding for the infant. Effect of breastfeeding duration and exclusivity.* Pediatr Clin North Am, 2001. **48**(1): p. 105-23, ix.
22. Maxson, P. and M.L. Miranda, *Pregnancy intention, demographic differences, and psychosocial health.* J Womens Health (Larchmt), 2011. **20**(8): p. 1215-23.
23. Salmon, P. and N.C. Drew, *Multidimensional assessment of women's experience of childbirth: relationship to obstetric procedure, antenatal preparation and obstetric history.* J Psychosom Res, 1992. **36**(4): p. 317-27.
24. Orr, S.T.M.C., *Psychosocial and behavioral factors and intendedness of pregnancy.* Johns Hopkins University School of Hygiene and Public Health., 1995. **Unpublished manuscript**.
25. Condon, J.T. and T.L. Watson, *The maternity blues: exploration of a psychological hypothesis.* Acta Psychiatr Scand, 1987. **76**(2): p. 164-71.
26. Najman, J.M., et al., *The mental health of women 6 months after they give birth to an unwanted baby: a longitudinal study.* Soc Sci Med, 1991. **32**(3): p. 241-7.
27. Kim, T.Y., R.K. Dagher, and J. Chen, *Racial/Ethnic Differences in Unintended Pregnancy: Evidence From a National Sample of U.S. Women.* American Journal of Preventive Medicine, 2016. **50**(4): p. 427-435.
28. Wherry, L.R., *State Medicaid Expansions for Parents Led to Increased Coverage and Prenatal Care Utilization among Pregnant Mothers.* Health Serv Res, 2018. **53**(5): p. 3569-3591.
29. Johnston, E.M. and E.K. Adams, *State Prescription Contraception Insurance Mandates: Effects on Unintended Births.* 2017. **52**(6): p. 1970-1995.
30. Clapp, M.A., et al., *Preconception Coverage Before and After the Affordable Care Act Medicaid Expansions.* Obstet Gynecol, 2018. **132**(6): p. 1394-1400.
31. Johnston, E.M., et al., *Impacts of the Affordable Care Act's Medicaid Expansion on Women of Reproductive Age: Differences by Parental Status and State Policies.* Womens Health Issues, 2018. **28**(2): p. 122-129.
32. Benitez, J.A., E.K. Adams, and E.E. Seiber, *Did Health Care Reform Help Kentucky Address Disparities in Coverage and Access to Care among the Poor?* Health Serv Res, 2018. **53**(3): p. 1387-1406.
33. Cathy L. Melvin, M.R., Brenda Colley Gilbert, PRAMS Working Group, *Pregnancy Intention: How PRAMS Data Can Inform Programs and Policy.* Maternal and Child Health Journal, 2000. **4**.

34. Committee on Health Insurance, S., et al., *America's Uninsured Crisis : Consequences for Health and Health Care*. 2009, Washington, D.C., UNITED STATES: National Academies Press.
35. Adams, E.K., et al., *Prepregnancy Insurance and Timely Prenatal Care for Medicaid Births: Before and After the Affordable Care Act in Ohio.* J Womens Health (Larchmt), 2018.
36. Culwell, K.R. and J. Feinglass, *The Association of Health Insurance with Use of Prescription Contraceptives.* Perspectives on Sexual and Reproductive Health, 2007. **39**(4): p. 226-230.
37. Nearns, J., *Health insurance coverage and prescription contraceptive use among young women at risk for unintended pregnancy.* Contraception, 2009. **79**(2): p. 105-110.
38. Foundation, K.F., *Health Insurance Coverage of Low Income Adults 19-64 (under 200% FPL)*. 2017: KFF.
39. Institute, G. Gains in Insurance Coverage for Reproductive-Age Women at a Crossroads 2018 2019]; Available from: https://www.guttmacher.org/article/2018/12/gains-insurance-coverage-reproductive-age-women-crossroads.
40. Adams, E.K., K. Galactionova, and G.M. Kenney, *Medicaid family planning waivers in 3 States: did they reduce unwanted births?* Inquiry, 2015. **52**.
41. Dunlop, A.L., et al., *Georgia's Medicaid Family Planning Waiver: Working Together with Title X to Enhance Access to and Use of Contraceptive and Preventive Health Services.* Womens Health Issues, 2016. **26**(6): p. 602-611.
42. Finer, L.B., A. Sonfield, and R.K. Jones, *Changes in out-of-pocket payments for contraception by privately insured women during implementation of the federal contraceptive coverage requirement.* Contraception, 2014. **89**(2): p. 97-102.
43. Sonfield, A., et al., *Impact of the federal contraceptive coverage guarantee on out-of-pocket payments for contraceptives: 2014 update.* Contraception, 2015. **91**(1): p. 44-48.
44. *Affordable Care Act's Mandate Eliminating Contraceptive Cost Sharing Influenced Choices Of Women With Employer Coverage.* 2016. **35**(9): p. 1608-1615.
45. *Early Impact Of The Affordable Care Act On Oral Contraceptive Cost Sharing, Discontinuation, And Nonadherence.* 2016. **35**(9): p. 1616-1624.
46. Munira Z. Gunja, S.R.C., Michelle M. Doty, Sophie Beutel, *How the Affordable Care Act Has Helped Women Gain Insurance and Improved Their Ability to Get Health Care*. 2017: The Commonwealth Fund.
47. Gangopadhyaya, B.G.a.A., *Who Gained Health Insurance Coverage Under the ACA, and Where Do They Live?* 2016, Robert Wood Johnson Foundation and Urban Institute.
48. Rosenbaum, S. and T.M. Westmoreland, *The Supreme Court's Surprising Decision On The Medicaid Expansion: How Will The Federal Government And States Proceed?* Health Affairs, 2012. **31**(8): p. 1663-1672.

49. *Status of State Action on the Medicaid Expansion Decision*. 2019 [cited 2019; Available from: https://www.kff.org/health-reform/state-indicator/state-activity-around-expanding-medicaid-under-the-affordable-care-act/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.
50. Jared B. Fox, P., Frederic E. Shaw, MD, JD, *Relationship of Income and Health Care Coverage to Receipt of Recommended Clinical Preventive Services by Adults — United States, 2011–2012*. 2014.
51. Guyer, J., et al., *Medicaid Family Planning Programs: CASE STUDIES OF SIX STATES AFTER ACA IMPLEMENTATION*. 2017, KFF: KFF.
52. Samantha Artiga, K.O., and Anthony Damico , *Changes in Health Coverage by Race and Ethnicity since Implementation of the ACA, 2013-2017*. 2019: KFF.
53. Johnston, E.M., et al., *Impacts of the Affordable Care Act's Medicaid Expansion on Women of Reproductive Age: Differences by Parental Status and State Policies.* Women's Health Issues, 2018. **28**(2): p. 122-129.
54. MacCallum, C.L. and C.E. Margerison, *The Affordable Care Act Contraception Mandate & Unintended Pregnancy in Women of Reproductive Age: An Analysis of the National Survey of Family Growth, 2008-2010 v. 2013-2015.* Contraception, 2019.
55. Redd, S.K. and K.S. Hall, *Medicaid Family Planning Expansions: The Effect of State Plan Amendments on Postpartum Contraceptive Use.* J Womens Health (Larchmt), 2018.
56. Andersen, R. and P. L. Davidson, *Improving access to care in America: Individual and contextual indicators*. Vol. 2007. 2014.
57. Courtemanche, C., et al., *Effects of the Affordable Care Act on Health Care Access and Self-Assessed Health After 3 Years.* INQUIRY: The Journal of Health Care Organization, Provision, and Financing, 2018. **55**: p. 0046958018796361.
58. Purdy, L., *Women's reproductive autonomy: medicalisation and beyond.* Journal of medical ethics, 2006. **32**(5): p. 287-291.
59. Upadhyay, U.D., et al., *Development and validation of a reproductive autonomy scale.* Stud Fam Plann, 2014. **45**(1): p. 19-41.
60. *State Political Parties*. 2019 [cited 2019 July 15, 2019]; Available from: https://www.kff.org/other/state-indicator/state-political-parties/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.
61. Poll, G.D. *2017 U.S. Party Affiliation by State*. 2017; Available from: https://news.gallup.com/poll/226643/2017-party-affiliation-state.aspx.
62. Yue, D., P.W. Rasmussen, and N.A. Ponce, *Racial/Ethnic Differential Effects of Medicaid Expansion on Health Care Access.* 2018. **53**(5): p. 3640-3656.
63. Elizabeth Nash, R.B.G., Lizamarie Mohammed, Zohra Ansari-Thomas, Olivia Cappello, *Policy Trends in the States, 2017*, G. Institute, Editor. 2018, Guttmacher Institute.

64. Opara, E.I. and J. Zaidi, *The interpretation and clinical application of the word 'parity': a survey.* Bjog, 2007. **114**(10): p. 1295-7.
65. Finer, L.B. and M.R. Zolna, *Unintended pregnancy in the United States: incidence and disparities, 2006.* Contraception, 2011. **84**(5): p. 478-485.
66. Bradby, H., *Describing Ethnicity in Health Research.* Ethnicity & Health, 2003. **8**(1): p. 5-13.
67. Anachebe, N.F. and M.Y. Sutton, *Racial disparities in reproductive health outcomes.* American Journal of Obstetrics and Gynecology, 2003. **188**(4): p. S37-S42.
68. D'Angelo, D.V., et al., *Differences between mistimed and unwanted pregnancies among women who have live births.* Perspect Sex Reprod Health, 2004. **36**(5): p. 192-7.
69. Schwall, A., *Defining age and using age-related constructs*. The Oxford Handbook of Work and Aging. 2012.
70. HIMES, C.L. *Elderly Americans*. 2003 [cited 2019.
71. Oakes, J.M. and P.H. Rossi, *The measurement of SES in health research: current practice and steps toward a new approach.* Soc Sci Med, 2003. **56**(4): p. 769-84.
72. Bhatt, C.B. and C.M. Beck-Sagué, *Medicaid Expansion and Infant Mortality in the United States.* American journal of public health, 2018. **108**(4): p. 565-567.
73. Verbrugge, L.M., *Marital Status and Health.* Journal of Marriage and Family, 1979. **41**(2): p. 267-285.
74. Robards, J., et al., *Marital status, health and mortality.* Maturitas, 2012. **73**(4): p. 295-299.
75. Koren, A. and B. Mawn, *The context of unintended pregnancy among married women in the USA.* Journal of Family Planning and Reproductive Health Care, 2010. **36**(3): p. 150.
76. Society, A.T., *Health Status, Health Perceptions.* 2007.
77. Braveman, P.A., et al., *Socioeconomic Disparities in Health in the United States: What the Patterns Tell Us.* American Journal of Public Health, 2010. **100**(S1): p. S186-S196.
78. Haas, J.S., et al., *Prepregnancy Health Status and the Risk of Preterm Delivery.* Archives of Pediatrics & Adolescent Medicine, 2005. **159**(1): p. 58-63.
79. Shulman, H.A., V. D, Harrison, L. Smith, R. A. Warner, L. , *The Pregnancy Risk Assessment Monitoring*
System (PRAMS): Overview of Design and Methodolog. Research and Practice, 2018.
80. *2017 U.S. Party Affiliation by State*. 2017 [cited 2019; Available from: https://news.gallup.com/poll/226643/2017-party-affiliation-state.aspx.
81. CDC. *Pregnancy Risk !ssessment Monitoring System (PRAMS) Phase 8 Core Questionnaire* 2016 [cited 2019.
82. Williams, J.A.R. and S.E. Ortiz, *Examining public knowledge and preferences for adult preventive services coverage.* PLOS ONE, 2017. **12**(12): p. e0189661.
83. Miller, S. and L.R. Wherry, *Health and Access to Care during the First 2 Years of the ACA Medicaid Expansions.* New England Journal of Medicine, 2017. **376**(10): p. 947-956.

84. Alharbi, A.G., et al., *Impact of Medicaid coverage expansion under the Affordable Care Act on mammography and pap tests utilization among low-income women.* PLoS One, 2019. **14**(4): p. e0214886.
85. Lindau, S.T., et al., *The association of health literacy with cervical cancer prevention knowledge and health behaviors in a multiethnic cohort of women.* Am J Obstet Gynecol, 2002. **186**(5): p. 938-43.
86. Goodnough, A., *Trump Administration Unveils a Major Shift in Medicaid*, in *The New York Times*. 2020.
87. Hasstedt, K., *Shoring Up Reproductive Autonomy: Title X's Foundational Role*, G. Institute, Editor. 2019.
88. *Managed Care*. [cited 2019 September 2, 2019]; Available from: https://www.medicaid.gov/medicaid/managed-care/.