"CLOSE" TO GOOD HEALTH: A QUANTITATIVE ANALYSIS OF COUNTY-LEVEL HEALTH OUTCOMES AND PROXIMITY TO PLANNED PARENTHOOD CLINICS VERSUS CRISIS PREGNANCY CENTER LOCATIONS

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On my honor
I have neither given nor received
unauthorized aid on this thesis.

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ABSTRACT

Research on family planning clinics has found that some population health outcomes vary with regard to proximity to reproductive health care. This research paper discusses the impacts of proximity to both Planned Parenthood clinics and Crisis Pregnancy Center locations on county-level health outcomes. Using a two-model regression, I analyzed the relationship between proximity and health outcome data concerning HIV rate and teen birth rate of 3,138 counties within the United States. These regressions controlled for relevant demographic and other factors that could influence health outcomes, such as class and race. Predicted values of HIV rates increased with proximity to Planned Parenthood clinics and increased with proximity to CPC locations. Additionally, predicted teen birth rates decreased with proximity to Planned Parenthood clinics and did not clearly increase or decrease with proximity to CPC locations. To conclude, this paper proposes various types of public health research that could help clarify the effects of proximity to CPCs and Planned Parenthood clinics on population health outcomes within the United States.

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INTRODUCTION

Due to an increase in state and federal level restrictions on family planning clinics, Planned Parenthood has been conflated with abortion care despite providing a myriad of services for patients. Despite this confusion, it should be noted that not all Planned Parenthood locations provide abortions and that in 2018, abortions only constitute 3.4% of all services provided at Planned Parenthood locations (Loenard 2019). Restrictions to abortion care inevitably impact the folk's access to the other services that Planned Parenthood provides such as cancer screenings, STI testing, and contraception counseling and distribution. It is also crucial to note that according to the Guttmacher Institute, "about one in four (24%) women will have an abortion by age 45," in the United States (U.S.) (Guttmacher Institute 2019)[1]. Conflation leads to specific anti-abortion legislation that hurts family planning clinics' ability to provide other healthcare services. Despite the prevalence of abortions as a medical procedure and its legality throughout the U.S. since the Supreme Court ruled in favor of legalizing abortion during the Roe vs. Wade case in 1973, creating equal access to abortion and other reproductive health services has been an ongoing problem.

Since 1973, pro-life activists have mobilized to limit pro-choice efforts at the state level.[2] As a result of conflating all family planning clinics with abortion care, pro-life supporters have

[1] It is important to note that not all women can get pregnant, and not all people who get pregnant are women. Gender exists on a continuous spectrum, and thus I will refer to people within the sample not as "women" but as people who can get pregnant (PWCGP). I want to be clear that the only reason you can or cannot get pregnant is due to the functionality of your reproductive organs and is separate from gender identity or sexual orientation. Much of the previous research done concerning reproductive health has failed to move past the binary notions of gender, and this paper is an attempt to move past that and create a more inclusive understanding of who would need reproductive healthcare both within the U.S. and on a global scale.

[2] As a cisgender, white, upper-class woman, I carry privilege in all aspects of my life. I have financial stability, white-privilege, and do not have to endure the emotional toll that it takes to be a non-cisgender person in society. As a woman, however, I experience some discrimination and marginalization due to the patriarchal system of our society. Nonetheless, I can never fully understand the experience of people marginalized due to their non-normative gender, race, or class. While writing and doing research for this paper, I have attempted to be as intentional and intersectional as possible, while acknowledging my inherent biases that come from my lived experience as a white, cis, upper-class woman in the United States. Additionally, my pro-choice views surrounding abortion rights and reproductive justice create a large bias within my interpretation of this research.

jeopardized the accessibility of other health services, such as contraception distribution, breast and ovarian cancer screenings and STD testing and treatment. Specifically, this paper will examine how the conflation of Planned Parenthood and abortion care influences county-level health outcomes of HIV and teen birth rates. Not every clinic can provide the same quality of services due to limited funding, difficulty finding healthcare providers due to fear of political backlash, and laws mandating restrictions on these clinics. State restrictions supported by pro-life activists and lawmakers have raised questions by pro-choice supporters concerning the accessibility of reproductive healthcare services for those seeking legitimate medical care. In recent years, state legislatures have placed restrictions on family planning clinics resulting in the creation of mandatory waiting periods for abortion care and requiring admitting privileges for physicians at a nearby hospital, forcing many clinics to limit their operations or shut down completely. More conservative states have succeeded in severely limited the number of clinics available: Missouri, for example, only has one abortion clinic left in the entire state (Calfas 2019).

Pro-life activists have attempted to further limit access to abortions through crisis pregnancy centers (CPCs), also known as pregnancy resource centers. CPCs are non-profit organizations that specialize in counseling pregnant people through their unplanned pregnancies, which typically involves discouraging them from having abortions. Additionally, people with negative pregnancy tests are typically discouraged from future use of birth control methods during these counseling sessions. CPCs are protected under the First Amendment, despite their ethically dubious advertising and distribution of inaccurate health information: CPC's are not healthcare clinics, but use misleading advertising to pose as medical care providers by offering free pregnancy tests. Ordinance 10-10, which would have mandated that CPCs inform clients that they lack licensed medical care providers in the State of Texas, was invalidated in June 2014 due to “vagueness” (Ahmed 2015). This pattern of CPCs avoiding regulation due to arguments centered on their freedom of speech has occurred in other places such as New York City and Baltimore. CPCs also lack concrete regulation because of their status as non-profit organizations. I hypothesize that people interacting with CPCs may have worse health outcomes due to a lack of legitimate medical information and care available at these locations.

Care Net is one of the largest organizations that establish and coordinate CPCs throughout the U.S. Their website advertises services that include “pregnancy decision, coaching by trained advocates, free pregnancy tests, information about pregnancy options, material resources, and post-decision support (including parenting education and abortion recovery groups),” (Care Net 2015). Today, CPCs are more common than abortion clinics in the U.S., with some states having ratios of CPCs to clinics of up to 15:1 (Borrero, Frietsche, and Dehlendorf 2019). Despite their popularity, the general population knows very little about CPCs and how they differ from other reproductive health care centers. CPCs and Planned Parenthood presences contrast because CPCs operate uncontested by lawmakers and public health officials, while Planned Parenthoods, including those that do not provide abortion care, struggle to function because of state restrictions that limit their day-to-day operations (Solis 2019).

The Guttmacher Institute estimates that if Roe v. Wade was overturned, 93,500 to 143,500 individuals each year would be unable to get safe and necessary abortion care, and the average distance traveled to a clinic would increase by 97 miles (Guttmacher Institute 2019). Proximity to a clinic impacts healthcare access, and this paper will examine to what degree county-level health outcomes vary by proximity to either Planned Parenthood or CPC locations. The health variables that were considered include rates of teen births (per 1000) and HIV rate (per 100,000). Proximity to healthcare services and health outcomes for a population is not a new concept to explore in the realm of public health; however, both qualitative and quantitative research on how proximity to CPCs as opposed to Planned Parenthood locations is lacking research concerning population health outcomes.

This quantitative analysis will work toward testing my thesis concerning the relationship between proximity to Planned Parenthood clinics or Crisis Pregnancy Center locations and county-level health outcomes. Findings will then be extrapolated to discuss the implications of this research and suggestions for future analysis regarding reproductive healthcare proximity and health outcomes. My research paper will test the hypothesis that HIV and teen birth rates will decrease closer to Planned Parenthood clinics and increase closer to CPC locations though a country-wide sociological quantitative analysis.

SOCIAL DETERMINANTS OF REPRODUCTIVE HEALTH

Increased levels of societal gender inequality lead to poor health outcomes for PWCGP, which can include “unwanted pregnancy, unsafe abortion, maternal mortality, sexually transmitted infections, depression, and psychosomatic symptoms” (Murphy 2003: 205). Family planning efforts to lower unintended pregnancies can mitigate these gender disparities and help create healthier PWCGP, children, and families (Rosen 2012). Sex has traditionally been thought of as biological, while gender is now viewed as a social construct within the field of sociology (West and Zimmerman 1987). The patriarchal structure of most known societies has deprioritized the needs and wants of PWCGP. This reality has resulted in numerous gender inequalities, such as unequal pay, on a national and global scale. Groups such as the World Health Organization are now prioritizing healthcare access and outcomes for PWCGP on an international scale (World Health Organization 2019). Efforts toward reproductive justice have emerged as a response to the unique challenges that PWCGP experience on a day to day basis.

The reproductive justice approach to healthcare adopted by the WHO focuses on "'… the basic right of all couples and individuals to decide freely and responsibly the number, spacing, and timing of their children and to have the information and means to do so, and the right to attain the highest standard of sexual and reproductive health. It also includes their right to make decisions concerning reproduction free of discrimination, coercion, and violence, as expressed in human rights documents'" (WHO, as cited in Chrisler 2014: 205). This definition prioritizes the rights of the individual over the structural restraints set by a governing body. Focusing on empowerment rather than on constraints concerning reproductive healthcare can help create more agency for patients and providers by mandating comprehensive and socially relevant reproductive healthcare. This strategy could allow PWCGP to believe that a governing body is helping rather than hindering them from making the best and most informed decisions about their bodies and sexual choices (Chrisler 2014). In reality, attempts to implement "reproductive justice for all" public health strategies are not established enough to serve those in need both within the United States and on a global scale.

Due to restrictive legislation that runs counter to a reproductive justice approach, the closure or reduction of resources to Planned Parenthood has led to increased travel time for those seeking such services. Restrictions set forth by state governments have decreased the number of family planning clinics and thus increased the travel time to reproductive health care services. For example, in Texas, PWCGP had to travel an average of 63 miles further between 2011 and 2013 to an abortion clinic due to closures. In cases like these, this results in more physical barriers to care, and more mental and emotional strain for patients (Gawron et al. 2018).

Supporters of reproductive justice operate under the assumption that well-informed and autonomous decisions about people's health leads to better overall health outcomes. Rational choice theory, the logic used to legitimize restrictive abortion laws, contrasts this belief by legitimizing government-supported constraints that limit the amount of choice and overall autonomy many PWCGP have when considering their healthcare options. Although health outcomes are usually thought of as individual issues by the general public, they are heavily impacted by the unique social context in which they are produced.

Two main theories within social science literature explain how and why government intervention influences reproductive health outcomes, such as unintended pregnancy. The first, rational choice theory, is rooted in an economic argument which posits that PWCGP base their reproductive choices and sexual decisions on a cost–benefit analysis. This cost-benefit strategy allegedly involves individuals taking all relevant market and individual factors into consideration before making decisions (Medoff 2014). Within sociology, rational choice theory tends to not align with academics in the discipline as it focuses on individual agency and fails to recognize the institutional factors that influence decision making (Hechter and Kanazawa 1997). Rational choice theory claims that when more restrictions are put on abortion, demand increases, cost rises, and more PWCGP will either avoid unprotected sex or seek out contraception as a way to avoid future financial burden of a procedure (Medoff 2014). Through restricting abortion access, the argument rests on the assumption that more PWCGP will choose preemptive reproductive care, such as abstinence, and as a result, unintended pregnancy rates will ultimately decrease.

The second model, random behavior, can help problematize the effectiveness of government restrictions that limit the number of abortions in a community (Medoff 2014). Rather than claiming PWCGP base sexual choices on a cost–benefit analysis, this model assumes

PWCGP do not think into the economic future while engaging in risky, sexual behavior. Instead, it recognizes that many sexual acts are random, unplanned, and spontaneous. In fact, researchers have found that even while controlling for an individual's demographic variables such as financial differences and race disparities, "none of the restrictive abortion laws are significantly different from zero…" This supports the claim that even while taking into consideration socioeconomic factors, abortion restrictions fail to lower the number of abortions taking place (Medoff 2014:269). This study, the first empirical analysis of its kind, aligns with the random choice model that affirms "that women's decisions to engage in risky sexual activity are independent of a state's restrictive abortion laws" (Medoff 2014:270). These two arguments contradict each other, as rational choice theory considers government restriction the solution to lowering abortion rates while random behavior theory cites federal and state involvement as the cause of more abortions throughout the United States. Despite the scientific evidence supporting the claim that restrictive abortion policy fails to lower the number of abortions within a society, many still believe that the rational choice model remains a relevant argument. Reproductive health restrictions are just one of the ways that gender inequality influences both mental and physical wellness.

ABORTION POLICY IN THE UNITED STATES

Reproductive health policy and care is driven by a highly polarized discourse surrounding abortion. Conservative-leaning individuals in the U.S. have adopted strict "pro-life" positions which have spurred many policies and pieces of legislation on both federal and state levels which pose restrictions on abortion care. For example, "women's right to choose" laws often mandate excessive informed consent procedures as an effort to prevent PWCGP from "regretting" their abortions. Restrictions emerged at the state level after abortion was nationally legalized in the well-known Roe vs. Wade Supreme Court case. Abortion clinics and family clinics have existed within an increasingly burdensome political climate since 1982 (Ahmed 2015). Between 1990 and 2018, over 700 pieces of legislation have passed in the U.S. restricting abortion care and access (Ely, Polmanteer, and Caron 2018). Restrictions include specific building codes for family planning clinics that are difficult to achieve or creating waiting periods to further the burden of finding abortion care.

These pieces of legislation were challenged in the Supreme Court case “Casey vs. Planned Parenthood,” in which pro-choice advocates attempted to challenge “women’s right to choose” laws. The court found that people who have the least access to services, such as PWCGP in rural areas, those who are low-income, and lower-educated PWCGP would have a harder time accessing necessary healthcare because of a 24-hour waiting period for abortion care due to an inevitable decrease in access to services at publically and privately family planning clinics. During this case, Pro-choice activists argued that these factors placed an “undue burden” on PWCGP. Ultimately, the court ruled that “These findings are troubling in some respects, but they do not demonstrate that the waiting period constitutes an undue burden” (Ahmed 2015:55). This court decision supported pro-life activists, helping to legitimize rational choice theory, pushing the limits of what constitutes an undue burden and laying the groundwork for more restrictive abortion legislation. This validation of abortion restrictions helps to reject the argument that proximity poses a significant issue for marginalized people seeking reproductive health services.

The pro-life versus pro-choice debate is constantly manufactured and manipulated by those on the conservative side of the political spectrum in ways that prioritize the life of the fetus while failing to acknowledge the autonomy and life of the PWCGP to control their current and future life trajectories. Abortion clinics also tend to provide other family planning care such as contraception distribution, sexually transmitted infection (STI) testing, and sexual education programs. When restrictions are set in place solely based on the abortion debate, other aspects of family planning care also become more difficult to access. With the reality that “more than half of U.S. women live in states with laws that are ‘hostile to abortion rights’ (i.e. that have at least four types of major abortion restrictions in place),” it is crucial to understand how other reproductive health outcomes have been affected by such legislation (Hebert et al. 2016:65). When abortion clinics are forced to close, lose funding, or are otherwise hindered from providing comprehensive care to their clientele, there are real physical, financial, and psychological consequences for marginalized populations. People seeking reproductive health support primarily include young, poor, female, and not well-educated individuals (Rosen 2012). With the reality that resources are harder to access due to various restrictions, proximity can be considered as a relevant factor to examine changes in reproductive healthcare accessibility.

PROXIMITY TO CARE

Due to restrictions on family planning clinics created by pro-life supporters primarily on a state basis, many individuals seeking care now experience difficulty finding other necessary health services. Accessibility is “influenced by a complex set of the facility and patient characteristics, including proximity, transportation networks, hours, fee policies, cultural and linguistic concordance, and client socioeconomic status” and remains a complex concept to analyze (Goodman et al. 2007). Various researchers have examined proximity to health services within the context of reproductive health outcomes and have found relatively weak links to worse health outcomes in terms of statistically significant correlations. Academics found that “proximity is cited more often by the younger than older teens - both black and white - especially as a contributing reason” for why teenagers wait to attend a family planning clinic. Although

PWCGP seeking abortion care in urban areas may not consider proximity a barrier to their healthcare needs, 20% of PWCGP “have to travel 42 to 54 miles or farther to access abortions” and those in disadvantaged economic situations who travel for abortion care reported traveling 140 miles to find a trained healthcare provider (Ely, Polmanteer, and Caron 2018:14). Local resources in low-income neighborhoods tend to be limited and thus restrictions have a greater impact on areas that already lack quality medical care. These health disparities associated with socioeconomic status impact those already marginalized in society and thus tend to hinder rather than help solve inequities in a given population.

Proximity to reproductive healthcare has been examined through limited academic research. For example, research has focused on how access to family planning services influences high school graduation rates (Hicks-Courant and Schwartz 2016). However, referrals from family planning clinics for abortion with regard to spatial analysis have been limited. Referrals from publicly funded health centers are a crucial step within reproductive healthcare as people who get pregnancy tests at clinics locations often want referrals for abortion care (Rosen 2012). When PWCGP cannot get referrals after a positive pregnancy test, their options are limited and will likely impact their decision of whether or not to seek out abortion care. One-third of women in the United States will go to a public clinic for a pregnancy test in their lifetime and often will ask for referrals to other types of care such as abortion services (Rosen 2012). One study found that rural health centers were more likely than urban health centers to note that the nearest abortion provider practiced in another state (16% vs. 6%) (Hebert et al. 2016). The same research also found that centers were willing to refer people to abortion providers, however, the more rural a health center was, the more difficult it became for them to know how far away that provider would be for the specific client. Additionally, in some areas of the country, there may not be any abortion providers within a reasonable distance from the referral site (Hebert et al. 2016). This supports the claim that rural individuals experience more difficulty overcoming the geographic barriers to care defined by "the extent to which family planning service delivery and supply points are located so that a large proportion of the target population can reach them with an acceptable level of effort" (Bertrand et al. 1995:65). Accessibility does not only concern physical distance; varying financial, religious, psychosocial, and other conditions may also impact an individual's ability to access the reproductive healthcare they desire.

CRISIS PREGNANCY CENTERS

Crisis pregnancy centers or pregnancy resource centers (CPCs) are non-profit organizations with the goal of preventing abortion and encouraging those considering options during pregnancy to carry the pregnancy to term (Borrero, Frietsche, and Dehlendorf 2019). It is estimated that there are 2,500 to 4,000 CPCs operating within the United States (Rosen 2012). Primarily run by pro-life organizations supported through Evangelical Christian communities, these centers provide pregnancy tests, sonograms, and counseling for PWCGP throughout the country (Kimport, Kriz, and Roberts 2018). They primarily advertise services through highway billboards asking the viewer if they are, "Pregnant and afraid?" and are vague about the actual status of their organization (Bryant et al. 2014). Advertisements tend to broadcast the perception of providing medical services, such as ultrasounds and pregnancy tests, despite CPCs having no medical qualifications, hence its characterization as deceitful advertising (Rubin 2018). Despite not being a legitimate healthcare-providing clinic and rarely having licensed medical professionals on staff, many CPCs receive funding directly from the state or federal government. In fact, "since 2001, CPCs received $30 million in federal funding" and at a state level, legislators have tried to gather funding through selling state license plates that say, "choose life" and directing those profits to CPCs throughout the state (Ahmed 2015:51). CPCs tend to target young, low-income, poorly-educated PWCGP of color (Rosen 2012). Due to CPCs existing at a much higher rate than publicly funded family planning clinics, many PWCGP may confuse CPCs with legitimate health clinics. Coercive techniques such as having staff wear white coats and using vague language to express what services are actually available have contributed to the reputation that CPCs are a public health risk due to their clear use of manipulation and spread of misinformation to those seeking legitimate health services (Borrero, Frietsche, and Dehlendorf 2019).

In a study of PWCGP seeking crisis pregnancy services in Louisiana, a state considered more conservative in terms of reproductive health policy, PWCGP who sought services at CPCs felt legitimately cared about despite understanding these centers were not legitimate health facilities. Additionally, staff members at these centers educated PWCGP on inaccurate information that connected abortion to negative health outcomes such as infertility (Kimport, Kriz, and Roberts 2018). Due to their protection under the first amendment and their status as a non-legitimate health clinic, CPCs are extremely difficult to regulate. As most CPCs register as non-profit organizations, their funding, activities, and advertising are not monitored strictly by state governments and donations received by CPCs remains tax deductible. Those fighting for reproductive rights would like to see legislation that forces CPCs to disclose that they are not licensed medical centers and to see them clarify if they actually have any medical professionals on their staff (Ahmed 2015). In a survey of CPC websites found by researchers through state directories, the analysis found that most misinformation concerned the possible connection between abortion and negative health outcomes. All of these websites were found on state directories means states are legitimizing these CPCs as health centers despite their lack of medical professionals or the provision of accurate medical knowledge. Examples include negative mental health impacts such and post-abortion syndrome and physical health outcomes such as infertility and breast cancer (Bryant et al. 2014). With unfounded claims about the negative health effects of abortion, PWCGP are not able to make well-informed decisions about their reproductive health.

Crisis pregnancy centers, through online advertising, also target the younger population. Researchers concluded this because CPC websites use images of young people on their webpages and advertise free or reduced-cost health services. Additionally, one-third of the examined websites clearly promoted their social media sites and had them easily accessible on the main pages of the website. In addition, beyond medically inaccurate information concerning negative health outcomes of abortion, CPC websites and clinics provide other incorrect statements concerning reproductive health. 63.5% of the analyzed websites criticized the effectiveness of condoms and many also advocated for abstinence as the only viable form of contraception. Inaccurate statements included were "Another lie perpetrated by our media is that condoms protect. The HIV virus can penetrate a condom" and "Condoms provide no protection against bacterial vaginosis, HPV, and herpes" (Bryant-Comstock et al. 2016:24). Both of those statements are medically inaccurate and discourage male condom use which is the only known way to help prevent the spread of sexually transmitted infections (STIs) currently available (Bryant-Comstock et al. 2016). Having these types of statements that encourage the dissemination of false medical information, CPCs are blatantly ignoring scientific facts. By discouraging condom usage, CPCs may be causing an increase in the spread of STIs and an increase in the rate of unintended pregnancies in areas where this misinformation is readily available. Ironically, in a qualitative study of staff members at CPCs, many of them emphasized their dislike of abortion providers, such as Planned Parenthood, and viewed them as misleading and coercive to the people who come to them for reproductive health services. A common theme from interviews with CPC staff that emerged in regard to family planning clinics was their emphasis on profit (despite Planned Parenthood's non-profit status) rather than proper care for patients (Kelly August). Despite the extreme medical and ethical dilemma posed by CPCs, there remains a large gap in academic research concerning the health impacts these centers may have on a population.

METHODS AND DATA

The dataset utilized comes from County Health Rankings & Roadmaps data produced through a Robert Wood Johnson Foundation Program. The County Health Rankings gather data concerning county-level health in order to rank counties within each state. Data was standardized in order to make comparisons across populations levels more easily understood. As health tends to deteriorate with age, some of the measures are age-adjusted to take this reality into consideration. Using the national data gathered for 2019, county-level health outcomes, and other demographic information, such as race and education level, were considered in the final dataset. Questions included in the dataset concerned reproductive health, infant and child wellbeing, and medical infrastructure such as percent insured.

Geographic Information Systems (GIS) was used to map both Planned Parenthood locations and Crisis Pregnancy Centers onto a map of counties in the United States (U.S.) Open-source Planned Parenthood data, accessed through an ArcGIS database, already existed as a GIS map created by user "agalleko." The map provided a spatial representation of Planned Parenthood locations throughout the 50 states and was last updated on November 22, 2016 (See Map 1 in appendix). Planned Parenthood locations were added to a GIS map as a layer on top of

U.S. counties using the “join” command. Creating centroids, the most central place in every U.S. county, was completed through GIS and added to the map as a layer (See Map 2 in the appendix). All three layers of the map were projected to more accurately represent these locations geographically. The distance from every centroid to the nearest Planned Parenthood was calculated in miles. Due to the large travel distance that exceeded the GIS limit, drive time was not used. Instead of estimated drive time, the final distance was calculated “as the crow flies” to create a proxy variable for the distance between the center of each county and the nearest Planned Parenthood health center.

Data for Crisis Pregnancy Center (CPC) locations were taken from data collected by Dr. Andrea Swartzendruber, who is a professor at the University of Georgia, between April and August of 2018. The data is publically available through a website called “crisispregnancycentermap.com” and one of the main goals of this data source is to help produce academic research on this topic. Data was collected through internet research specifically targeting five main organizations that fund and support CPCs. These organizations included Care Net, Heartbeat International, National Institute of Family and Life Advocates (NIFLA), Birthright International and Ramah International. CPCs were included in the map if they were a CPC and currently in business. The data is limited as data collection is not always occurring and the map is not being constantly updated, however, it is the best possible data available for this type of analysis. In order to convert the data into a format compatible with ArcGIS, the HTML of the website was converted into an excel spreadsheet through the use of Python computer science software (see Map 3 in the appendix). Then, the same process described above was utilized to create a map of CPCs within counties and to calculate the distance, as the crow flies, from each centroid to the nearest CPC.

Both Planned Parenthood and the CPC map data were then joined to county-level health data using FIPS codes. This created two separate datasets that were then uploaded into STATA statistical software. Finally, I merged 2017 data that provided percent impoverished data from the United States Department of Agriculture (USDA) Economic Research Service into the STATA dataset. The USDA data was last updated on 02/28/19 and was used to control for the class differences throughout my research. In my analysis, I used control variables in both of my models for each dependent variable. The two dependent variables included county-level teen birth rate and HIV rate data which provided unique measures of population-level health outcomes. The teen birth rate is defined as the number of births per 1000 females aged 15-19 while HIV rate is defined as the number of people aged 13 or older living with HIV infection per 100,000 people. Percent black, percent Hispanic, percent uninsured, percent rural, high school graduation rate, population to primary care physician ratio, and percent impoverished were utilized as control variables throughout this research. Finally, my two independent variables were the distance from the centroid of every county to the nearest Planned Parenthood and the distance from the centroid of every county to the nearest CPC. Choosing control variables and covariates primarily came about from reading previous studies using spatial analysis to investigate health outcomes in the United States. The two race variables, percent Black and percent Hispanic, provided a control for the reality that women of color tend to face more barriers to medical care in the United States (Center for Reproductive Rights 2019). Gender was not included as a control variable as most counties have an even split between male and female populations.

Developing categorical variables concerning distance to the nearest Planned Parenthood and the nearest CPC was informed by condensing these two variables into meaningful categories and determining that simplifying distance into five groups would aid both informed and lay readers of the results. Due to such a large number of cases, this simplification may have decreased nuance within the analysis but created a clearer measure of distance for this research. Creating categories for each variable was achieved by looking at quartiles within the data while considering how to come up with a generally even amount of cases within each category. The categorical variables for distance to Planned Parenthood's and CPC's both had five separate categories. The first for Planned Parenthood was any county less than or equal to 25 miles from a clinic, the second was more than 25 and less than or equal to 50 miles from a clinic, the third was more than 50 and less than or equal to 80 miles from a clinic, and the fourth was more than 80 and less than or equal to 140 miles from a clinic, and the fifth was any county more than 140 miles from a clinic. The notation throughout the rest of this paper for these distance categories (for Planned Parenthood) will be <25, >25 <50, >50 <80, >80 <140, and >140. The first proximity category for CPCs was any county less than or equal to 6 miles from a CPC, the second was more than 6 and less than or equal to 16 miles from a CPC, the third was more than 16 and less than or equal to 26 miles from a CPC, and the fourth was more than 26 miles and less than or equal to 56 from a CPC, and the fifth was any county more than 56 miles from a CPC. The notation throughout the rest of this paper for these distance categories (for CPCs) will be <6, >6 <16, >16 <26, >26 <56, and >56.

To create easily understandable results, I standardized variables using the "z-score" STATA command for all of the interval variables in this analysis. By using the z-scored version of my interval variables people can simply understand the coefficient as the average estimated change in the dependent variable for a standard deviation change in the independent variable. The z-scored variable also takes into account other factors and despite all of the variables having different standard deviations, the z-scored interval variables still remain useful within this analysis with regard to graphing results. It became clear that a few counties would not be relevant due to a lack of data. The Wade Hampton census area in Alaska, Shannon County in South Dakota, and Kalawao County in Hawaii were all dropped from the analysis due to a lack of health outcome data available through the County Health Rankings website. Despite three counties being dropped from the analysis, the final number of cases included was 3,138 counties in all fifty states.

The categorical nature of my primary variables of interest warranted using multivariate OLS regression through a two-model approach for this research. Running regressions in STATA on all of the dependent variables (teen birth rate and HIV rate) with either the categorical Planned Parenthood or CPC variable being used as the independent variable constituted the majority of the analysis. In the first model, the regression was run with only the control variables and the dependent variable. In the second model, the categorical variable for either Planned Parenthood or CPCs was introduced into the regression. For every combination, a variable inflation factor (vif) test was run to determine if any issues would arise surrounding multicollinearity among covariates. For each, the vif was not high enough to warrant any concern and I proceeded to check for outliers within each separate test. After removing any outliers found through using a lvr2plot in STATA, it became clear that the r-squared did not change significantly enough to warrant removing those cases from the analysis for any of the tests. Finally, for every test run a Breusch-Pagan/Cook-Weisberg test for heteroskedasticity was run to determine any further diagnostic issues. Despite some of the tests presenting a significance of $p<0.05$, insinuating heteroskedasticity, the regressions were run with the “robust” option and again the r-squared did not differ enough to continue using the “robust” regression throughout the analysis. Although no cases were removed and no tests used the "robust" option, finding these diagnostic issues should be noted and clearly understood in terms of accuracy and transparency within this paper.

FINDINGS

Table 1: Descriptive Statistics of Regression Variables

	Obs	Mean	Std. Dev.	Min	Max
Dependent Variables					
Teen Birth Rate	2,996	32.1	15.1	2.39	110.2
HIV Rate	2,424	188.3	207.2	10.4	2590.2
% Low Infant Birth Weight	3,033	8.1	2.1	3	26
Mammogram Screening Rate	3,121	40.0	7.5	7	62
Independent Variables					
% of the population, African American	3,137	9.0	14.3	0	85
% of the population, Hispanic	3,137	9.5	13.8	1	96
Poverty rate	3,134	15.4	6.2	3	56.7
% Uninsured	3,137	11.1	4.9	2	33
% of the population that lives in a rural area	3,134	58.6	31.5	0	100
Graduation Rate	3,040	88.3	7.4	26	100
PCP Ratio	3,004	2620.8	2436.2	0	46588
	Freq	**Percent**			
Distance Variables					
Planned Parenthoods					
<25	756	23.7			
>25 <50	910	28.5			
>50 <80	711	22.2			
>80 <140	531	16.6			
>140	289	9.0			
Crisis Pregnancy Centers					
<6	886	27.7			
>6 <15	731	22.9			
>16 <26	732	22.9			
>26 <56	636	19.9			
>56	212	6.6			

Note: percentages may not add to 100 due to rounding.

To create more consistency in this analysis, all of the interval dependent variables and categorical independent variables were not transformed in any way. All of the interval independent variables were standardized using the "zscore" command in STATA. This means that for one standard deviation change in any of the independent variables, we can see the estimated point increase in any of the four dependent variables being examined. A standard deviation change in the average standard deviation from the mean of that specific variable. This method is helpful in keeping the results somewhat intuitive but does not completely allow for a direct comparison for a standard change in a categorical variable with a standard deviation change in an interval dependent variable. All the dependent and independent variables present in my regression models have descriptive statistics shown below in Table 1. Each dependent variable will be discussed below in relation to results from both regressions run with respect to distance to the nearest Planned Parenthood and to the nearest CPC.

TEEN BIRTH RATES

Based on the literature, this paper hypothesizes that teen birth rates would decrease closer to Planned Parenthood's and increase closer to CPCs. In table 2, the OLS regression results for teen birth rate and Planned Parenthood proximity are shown in a two-model analysis. In model 1, all control variables were included in the regression. In model 2, proximity to Planned Parenthood was included as a categorical variable was separated by each distance group. Each analysis from here on out will have the same two-model approach with either proximity to Planned Parenthoods or CPCs included in the second model. Surprisingly, % African American has a negative effect on the teen birth rate as being African American is typically associated with higher levels in the teen birth rate. When % African American was regressed alone with respect to teen birth rate (not shown here), it had a positive impact with one standard deviation change in

% African-American (14.3 percentage points) resulting in an estimated 3.55 point increase on average on the teen birth rate. Once the other control variables were included in the analysis, the regression coefficient became -1.38. Thus, a standard deviation change in % African American (14.3 percentage points) results in an estimated -1.38 point decrease (per 1000) in the teen birth rate. High school graduation rate is not significant in either of the models while % rural is significant at the $p < 0.05$ level. One standard deviation change in % Hispanic (13.8 percentage points) in model 1 results in an estimated 1.10 point increase, on average, in the teen birth rate. In model 2, on standard deviation change in % Hispanic results in an estimated teen birth rate that, on average, increases teen birth rate only by 0.61 points. This suggests that % Hispanic and distance are associated with each other and that both variables are also associated with the teen birth rate. A possible explanation is that % Hispanic was capturing the distance effect in model 1 and thus the regression coefficient decreased from 1.10 in model 1 to 0.61 in model 2. A bivariate analysis of % Hispanic and proximity to Planned Parenthood (not shown) resulted in a negative regression coefficient for proximity groups >25 <50 (-1.95) and >50 <80 (-1.23) in reference to the close group (<25). Additionally, in reference to the close proximity group (<25), counties 80 to 140 miles (1.31) and counties more than 140 miles (14.49) from a Planned Parenthood both had positive regression coefficients.

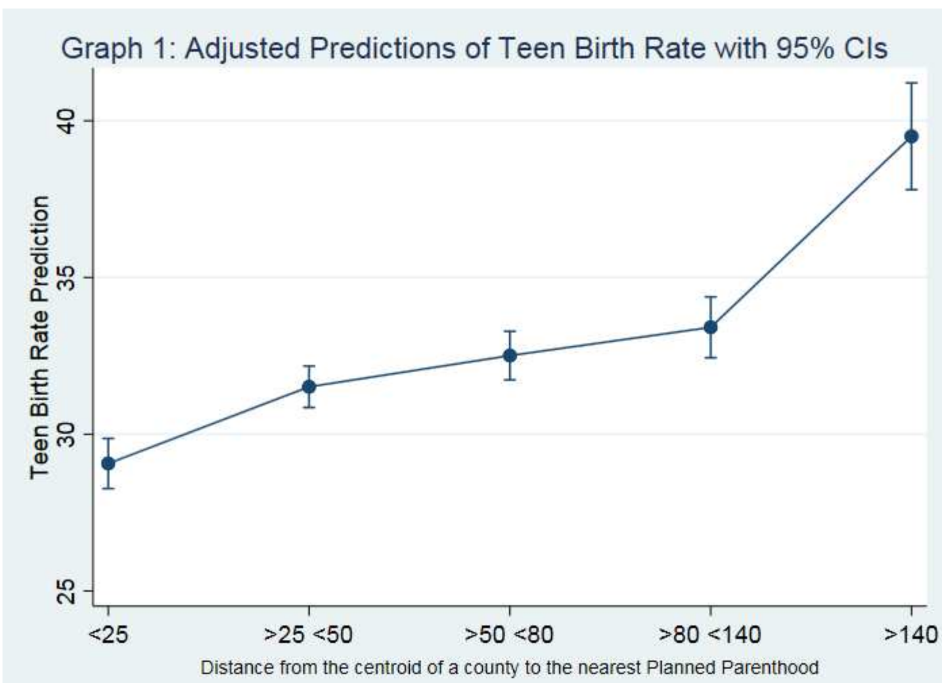
Even once Planned Parenthood proximity is added to the model, one standard deviation change in poverty rate (6.2 percentage points) results in an estimated 8.65 point increase (per 1000) on average in the teen birth rate of a county. Overall, in comparison to being less than 25 miles from a Planned Parenthood, all of the distance categories are significant at the $p<.001$ level. Relative to the close proximity group (<25), counties that are 25 to 50 miles away from a Planned Parenthood have a teen birth rate that is, on average, 2.45 points (per 1000) higher than the reference group. The next proximity group, counties that are 50 miles to 80 miles from a Planned Parenthood have a teen birth rate that is, on average, 3.44 points (per 1000) higher than the reference group. Counties that were 80 to 140 miles away from a Planned Parenthood results in an estimated 4.34 point increase (per 1000) on average in a county's teen birth rate. Finally, counties more than 140 miles from a Planned Parenthood have a teen birth rate that is, on average, 10.45 points (per 1000) higher than the reference group (<25). Finally, outside of being over 140 miles from a Planned Parenthood, the poverty rate has the largest estimated point increase in the teen birth rate of a county within this analysis. To see table 1 results represented graphically, please see graph 1 in the appendix. Overall, model 1 can account for 54.84% of the variance in teen birth rate and model 2 can account for 56.66% of the variance in the teen birth rate in this unique sample.

Table 2: OLS Regression Results - Teen Birth Rate x Planned Parenthood

	Model 1	Model 2
% of the population is African American	-1.501***	-1.379***
	[-1.957,-1.044]	[-1.829,-0.929]
% of the population that is Hispanic	1.101***	0.605*
	[0.612,1.589]	[0.113,1.097]
Poverty rate	9.111***	8.653***
	[8.633,9.590]	[8.164,9.141]
Percentage uninsured	4.070***	3.376***
	[3.592,4.547]	[2.891,3.862]
% of the population that lives in a rural area	-0.066	-0.671**
	[-0.554,0.423]	[-1.175,-0.168]
Graduation rate	0.034	-0.075
	[-0.371,0.440]	[-0.474,0.323]
PCP ratio	0.840***	1.052***
	[0.445,1.234]	[0.662,1.441]
Distance to the nearest Planned Parenthood (Ref: <25)		
>25 <50		2.447***
		[1.405,3.489]
>50 <80		3.442***
		[2.272,4.612]
>80 <140		4.344***
		[3.008,5.681]
>140		10.437***
		[8.491,12.382]
Constant	32.014***	29.153***
	[31.643,32.385]	[28.330,29.977]
Observations	2835	2835
R^2	0.5484	0.5666

95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In Graph 1, the predicted value of the teen birth rate for each category of distance to a Planned Parenthood is depicted visually including 95% confidence intervals (CIs). In accordance with my initial hypothesis, the teen birth rate consistently rises as the distance to a Planned Parenthood clinic also increases. Holding all other variables constant at their means, the predicted teen birth rate if counties are less than 25 miles from a Planned Parenthood is 29.27 (CIs 28.27, 29.87) while the predicted teen birth rate, if counties are more than 140 miles from a Planned Parenthood, is 39.50 (CIs 37.80, 41.21). Both of these CI ranges illustrate a high-level of predictability of estimates of teen birth rate with a distance of over 140 miles having slightly less precise. Despite this shortcoming, graph 1 represents findings that suggest that the predicted teen birth rate of a county will steadily increase as county centroids are further from Planned Parenthood locations.



In contrast to the proximity to Planned Parenthood, Table 3 represents the OLS regression results of teen birth rate and CPCs which includes 95% CIs for both model 1 and model 2. Again, % African American appears to have a negative effect on teen birth rate within the context of the full regression with a regression coefficient of -1.501 in model 1 and -1.48 in model 2. Within model 2, a standard deviation change in % African American (14.3 percentage points) results in an estimated -1.48 point decrease (per 1000) in the teen birth rate. Again, % African American has a positive effect (not shown) on the teen birth rate without the other control variables in the analysis. The effects of % rural and high school graduation rate were not significant in either model 1 or model 2. Additionally, in model 2, none of the categorical distances to a CPC were statistically significant at any level.

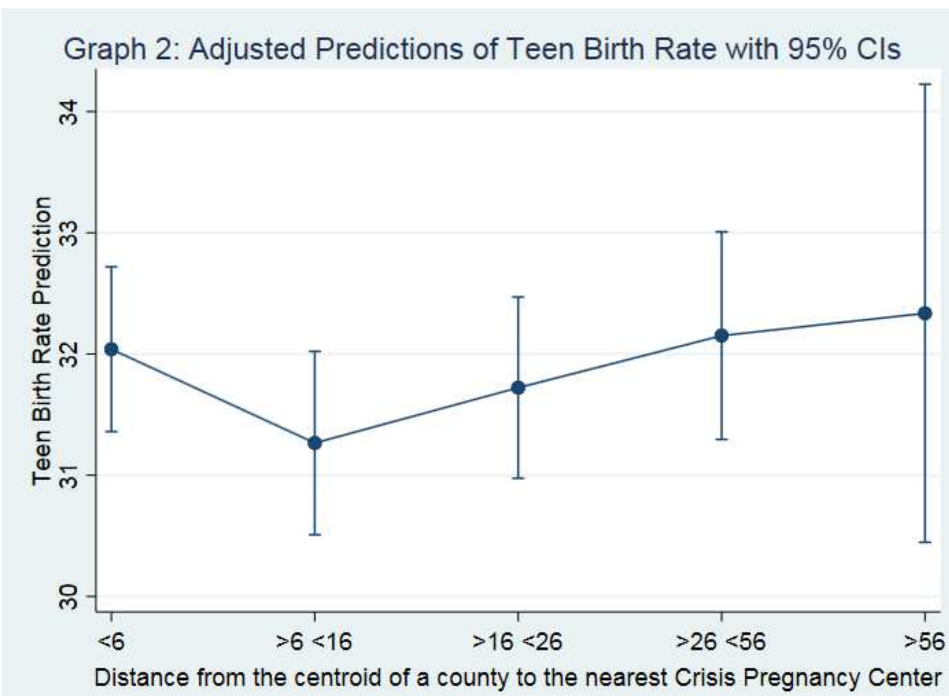
In reference to being less than 25 miles from a CPC, being 6 to 16 miles had an estimated teen birth rate that is, on average, 0.77 points (per 1000) lower than the reference close proximity group. Similarly, being 16 to 26 miles away resulted in an estimated 0.32 point (per 1000) decrease in a county's teen birth rate in reference to the close proximity group (<25). Counties 26 to 56 miles from a CPC had an estimated 0.11 point increase (per 1000) on average in the teen birth rate in reference to being less than 25 miles from a CPC. Finally, counties over 56 miles, in reference to the close proximity group, from a CPC had an estimated 0.30 point increase (per 1000) on average in the teen birth rate. The two closer proximity groups having a negative effect on teen birth rate and the two further proximity groups having a positive effect on teen birth rate a positive effect on the teen birth rate are mixed results in terms of my hypothesis. To see a graphical representation of Table 2, please see graph 13 in the appendix. Overall, within this analysis of CPCs and teen birth rate, model 1 can account for 54.84% of the variance in teen birth rate and model 2 can account for 54.89% of the variance in teen birth rate within the data.

Table 3: OLS Regression Results – Teen Birth Rate x CPCs

	Model 1	Model 2
% of the population that is African American	-1.501***	-1.480***
	[-1.957,-1.044]	[-1.941,-1.020]
% of the population that is Hispanic	1.101***	1.101***
	[0.612,1.589]	[0.609,1.592]
Poverty rate	9.111***	9.117***
	[8.633,9.590]	[8.638,9.595]
% Uninsured	4.070***	4.030***
	[3.592,4.547]	[3.548,4.511]
% of the population that lives in a rural area	-0.066	-0.067
	[-0.554,0.423]	[-0.556,0.423]
Graduation rate	0.034	0.041
	[-0.371,0.440]	[-0.369,0.450]
PCP ratio	0.840***	0.853***
	[0.445,1.234]	[0.457,1.249]
Distance to the nearest CPC (Ref: <6)		
>6 <16		-0.774
		[-1.789,0.241]
>16 <26		-0.317
		[-1.326,0.692]
>26 <56		0.112
		[-0.989,1.213]
>56		0.296
		[-1.726,2.319]
Constant	32.014***	32.238***
	[31.643,32.385]	[31.553,32.924]
Observations	2835	2835
R^2	0.5484	0.5489

95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In graph 2, the predicted value of the teen birth rate for each category of distance to a CPC is depicted visually including 95% CIs. The predicted values of the teen birth rate have extremely large CIs which indicates a low-level of predictability of estimating teen birth rate, especially for the over 56-mile category. The predictions (not shown) are pretty similar among each category and it is noteworthy that predicted teen birth rate (per 1000) for less than 6 miles from a CPC is 32.04 (CIs 31.36, 32.72) and the predicted teen birth rate (per 1000) for more than 56 miles from a CPC is 32.34 (CIs 30.35, 34.23). There does not seem to be a trend either supporting or denying my hypothesis that the teen birth rate should be higher for counties closer to a CPC location. Both of these CI ranges illustrate a high-level of predictability of estimates of teen birth rate with a distance of over 56 miles being less precise than the other proximity categories.



HIV RATES

Again, based on background research, I hypothesized that HIV rates would increase for counties further away from Planned Parenthood and would increase in the counties closer to CPCs. In Table 4, the OLS regression results for HIV rate and planned parenthood proximity are shown in a two-model analysis. In model 2, one standard deviation change in % African American (14.3 percentage points) results in an estimated 114.90 point increase (per 100,000) on average in the HIV rate of a county. Additionally, in model 2, one standard deviation change in % Hispanic (13.8) results in an estimated 28.65 point increase (per 100,000) on average in the HIV rate. Both the poverty rate (-1.10) and % uninsured (-0.65) had an insignificant negative effect on the HIV rate in model one. In model 2, however, the poverty rate and % uninsured had a significant positive effect on the HIV rate at the $p<0.05$ level. In model 2, one standard deviation change in poverty rate (6.2 percentage points) results in an estimated 10.74 point increase on average in the HIV rate while one standard deviation change in % uninsured (4.94 percentage points) results in an estimated 8.66 point increase on average in a county's HIV rate.

Although % rural was significant at the $p<0.001$ level in both models, the regression coefficient increased from -31.51 (CIs -40.58, -22.43) to -19.49 (CIs -28.842, -15.90). This suggests that % rural was capturing some of the effects of proximity to Planned Parenthood in model 1. One standard deviation change % rural (31.5 percentage points) results in an estimated 31.51 point decrease (per 100,000) on average in HIV rate in model 1 and an estimated 19.49 point decrease (per 100,000) on average in HIV rate in model 2. The primary care provider ratio did not have a significant effect at any level in model 1 or model 2. All of the proximity categories of the Planned Parenthood distance variable had significant negative effects on the HIV rate at the $p<0.001$ level.

Relative to the close proximity group (<25), counties that are 25 to 50 miles away from a Planned Parenthood have an HIV rate that is, on average, 51.18 points (per 100,000) lower than the reference group. The next proximity group, counties that are 50 miles to 80 miles from a Planned Parenthood have an HIV rate that is, on average, 68.95 points (per 100,000) lower than the reference group. Counties that were 80 to 140 miles away from a Planned Parenthood results in an estimated 106.90 point decrease (per 100,000) on average in a county's teen birth rate. Finally, counties more than 140 miles from a Planned Parenthood have a teen birth rate that is, on average, 132.85 points (per 100,000) lower than the reference group (<25). Finally, outside of being over 140 miles from a Planned Parenthood, % African American has the largest estimated point increase (114.90 point decrease per 100,000) in the teen birth rate of a county within this analysis. To see a graphical representation of table 2, please see graph 4 in the appendix. Ultimately, model 1 can account for 42.65% of the variance in HIV rate and model 2 can account for 44.96% of the HIV rate within this sample.

Table 4: OLS Regression Results - HIV Rate x Planned Parenthood

	Model 1	Model 2
% of the population African American	115.623***	114.869***
	[107.916,123.329]	[107.245,122.494]
% of the population that is Hispanic	23.270***	28.645***
	[14.723,31.817]	[19.971,37.319]
Poverty rate	-1.100	10.741*
	[-9.514,7.314]	[2.038,19.443]
Percent uninsured	-0.650	8.660*
	[-9.136,7.835]	[0.138,17.182]
% of the population that lives in a rural area	-31.508***	-19.487***
	[-40.583,-22.434]	[-28.842,-10.131]
Graduation rate	-24.697***	-23.085***
	[-32.005,-17.389]	[-30.266,-15.903]
PCP ratio	2.785	0.048
	[-3.976,9.545]	[-6.614,6.711]
Distance to the nearest Planned Parenthood (Ref: <25)		
>25 <50		-51.181***
		[-68.912,-33.451]
>50 <80		-68.946***
		[-89.354,-48.538]
>80 <140		-106.879***
		[-131.017,-82.742]
>140		-132.849***
		[-170.366,-95.332]
Constant	160.412***	214.065***
	[153.645,167.178]	[199.953,228.176]
Observations	2359	2359
R^2	0.4265	0.4496

95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In graph 3, the predicted value of HIV rate for each category of distance to a Planned Parenthood is depicted visually including 95% CIs. The trend shown below, of HIV rates decreases further away from Planned Parenthood locations, goes against my initial hypothesis and deserves further reflection in the discussion section of this paper. Holding all other variables at their means (not shown), counties less than 25 miles from a Planned Parenthood have a predicted HIV rate of 238.29 per 100,000 (CIs 224.97, 251.43), counties 24 to 50 miles from a Planned Parenthood have a predicted HIV rate of 187.02 per 100,000 (CIs 175.56, 198.47), counties 50 to 80 miles from a Planned Parenthood have a predicted HIV rate of 169.25 per 100,000 (CIs 155.40, 183.10), counties 80 to 140 miles from a Planned Parenthood have a predicted HIV rate of 131.32 per 100,000 (CIs 112.99, 149.65), and finally counties over 140 from a Planned Parenthood have a predicted HIV rate of 105.35 per 100,000 (CIs 71.12, 139.57). This trend, of HIV rates decreasing further away from Planned Parenthood locations, goes against my initiation hypothesis. Additionally, the CIs for these proximity categories illustrate a relatively low level of precision in the predictability of HIV rate especially for counties more than 140 miles from Planned Parenthood (CIs 71.12, 139.57).

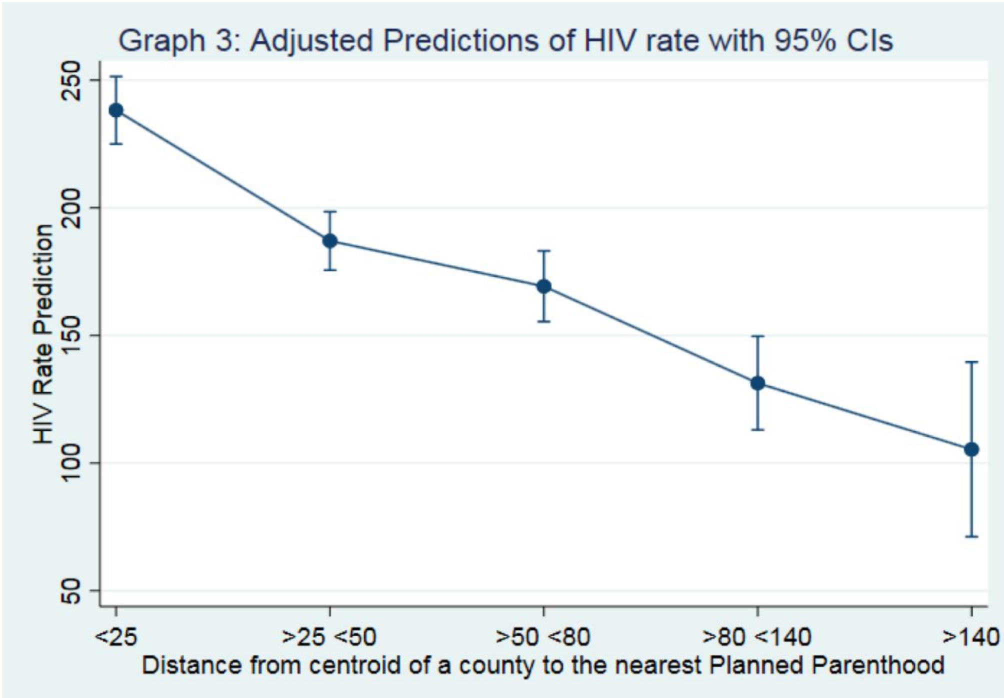


Table 5 below illustrates the OLS regression results of HIV rate and CPCs including 95 % CIs for both model 1 and model 2. In model 2, one standard deviation change in % African American (14.3 percentage points), there is an estimated 113.46 point increase in HIV rate of a county. % Hispanic also had a positive regression coefficient and for one standard deviation change in % Hispanic (13.8 percentage points), there is an estimated 25.65 point increase in a county's HIV rate. Oddly, in model 1, both the poverty rate (-1.10) and % uninsured (-0.65) had a negative effect on the HIV rate. When I regressed the poverty rate and HIV rate (not shown), the regression coefficient was positive (59.83), however, regressing % rural and HIV rate still resulted in a negative effect on the HIV rate with a regression coefficient of -40.99. In model 2, one standard deviation change in % rural (31.5 percentage points) results in an estimated 31.22 decrease on average in the HIV rate of a county. Neither poverty rate, % uninsured or PCP ratio were significant in either model 1 or model 2. Similar to poverty, it was surprising that % uninsured would have a negative effect on HIV rate in model 1. Being uninsured is generally associated with worse health outcomes making this result stand out within the analysis. I ran a regression of HIV rate and % uninsured and found a positive effect with a regression coefficient of 36.47 which turned negative once other control variables were added to the regression.

The other variables such as % African American, % Hispanic, and high school graduation rate all were significant at the $p<0.001$ level. In model 2, one standard deviation change in high school graduation rate (7.4 percentage points) results in an estimated 27.48 point decrease on average in the HIV rate of a county. Finally, every distance category was significant in reference to being less than 6 miles from a CPC in model 2 besides the proximity category of counties 6 to 16 miles from a CPC. Being 16 to 26 miles from a CPC was significant at the $p<0.01$ level while the two higher distance categories were both significant at the $p<0.001$ level.

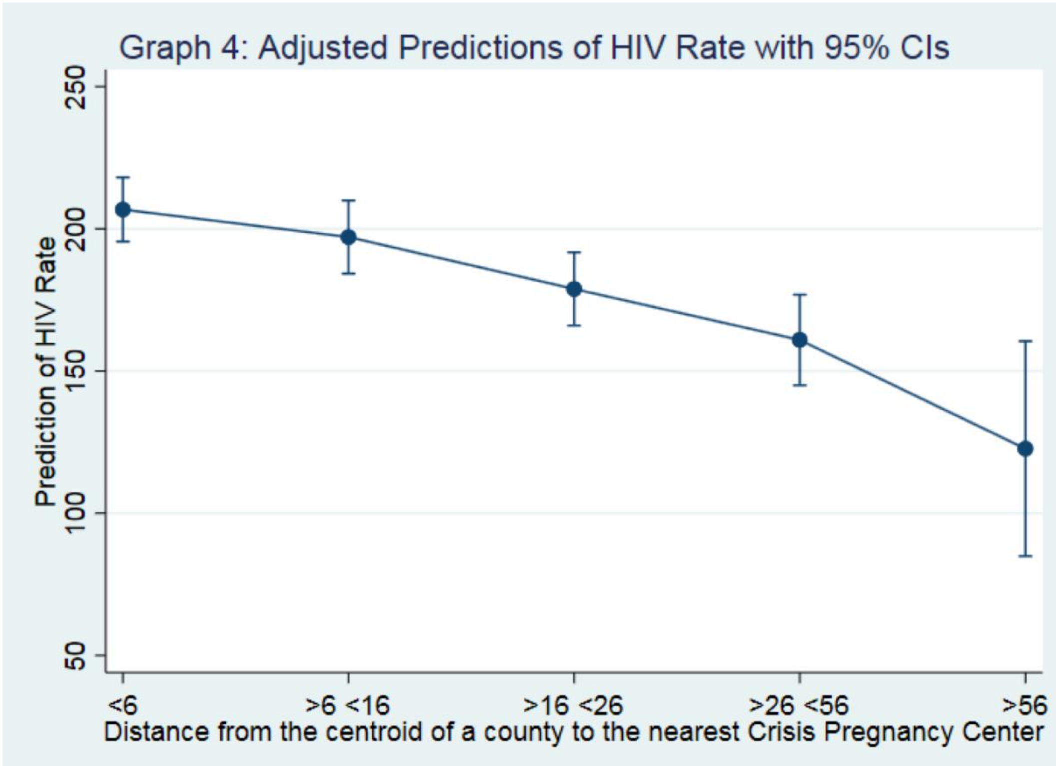
In reference to being less than 25 miles from a CPC, being 6 to 16 miles had an estimated HIV rate that is, on average, 9.68 points (per 100,000) lower than the reference close proximity group. Similarly, being 16 to 26 miles away resulted in an estimated 27.93 point (per 100,000) decrease in a county's teen birth rate in reference to the close proximity group (<25). Counties 26 to 56 miles from a CPC had an estimated 45.87 point decrease (per 100,000) on average in the teen birth rate in reference to being less than 25 miles from a CPC. Finally, counties over 56 miles, in reference to the close proximity group, from a CPC had an estimated 84.09 point decrease (per 100,000) on average in the teen birth rate. Every distance category had a negative effect on HIV rate which increased as distance also increased. To see a graphical representation of table 4, please see graph 17 in the appendix. Overall, model 1 can account for 42.65% of the variance in the HIV rate and model 2 can account for 43.51% of the variance in HIV rate in this analysis.

Table 5: OLS Regression Results – HIV Rate x CPCs

	Model 1	Model 2
% of the population that is African American	115.623***	113.464***
	[107.916,123.329]	[105.759,121.169]
% of the population that is Hispanic	23.270***	25.648***
	[14.723,31.817]	[17.092,34.203]
Poverty rate	-1.100	-0.837
	[-9.514,7.314]	[-9.197,7.524]
% Uninsured	-0.650	1.624
	[-9.136,7.835]	[-6.845,10.094]
% of the population that lives in a rural area	-31.508***	-31.219***
	[-40.583,-22.434]	[-40.236,-22.202]
Graduation rate	-24.697***	-27.467***
	[-32.005,-17.389]	[-34.812,-20.122]
PCP ratio	2.785	2.177
	[-3.976,9.545]	[-4.542,8.896]
Distance to the nearest CPC (Ref: <6)		
>6 <16		-9.684
		[-26.763,7.395]
>16 <26		-27.925**
		[-45.021,-10.829]
>26 <56		-45.871***
		[-65.536,-26.205]
>56		-84.093***
		[-123.819,-44.367]
Constant	160.412***	179.789***
	[153.645,167.178]	[168.244,191.333]
Observations	2359	2359
R^2	0.4265	0.4351

95% confidence intervals in brackets
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In graph 4, the predicted HIV rate for each proximity category to a CPC is shown visually with 95% CIs. This graph, showing that HIV rates are higher closer to CPCs and decrease as they move away, is in line with my original hypothesis. Holding all other variables at their means, counties less than 6 miles from a CPC have a predicted HIV rate of 206.78 (CIs 195.52, 218.06), counties 6 to 16 miles from a CPC have a predicted HIV rate of 197.19 (CIs 184.24, 209.95), counties 16 to 26 miles from a CPC have a predicted HIV rate of 178.86 (CIs 165.97, 191.74), counties 26 to 56 miles from a CPC have a predicted HIV rate of 160.91 (CIs 144.99, 176.83), and counties further than 56 miles from a CPC have a predicted HIV rate of 122.69 (CIs 84.87, 160.51). All of these have fairly unreliable predictability due to the large CIs, especially at the large distance categories. The last proximity category, of counties further than 56 miles from a CPC, has the largest CI interval (84.87, 160.51) which indicates low levels of precision in predicting HIV rate for that category.



DISCUSSION AND CONCLUSION:

My original hypothesis, that teen birth rates would increase further from Planned Parenthood locations, holds true when examining the predicted value of the teen birth rate in Graph 1. Counties less than 25 miles from a Planned Parenthood had a predicted teen birth rate of 29.27 (per 1000) while counties more than 140 miles from a Planned Parenthood had a predicted teen birth rate of 39.50 (per 1000). As proximity is cited as a main reason for teens to not visit a family planning clinic, this finding aligns with the hypothesis that access to reproductive healthcare can lower teen birth rates across the country (Zabin and Clark 1983). In terms of teen birth rate and proximity to CPCs, the findings are less clear and deserve more nuanced analysis. Counties less than 6 miles from a CPC had a predicted teen birth rate of 32.04 (per 1000) while counties more than 56 miles from a CPC had a predicted teen birth rate of 32.34 (per 1000). According to these findings, the relationship between teen birth rate and Planned

Parenthood proximity is more clearly positive while the relationship between teen birth rate and CPC proximity is only slightly positive (as seen in Graph 2). This suggests that CPC proximity does not have a very strong effect on teen birth rate controlling for all other variables at their means.

Most teenagers go to family planning clinics when they are concerned about their pregnancy status (Zabin and Clark 1981). Planned Parenthood locations provide contraception for free or at discounted costs for many teenagers which may be the reason teen pregnancy rates decrease the closer counties are to Planned Parenthood locations. Additionally, as almost all adolescents (98% aged 13 to 24) used the internet to gather health information, the impact of misinformation on CPC websites is of particular interest (Bryant-Comstock et al. 2016). Girls have higher rates of looking up health information online and therefore may have a higher chance of coming across inaccurate medical information surrounding pregnancy and contraception on CPC websites. This hypothesis that closer proximity to CPCs would lead to a higher predicted teen birth rate did not seem to hold true on a nationwide analysis. However, state-level analysis of teen birth rate and CPC proximity, especially in states with high numbers of CPC locations, could lead to a more nuanced understanding of this relationship.

Both the relationship between HIV rates and either proximity to Planned Parenthood's or CPC's could also benefit from a more specific state-level analysis. Initially, I hypothesized that HIV rates would increase further from Planned Parenthood locations. In graph 3, it is clear that the opposite trend is shown in the predicted HIV rates for the various proximity categories of Planned Parenthood locations. For counties less than 25 miles from a Planned Parenthood there is a predicted HIV rate of 238.29 (per 100,000) while counties more than 140 miles from a Planned Parenthood had a predicted HIV rate of 105.57 (per 100,000). As Planned Parenthood locations typically provide STI screening, one hypothesis to explain this finding is through screening rates. Perhaps HIV rates are closer to Planned Parenthood locations due to higher screening rates than in areas further away from Planned Parenthood's. In essence, this would mean that the rates may be similar across the board but people are more likely to get screened and be aware of their status closer to Planned Parenthood locations. Another possible explanation is that there may be higher concentrations of people who belong to the LGBTQIA2S+ community or more individuals who are sexually active tend to live closer to Planned Parenthood locations which could account for these results. Finally, in comparison to % Hispanic, % African-American a regression coefficient about five times larger in both models suggesting HIV rates are largely higher in African-American residents of U.S. counties as compared to their Hispanic counterparts.

As many CPCs discourage condom use (only 10% of CPC websites encourage using condoms to stop the spread of STIs), I hypothesized that HIV rates would increase closer to CPC locations (Bryant-Comstock et al. 2016). This hypothesis was somewhat disproved by the findings representing in Graph 4. Counties less than 6 miles from a CPC had a predicted HIV rate of 206.78 (per 100,000) while counties more than 56 miles from a CPC had a predicted HIV rate of 122.69 (per 100,000). This trend, of HIV rates decreasing further away from CPC locations aligns with my initial hypothesis. Although CPC website analysis showed a tendency to discourage condom use for the spread, staff members at CPC observed through qualitative work have noted problematic statements about STIs concerning the curability and treatability of various STIs (Kelly 2017). It can be inferred that if CPC websites are disseminating factual information surrounding STIs that staff members would also be advising people to not use condoms as a barrier method to prevent the spread of STIs. Overall, although the relationship between Planned Parenthood proximity and HIV rate was contrary to the hypothesis, it remains that findings suggest predicted HIV rates decrease in counties further from CPC locations. Finally, findings suggest that the HIV rate, regardless of other factors, is lower in more urban areas and lower in more rural parts of the U.S.

Policy makers must understand that when family planning clinics are defunded, shut down, or restricted, other aspects of reproductive health, outside of abortion, are affected by the increased strain on providing care to populations in need. If family planning clinics, such as Planned Parenthoods, continue closing or running on limited capacity, health outcomes of future generations will be impacted. Overall, this study found that the teen birth rate decreased closer to Planned Parenthood locations and did not particularly decrease or increase with reference to proximity to CPCs. The second major finding was that HIV rate increased closer to Planned Parenthood locations and CPC locations. Testing this same hypothesis on a state by state basis would yield more nuanced and specific findings for state policymakers to consider in future legislative choices regarding funding both family planning clinics and CPCs. Examining the relationship between the proximity to family planning clinics or CPCs and health outcomes using data-driven evidence can help public health officials improve overall population health.

LIMITATIONS AND IMPLICATIONS FOR FUTURE RESEARCH

It is important to note that distance to Planned Parenthood locations and CPC locations may be capturing unmeasured causal factors. Despite controlling for relevant and obvious covariates, there is no possible way to control for all of the relevant factors that influence teen birth rates or HIV rates for every county in the United States. Factors such as family medical history, transportation access, and other demographic components could dramatically change this analysis. Due to limitations within the available data and the restricted time allowed for this thesis project, not every causal factor could be considered within the analysis. Although I believe these findings are informative and relevant, I concede that both of these distance variables may be “fronting” for other influential factors in the social structure of the United States.

Overall, research on the influence and impact of CPCs on social life has been limited. Investing in both qualitative and quantitative conducting projects concerning the impact that CPCs have on communities across the country can provide useful data for state governments to determine how best to serve people of reproductive age. Additionally, more public health research concerning proximity to all family planning clinics in the county, not just Planned Parenthood locations, could further the reliability of various health outcomes. CPC’s are relatively unknown by the general population and remain a public health threat due to their unrestricted legal nature through their non-profit categorization. Other health outcomes, such as other STI rates and contraception use, can be analyzed in reference to proximity to both Planned Parenthood and CPC locations to help inform policy makers and public health officials limit the spread of STIs and lower rates of unintended pregnancies. Research could focus on states with the lowest and highest ratios of CPCs to family planning clinics within the United States. Another possible subject of future research could involve the impact of restrictive abortion policy and health outcomes in a state-level analysis.

Transparency regarding the limitations of this study include the inability to get driving distances as a proximity variable, human error, and a lack of data surrounding other possible control variables. ArcGIS, the software used to create the distance variables that represented the two proximity measures could not calculate estimated driving time. As there were county centroids that had an estimated drive distance that was over 9 hours to either the nearest Planned Parenthood or CPC location, the software was unable to calculate estimated drive times.

Additionally, from compiling the final dataset to typing the number into the findings section there is always the possibility of human error within many parts of this analysis. Finally, due to a lack of time and a need to simplify the analysis there are most likely other control variables that could have added nuance to this research project. Finally, due to time restraints, the types of services available at each Planned Parenthood locations was not able to be captured in any meaningful way throughout this analysis. Future research can examine how the types of care available at various Planned Parenthood locations and other family planning clinics impacts population health outcomes in various state or community level analyses.

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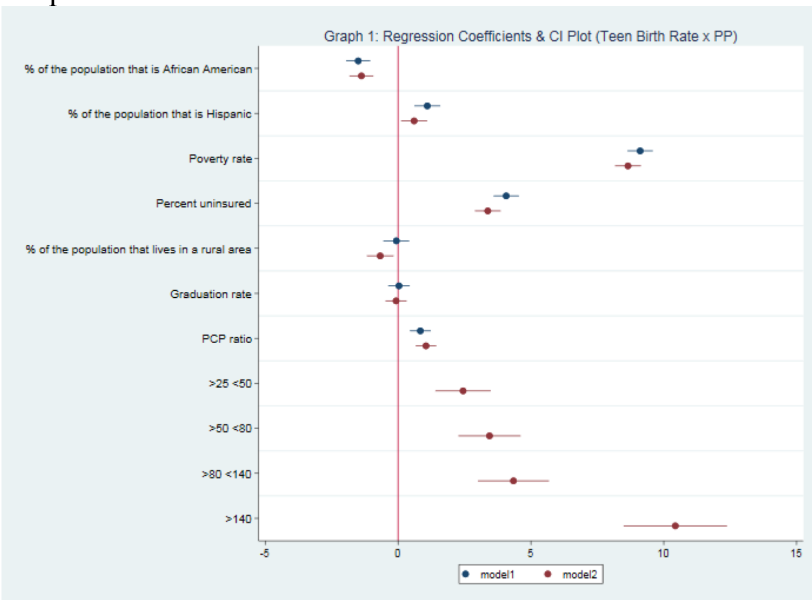
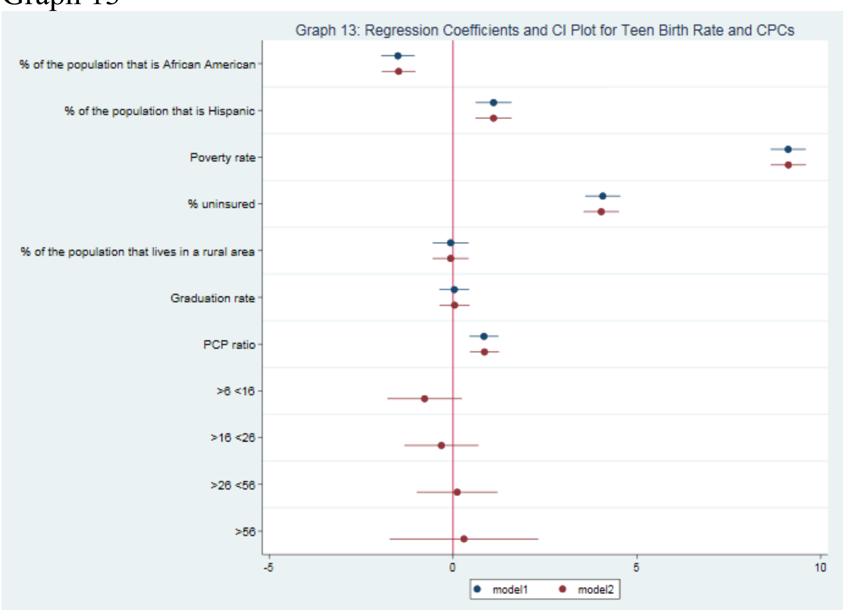
APPENDIX

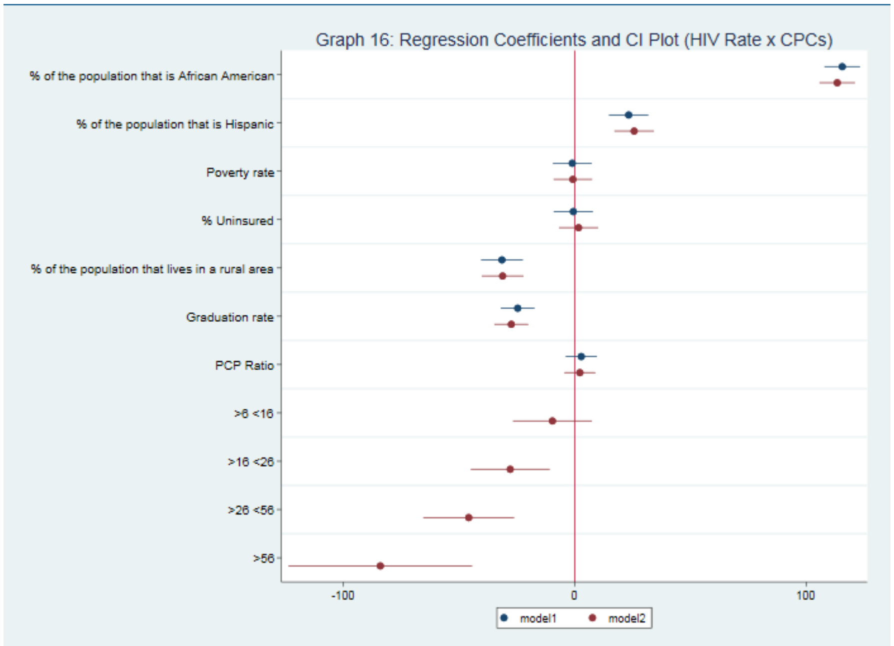
Graph 1



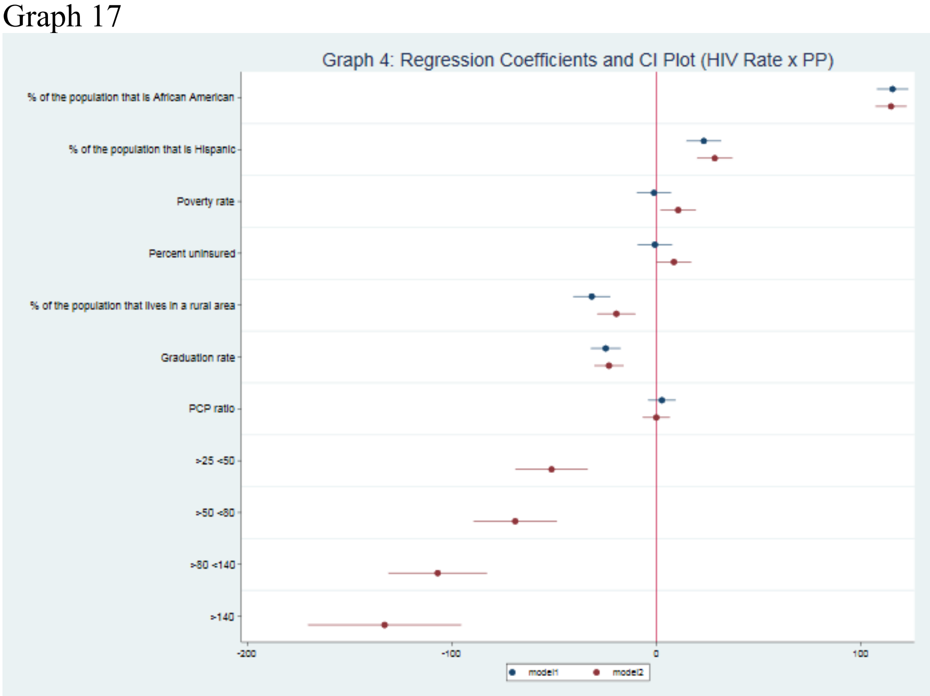
Graph 13



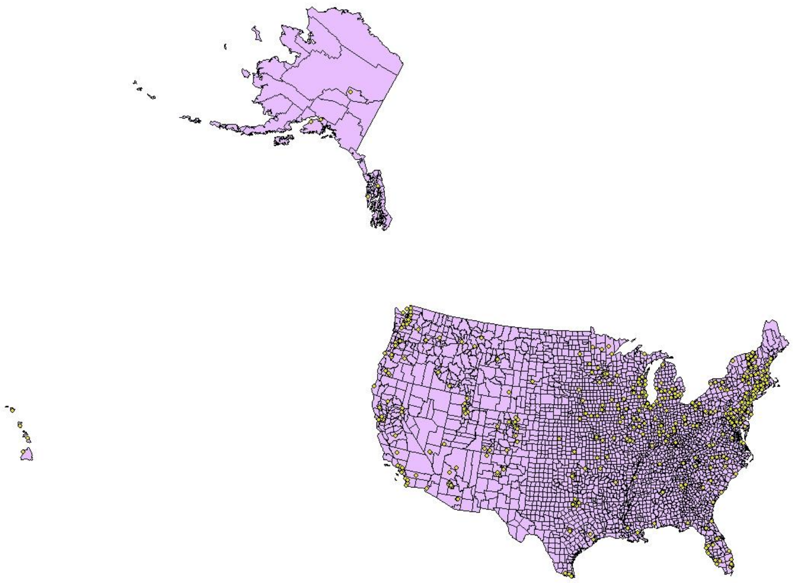
Graph 4


Graph 16: Regression Coefficients and CI Plot (HIV Rate x CPCs)
% of the population that is African American
% of the population that is Hispanic
Poverty rate
% Uninsured
% of the population that lives in a rural area
Graduation rate
PCP Ratio
>6 <16
>16 <26
>26 <56
>56
-100
0
100
model1
model2

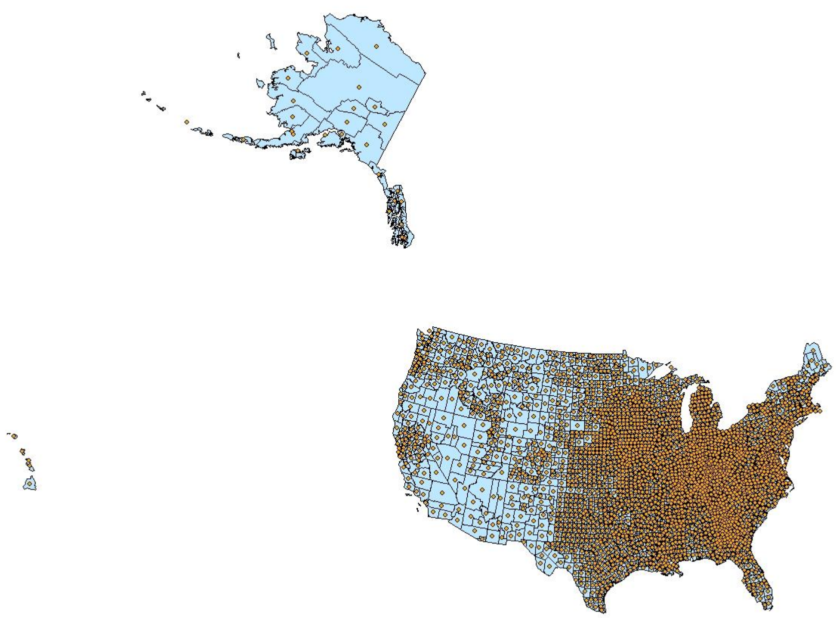
Graph 17


Graph 4: Regression Coefficients and CI Plot (HIV Rate x PP)
% of the population that is African American
% of the population that is Hispanic
Poverty rate
Percent uninsured
% of the population that lives in a rural area
Graduation rate
PCP ratio
>25 <50
>50 <80
>80 <140
>140
-200
-100
0
100
model1
model2

Map 1



Map 2



Map 3