Safer Sex?
The Effect of AIDS Risk on Birth Rates

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August 29, 2020

Abstract

The advent of the AIDS epidemic in the 1980s dramatically increased the cost of contracting a sexually transmitted infection (STI). Prior research shows that people responded to the AIDS epidemic by switching to sexual behaviors and contraceptive methods with lower likelihood of AIDS transmission. These behavioral adjustments also affect the likelihood of pregnancy and the incidence of other STIs. This paper provides evidence that the AIDS epidemic increased the birth rate among white adult women by as much as 1.5 births per 1000 women and reduced gonorrhea incidence. My analysis suggests that unmarried white women avoided AIDS by entering monogamous relationships, which in turn led to an increase in the birth rate. I find no effect of AIDS on births to Black women and provide a number of possible explanations for this racial disparity.

Keywords: HIV/AIDS, STI, Fertility, Birthrate, Epidemic, Infectious Disease, Family Structure

JEL Classifications: I12, J13, J12, J16

*Department of Economics, University of Virginia, mkm8kf@virginia.edu. I would like to thank my advisors, Amalia Miller, Eric Chyn and Sebastian Tello-Trillo, who guided me throughout this project. I would also like to thank many faculty and students at the University of Virginia for their advice and support, especially Eric Young, John Pepper, Lee Lockwood, Brett Fischer, and Haruka Takayama Hasegawa. Thank you also to Allison Luedtke and Jose Fernandez for their feedback on this project. I also wish to acknowledge the Jefferson Scholars Foundation and the Bankard Fund for Political Economy for their financial support. The results contained herein were derived in part from data provided by the National Center for Health Statistics, specifically the natality detail data as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. All errors are mine.

I. Introduction

Women face two potential health risks from sexual activity: acquiring a sexually transmitted infection (STI) and becoming pregnant. They can mitigate these risks through safer choices about sexual behavior and contraceptive use. A key feature of these choices is that risk mitigation strategies entail trade-offs. While some choices, such as abstinence, reduce both STI and pregnancy risk, other choices decrease one risk but increase or leave the other unchanged.

This paper examines the effect of increases in STI risk and resulting STI avoidance behaviors on birth rates. It is well documented in the literature that women's fertility and contraceptive decisions are affected by changes in the cost of preventing pregnancy (Kearney and Levine, 2009; Bailey, 2010; Goldin and Katz, 2002). Previous studies have also shown that people adjust their sexual behavior and contraceptive use in response to STI risk (Francis, 2008; Shah, 2013). Further connecting these two literatures are studies relating the cost of preventing pregnancy to STI incidence (Sen, 2003; Mulligan, 2016; Durrance, 2013). I analyze the reverse relationship and ask whether changes in the cost of STIs affect birth rates.

This paper is further motivated by the theoretical ambiguity in the relationship between STI risk and birth rates, as well as the public health implications of STI avoidance behaviors. Condoms and monogamy both reduce STI risk, but can potentially increase the likelihood of pregnancy. This is especially true if condoms are used to substitute for more reliable forms of contraception, such as oral contraceptives, or if women with only one sexual partner have unprotected sex more frequently. In those cases, a behavioral shift toward sex that is safer in terms of STI transmission may cause an increase in pregnancy risk. Understanding how women adjust their behavior in response to STI risk can inform the development of public health interventions to contain the spread of disease and prevent future epidemics.

I empirically examine the effect of STI avoidance on birth rates by exploiting variation in the spread of AIDS across U.S. cities in the 1980s and 1990s. The AIDS epidemic created

a large and plausibly exogenous increase in the cost of contracting an STI. During this time period, the spread of AIDS was largely driven by male same-sex contact, and the average length of time between HIV infection and AIDS diagnoses was 10 years. Thus, within a city, the timing of AIDS arrival and the extent of the epidemic was unrelated to women's current sexual behavior. As a first stage, I use survey data to show that local AIDS incidence is predictive of an individual's perceived risk of contracting AIDS. Then, using local AIDS incidence among women as a proxy for AIDS risk, I analyze the effect of AIDS risk on birth rates using a fixed effects specification.

I find that local AIDS incidence has a positive and statistically significant effect on birth rates. A 1 standard deviation increase in AIDS incidence increases the birth rate among women 20-44 years old by as much as 1 birth per 1000 women. Results are robust to the inclusion of city-specific year trends and controls for drug use, prostitution, poverty, education, and sex ratios. The positive effect of AIDS incidence on births is driven by an increase in the birth rate among white women. I find no effect of AIDS incidence on the birth rate among Black women.

I analyze the mechanisms underlying the positive effect for white women and the null effect for Black women using information on the demographics of AIDS patients and the relationship between AIDS and other STIs. I evaluate how AIDS incidence among people with different sexual identities affects birth rates. I find that there is no effect of AIDS infection among homosexual and bisexual males on birth rates. The positive effect of AIDS on birth rates to white women is due to increases in AIDS incidence among females and heterosexual males. This result further supports a causal interpretation of effects by showing that women are adjusting their behavior in response to their true risk of infection.

We might be concerned that increases in birth rates and AIDS incidence are both driven by increases in unprotected sex among women. I evaluate this alternative hypothesis using data on gonorrhea incidence. Using a fixed effects specification, I find that AIDS led to a decrease in gonorrhea incidence among women. This result shows that white women are

successfully adopting behaviors which decrease their likelihood of contracting AIDS and other STIs, but at the expense of heightened pregnancy likelihood. There are two AIDS avoidance behaviors that could result in a decrease in gonorrhea but an increase in births. First, women could switch from effective prescription contraceptives to condoms. Second, women could choose to limit their number of sexual partners. While there are likely heterogeneous responses in the population, I use birth record data and survey data to determine which behavioral response is the most common.

I provide evidence that the increase in births is due to women entering into monogamous partnerships to avoid AIDS. I make use of information from birth certificates on whether a father's age is recorded. For unmarried women, presence of a father's age on the birth record is a proxy for a cohabiting or monogamous couple. Lack of a father's age on the record suggests an absent father. I find that the increase in births is driven by an increase in births to unmarried, cohabiting women. There is no effect of AIDS incidence on births with absent fathers. I supplement these results with survey data to argue that the increase in births is driven by women choosing to have only one sexual partner to protect from AIDS. Survey data shows that 37.5% of unmarried women adjusted their sexual behavior to avoid AIDS and 16% of unmarried women decided to stop having sex with more than one man (Mosher and Pratt, 1993). Using survey data on pregnancy probabilities, I estimate the birth rate would increase by 2 births per 1000 women if 16% of unmarried women switched from multiple partners to one partner. This is higher than my estimate of a 1 birth increase, but is consistent with additional women in the population combining condoms with existing contraceptive methods or abstaining from sex.

The magnitude of estimated effects seems reasonable in comparison to the literature. I find that the birth rate to white women increased from as little as 0.5 births to as much as 1.5 births per 1000 women. Similar in magnitude, Kearney and Levine (2009) find that expanded family planning coverage decreased the birth rate by 1.5 births per 1000 women.

In contrast to the positive effect of local AIDS incidence on birth rates to white women,

I find no effect of AIDS risk on births to Black women. I discuss a number of possible explanations for this racial disparity, including differences in the sex ratio and male incarceration rates, varying cultural norms regarding sexual behavior, and differences in knowledge about AIDS transmission. I provide descriptive evidence which suggests that AIDS incidence might have led to an increase in births to Black women had the Black male incarceration rate been lower. However, this evidence must be interpreted with caution. First, because such a claim requires out-of-sample extrapolation. Second, while the results on births to Black mothers are insignificant, they are not statistically different in magnitude from the positive result found for white women.

This is the first paper, to my knowledge, to empirically relate AIDS avoidance behaviors and birth rates. Posner (1993) hypothesized an economic model of protection against fertility risk and disease risk. However, he does not extend his theoretical model to an empirical analysis. One reason for the existing gap in the literature is difficulty obtaining sufficient data on sexual behavior and contraceptive use for this time period. I demonstrate that using data on city-level birth rates and STI incidence can allow us to draw broad conclusions about AIDS avoidance behaviors, despite the lack of high quality individual data.

My results build on existing studies relating fertility decisions and STI avoidance. Delavande (2008) shows that pregnancy prevention and STI avoidance are the two most important characteristics women consider when picking a method of contraception. Multiple studies have analyzed the effect of changes in the cost of pregnancy prevention on STI incidence by exploiting policy changes in abortion and contraceptive access (Sen, 2003; Klick and Stratmann, 2008; Colman et al., 2013; Mulligan, 2016; Durrance, 2013; Mallatt, 2019; Willage, 2020). I expand on this literature by analyzing the reverse relationship – the effect of changes in STI cost on birth rates.

I find that the STI risk is an important and understudied determinant of birth rates. Previous studies have evaluated how people adjust their sexual behavior in response to AIDS. Ahituv et al. (1996) use regional AIDS incidence and find that men respond to AIDS

risk by adopting condoms as a contraceptive method. They find no effect of regional AIDS incidence on condom use by women. Francis (2008) uses survey data to show that people who know somebody with AIDS switch to sexual behaviors with lower likelihood of HIV transmission. Shah (2013) shows that increases in HIV risk result in a higher risk premium paid to male sex workers for sex without a condom. Furthermore, it is well documented in the literature that individual behavioral changes can affect the rate of AIDS infection in the population (Boozer and Philipson, 2000; Lakdawalla et al., 2006; Greenwood et al., 2019; Friedman, 2018; Kremer and Morcom, 1998; Kremer, 1996; Thirumurthy et al., 2012). I further show that individual AIDS avoidance behaviors can affect birth rates.

Understanding the relationship between STI risk and birth rates can inform the development of reproductive health policy and HIV prevention programs. My results are of particular importance for the development of screening guidelines for healthcare providers. Current screening guidelines promote a unidimensional idea of "safe sex" (i.e. condoms) and fail to address the joint risks of pregnancy and STI. The relationship between STI risk and birth rates is also important given current trends in public health. The rapid rise of antibiotic-resistant gonorrhea in the United States threatens an STI-driven epidemic similar to the AIDS epidemic in the 1980s (CDC, 2017; Bodie et al., 2019). The COVID pandemic of 2020 highlights both the cost and the challenges associated with containing infectious disease. The relationship between STI risk, sexual behaviors, and birth rates is a critical determinant of public health responses to antibiotic-resistant STIs.

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