The effects of coerced sterilization: evidence from Native American women*

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Abstract

Forced sterilization represents one of several coercive population control measures enacted during the 20th century. This paper examines the short- and long-run effects of coerced sterilization, drawing evidence from the experience of Native American women in the 1970s. Our findings indicate that Native American women exposed to forced sterilization experienced lower parity, worse health outcomes, lower labor market participation, lower income, and decreased investment in their children's education. This study also explores the intergenerational transmission of fertility choices among children whose mothers were exposed to forced sterilization.

JEL Codes: I15, J13, J15, N32; O12
Keywords: Sterilization; fertility; human capital; intergenerational transmission.

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1 Introduction

Forced sterilization represents one of the most coercive forms of population control implemented during the twentieth century. Across the world, coercive contraception and other restrictions on reproductive autonomy have been used to regulate the fertility of groups deemed poor, marginalized, racially undesirable, or socially burdensome. These policies were often justified by a combination of demographic, developmental, and public health arguments, but they were also deeply shaped by eugenic ideas about improving population quality. In the United States, the eugenics movement gained prominence in the early twentieth century and promoted the belief that certain human traits should be *"bred out"* through the control of reproduction (Kluchin, 2020). Although no comprehensive statistics exist, forced sterilization and coercive contraception have likely affected millions of individuals worldwide, including African American, Native American and Hispanic women in the United States (Kluchin, 2020), men in India (Singh and Vincent, 2024), Indigenous women in Peru (Vasquez Del Aguila, 2022) and Canada (Stote, 2012), Aboriginal women in Australia (Rademaker, 2024). Despite the scale of these interventions, their full social and economic consequences remain poorly understood.

This paper sheds light on the short- and long-run impact of coercive population control policies, drawing evidence from the experience of Native American women. It is estimated that between 25 and 40 percent of Native American women were coercively sterilized in the 1970s, through tubal ligation or hysterectomy, often without consent or full understanding of the procedure or its physical and psychological effects (Ralstin-Lewis, 2005; Kluchin, 2020). Our analysis evaluates the effects on parity, health, labor market outcomes, and investment in children for women exposed to such measures. We also explore the intergenerational transmission of fertility choices among children whose mothers were potentially exposed to forced sterilization. Identifying American Indian households affected by coerced sterilization is a significant challenge, as individual-level data on Native American women forcibly sterilized are not available. We address this issue by capturing the likelihood of exposure to coerced sterilization through proxies for the loss of reproductive autonomy during this period. According to numerous studies (Kluchin, 2020; Lawrence, 2000), tubal ligations or hysterectomies were often performed on women at the time of giving birth. Therefore, we define the treatment group as the cohort of Native American women whose youngest child was born during the late 1960s and through the 1970s. We mitigate the influence of potential confounding factors, such as menopause or broader fertility trends, by comparing women

of the same cohort.

We test the validity of our treatment definition in three ways. First, we provide evidence that the timing of the last birth is a reasonable proxy for exposure to forced sterilization by showing that the age at last birth declines markedly during the period under consideration for Native American women in peak fertility. Given the availability of contraceptives and family planning initiatives since 1965, we would expect mother's age at last birth to increase over this time period. On the contrary, we show that the average age at last birth for Native American women entering childbearing age in the 1970s is almost 1.2 years lower than that of the comparison group, even when controlling for mother's cohort. Interestingly, the age at last birth for Native American women entering childbearing age either before or after the period of interest tends to be relatively higher than that of the reference group. As a second step in the validation of our treatment definition, we use a sharp age-based cutoff introduced by a 1973 moratorium on sterilization for women below 21 to show that the timing of the last birth changes in line with the restrictions imposed by the moratorium. Native American women who turned 20 after the 1973 moratorium were more likely to have their last child at age 21. Conversely, women who turned 20 just before the moratorium were more likely to have their last child at age 20. This evidence is relevant for two reasons. It supports the use of the timing of the last birth as a proxy for exposure to forced sterilization for Native American women. At the same time, it suggests that the sterilization of young Native American girls was indeed practiced before the moratorium. This phenomenon bears comparison to other documented instances of coercive reproductive control. Notably, similar practices have been identified among Inuit populations in Greenland, where large numbers of girls and women were subjected to non-consensual contraception or sterilization as part of state-led population control initiatives (Lekvall, 2025). Finally, to further test the validity of the treatment definition, we rely on the medical evidence on the gynecological side effects of permanent sterilization. Using data from the National Health Interview Survey (NHIS), we show that Native American women potentially exposed to sterilization have an almost 3 percentage point higher probability of reporting gynecological disorders in the long run, which, relative to the sample mean (3.3 percent), corresponds to a substantial increase in the share of women reporting such issues.

Having assessed the validity of the treatment definition, we explore the short-run effect of exposure to forced sterilization. We use retrospective household data from the 1990 5% U.S. Census State Sample, combined with the National

Health Interview Survey (NHIS) data, and exploit variation across treated and untreated cohorts as well as variation across races. We provide evidence that Native American women potentially exposed to forced sterilization have a lower number of children. The probability of having more than one child for treated women decreases by approximately 6.1 percentage points, corresponding to an 8 percent reduction relative to the sample mean. The probability of having more than two children decreases by nearly 11 percent, and the estimated probability of having more than three children drops by roughly 6. This reduction in parity becomes even more pronounced when American Indian women are compared to white women (hence excluding all other minorities): in this case, the reduction in the probability of having more than one child is close to 10 percent, while the probability of having more than two children decreases by nearly 13 percent relative to the mean.

We disentangle the effect of family planning from forced sterilization by exploiting the timing of the provision of family planning at IHS facilities in 1965, and conducting an event study. We show that family planning had no impact on fertility, in line with anecdotal and medical evidence of low adoption of contraception among Native American women (Lawrence, 2000; Temkin-Greener et al., 1981). The effect of exposure to forced sterilization begins to manifest in households whose last child was born in 1969, with fertility continuing to decline among successive cohorts, consistent with anecdotal evidence.

We then explore whether the effect on parity varies by tribe: interestingly, we find that the impact of potential exposure to forced sterilization is much more pronounced among tribes with traditionally shorter birth spacing, and thus among women who were likely to have a larger number of children. This latter result is in line with the evidence of a selective use of forced sterilization, to conform American Indian families to traditional white family norms and to keep their population growth under control (Kluchin, 2020). We match tribes with ethnographic data from Murdock (1967) on post-partum sex taboos and show that the effect on parity is larger in tribes with a post-partum abstinence period below one year, which confirms heterogeneity by birth spacing. We also conduct a sentiment analysis to capture Malthusian fears related to population growth and attitudes toward Native Americans in the early 1960s, and find that the effect on parity is larger in states where population growth is a significant concern and attitudes toward Native Americans are more negative. Using data from the 1930 Census, which includes information on Native Americans, we find substantial heterogeneity in the effects across tribes, driven by differences in fertility and socioeconomic conditions at that time. Tribes with higher

fertility rates in 1930 experienced larger reductions in parity by 1990. This decline is more pronounced among women from tribes where the average age at marriage in 1930 was lower and where literacy rates were relatively low. Overall, this evidence consistently points to a potential targeting of forced sterilization.

Next, we investigate the long-run effects of exposure to forced sterilization on health and socioeconomic outcomes. Using data from the NHIS, we show that Native American women exposed to coerced sterilization experience worse health outcomes. The probability of self-reporting poor health increases by almost 1.7 percentage points. They are also significantly more likely to report health issues, with an increase of 4.3 percentage points, and to report having been bedridden due to a disability. Furthermore, they exhibit a higher likelihood of reporting alcohol consumption, which we use as a proxy for mental health outcomes. Using data from the 5% 1990 Census, we find that treated women are more likely to live in single-headed households (i.e., a proxy for divorce or separation), have a higher probability of work disability (i.e., receiving benefits), and, consequently, a lower probability of labor force participation, which in turn negatively affects both personal and household income.

As a second step, we evaluate the effect of exposure to forced sterilization on children's human capital. Controlling for birth cohort and current school enrollment, we find that for children of mothers potentially exposed to sterilization, the probability of completing a high school diploma (grade 12) or at least one year of college decreases by 2.9 and 4.3 percentage points, respectively. As a placebo test, we examine whether treatment exposure affects the probability of completing free compulsory education (i.e., middle school) and find no effect. These findings are robust when controlling for the household head's education level, labor force participation, and socioeconomic status.

Finally, we explore the intergenerational transmission of fertility to children born in households exposed to the treatment using data from the IPUMS 2000 US census (5% sample) and the Panel Study of Income Dynamics - Social, Health, and Economic Longitudinal File (PSID-SHELF). We provide exploratory evidence that children born into households exposed to forced sterilization have higher fertility later in life. We interpret these results as consistent with potentially adverse attitudes toward contraception and a change in fertility preference in response to the declining Native American population. However, formal testing of these two channels is not possible due to data limitations, and we regard these latter results as exploratory.

To the best of our knowledge, this is the first study to provide a quantitative estimate of the short- and long-term economic effects of forced sterilization. We contribute to three main strands of literature.

First, this paper is closely related to the literature on the long-term effects of medical malpractice and medical abuse. Gaston and Alleyne-Green (2013) conduct a systematic review to examine the legacy of abuse from medical experimentation on slaves and African Americans, finding significant effects of these past experiences on attitudes toward HIV-related health care. Alsan and Wanamaker (2018) evaluate the lasting impact of the Tuskegee Study of Untreated Syphilis on the behavior and health of older Black men, documenting enduring effects on medical mistrust and mortality. Chang (2018) study the impact of the controversy surrounding the measles-mumps-rubella (MMR) vaccine on vaccination rates among subsequent cohorts and observe spillover effects on the uptake of other vaccines. Similarly, Qian et al. (2020) provide evidence of confirmatory bias in health decisions following the MMR-autism vaccine controversy. Lowes and Montero (2021) find lower vaccination rates and diminished trust in medicine in areas heavily exposed to the French medical campaign to treat and prevent sleeping sickness in Africa. Martinez-Bravo and Stegmann (2022) examine the effects of the anti-vaccination campaign led by the Taliban after news emerged that the CIA had used a vaccination program as cover to capture Osama Bin Laden. Finally, Archibong and Annan (2023) investigate the impact of the 1996 Pfizer human trials in Kano, Northern Nigeria, where an experimental antibiotic for meningitis led to the deaths of 11 children.

Second, this study relates to the literature on racial discrimination in the US. A large part of this literature has focused on the effect of slavery (Fogel and Engerman, 1995; Nunn, 2008; Naidu, 2010; Engerman and Sokoloff, 2012; Bertocchi and Dimico, 2014; Boustan and Margo, 2014; Acharya et al., 2016; Levine et al., 2020; Ager et al., 2021; Wright, 2022; Bleakley and Rhode, 2024), the impact of the Jim Crow laws (Margo, 1982, 1984, 1987, 1990; Collins, 2003; Bertocchi and Dimico, 2017; Carruthers and Wanamaker, 2017; Ruef and Grigoryeva, 2018; Althoff and Reichardt, 2024) and consequences of racial violence (Collins and Margo, 2004, 2007; Cook, 2014; Cook et al., 2018; Albright et al., 2021; Williams, 2022). A small part of this literature has focused instead on discrimination against American Indians. Feir (2016) evaluates the impact of residential schools on cultural and economic assimilation and finds that children who attended residential schools shows a higher level of assimilation. Maruthiah (2024) looks at cohort variation in the exposure to boarding schools

and finds that children in reservations are more likely to speak English, have a Western name and be perceived as white. Gregg (2018) shows that children in reservations that sent a larger share of students to off-reservation boarding schools have better educational and economic outcomes, lower fertility, and a higher probability of speaking English. Kopriva (2024) finds that the Indian Relocation Policies in the late 1950s and 1960s promoted the redistribution of Indigenous Peoples to the urban centers selected for relocation. Frye and Parker (2021) look at close elections following the formation of Indigenous self-government units as part of the Indian Reorganization Act (IRA)and argues that adopting an IRA constitution has implied more federal oversight and lower income. Anderson and Lueck (1992) argue that the low agricultural productivity across Indian reservations is the result of constraints imposed by the federal government over Indian land. Dippel (2014) studies the impact of American Indian reservations and finds that forced coexistence led to a reduction in income per capita on reservations today by about 30%. Leonard et al. (2020) evaluate the impact of land titling following the General Allotment Act of 1887 and find a non-linear effect on income across reservations. Feir et al. (2023) look at discrimination in the mortgage market, while Feir et al. (2023) evaluate the impact on health of the Slaughter of the Bison toward the end of the 19th century on health. Watson (2006) evaluates the impact of federal sanitation interventions in reservations using a staggered DiD and find a substantial effect on child mortality. Anderson and Parker (2008), Brown et al. (2019), Cookson (2010) examine the effect of the 1953 Public Law 280. Feir (2025) and Carlos et al. (2022) provide a broad review of the historical and economic literature related to Native Americans.

Finally, this paper contributes to the broader literature on fertility and family planning. Seminal studies (Goldin and Katz, 2002; Bailey, 2006; Bailey and Lindo, 2018; Bauernschuster et al., 2023) document the transformative effects of access to contraception, including reductions in fertility, increased birth spacing, declines in stillbirths and infant mortality, and increases in age at first birth and marriage. These changes are also associated with greater investments in education and higher labor force participation. While this literature clearly demonstrates the positive impacts of expanding access to family planning, our paper offers the first examination of the consequences of restricting women's autonomy in these decisions. We show that when Native American women's reproductive choices were removed, the long-run effects were deeply adverse, with negative impacts across health, socioeconomic outcomes, and labor force

participation.[1]

The paper is structured as follows. Section 2 provides a discussion of the historical background regarding coerced sterilization of American Indian women. Section 3 presents the data sources, while Section 4 provides evidence on the validity of the treatment definition. Section 5 presents the estimation strategy. The effects of forced sterilization exposure on fertility in Section 6, followed by a set of heterogeneity exercises in Section 7. Section 8 explores the effect of sterilization exposure on health and labor market outcomes. Section 9 investigates the potential intergenerational transmission channel and Section 10 concludes.

2 Background

On March 25, 1974, the Court for the Western District of Pennsylvania received a civil action (No. 74-313) filed by the lawyer of Norma Jean Serena. A bilateral salpingectomy was performed on her without her knowledge or consent after the delivery of her third child on August 16, 1970. The procedure was deemed necessary for her health, based on the belief that she had enough children and that further pregnancies could result in children with disabilities (USDC WDPA, 1974). Like Serena, thousands of American Indian women were sterilized in the 1970s, often without consent or full understanding of the procedure or its physical and psychological effects. According to Dr. Constance Redbird Pinkerton-Uri, a Choctaw-Cherokee physician, nearly 25 percent of Native women of childbearing age in the U.S. underwent forced sterilization between the 1960s and 1970s. This loss of reproductive autonomy not only disrupted traditional family structures but also led to significant economic, psychological, and emotional consequences. Many marriages ended in divorce, friendships dissolved, and an increasing number of women faced marital conflicts, alcoholism, and physical and mental health challenges (Lawrence, 2000).

[1]The paper also contributes to the literature investigating the impact of parental job loss, maternal mental health, negative family environment on children's outcomes (Heckman, 2007; Oreopoulos et al., 2008; Frank and Meara, 2009; Aizer et al., 2016; Dahlen, 2016; Persson and Rossin-Slater, 2018; Mörk et al., 2020; Carneiro et al., 2021; Willage and Willén, 2022; Eshaghnia et al., 2022; Carneiro et al., 2024; Huttunen and Riukula, 2024; Salvanes et al., 2024). In line with the literature, we find evidence of a significant relationship between negative family environment and child outcome.

The 1960s marked a period of significant change for many American women, particularly regarding reproductive rights. President Lyndon B. Johnson's War on Poverty provided unprecedented access to family planning programs, under the expectation that increased reproductive autonomy would foster greater economic mobility and equality. For many women, the ability to control their fertility represented an opportunity for self-sufficiency, enabling them to take advantage of the educational and economic prospects created by the program. While many American women benefited from these policies, reports of reproductive rights abuses involving American Indian women at Indian Health Service (IHS) hospitals began to surface in the 1970s. Several women from various tribes came forward with accounts of forced sterilizations. The growing number of such reports, along with allegations of questionable sterilization practices at the Claremore IHS hospital in Oklahoma, prompted Dr. Constance Redbird Pinkerton-Uri, a physician with the IHS, to conduct her own inquiry. By examining records from 26 of the 35 Indian Health Service hospitals across the country with obstetric wards, she estimated that approximately 25 percent of American Indian women had been sterilized (Shepherd, 2021). Dr. Uri's findings led to an investigation by the Government Accountability Office (GAO) in four of the twelve IHS program areas: Aberdeen, Albuquerque, Oklahoma City, and Phoenix (Lawrence, 2000). The resulting report, released in 1976, revealed that the IHS performed 3,406 sterilizations between 1973 and 1976 and highlighted potential issues in terms of: (1) *sterilization of persons under 21 years of age* - despite the Department of Health, Education, and Welfare moratorium on underage sterilizations, introduced in 1973; (2) *non-standard consent forms*; (3) *lack of widespread physician understanding of the regulations*; and (4) *lack of definitive requirements for informed consent for sterilizations performed by contract doctors* (Government Accountability Office, 1976).

Over the period considered by the Government Accountability Office (1973-1976), the reported rates of female sterilization procedures ranged from approximately 3 percent of women at the IHS Albuquerque center to nearly 7 percent at the IHS Oklahoma center, with an average across the four centers of around 6 percent (Government Accountability Office, 1976). However, the report covers only a limited three-year period and a small number of IHS centres. In light of the prolonged prevalence of sterilization practices from the late 1960s through the 1970s, subsequent studies suggest that the prevalence may have been much higher. For example, Carpio (2004) reports estimates indicating that more than 40 percent of Native American women may have been subjected to sterilization procedures during this era.

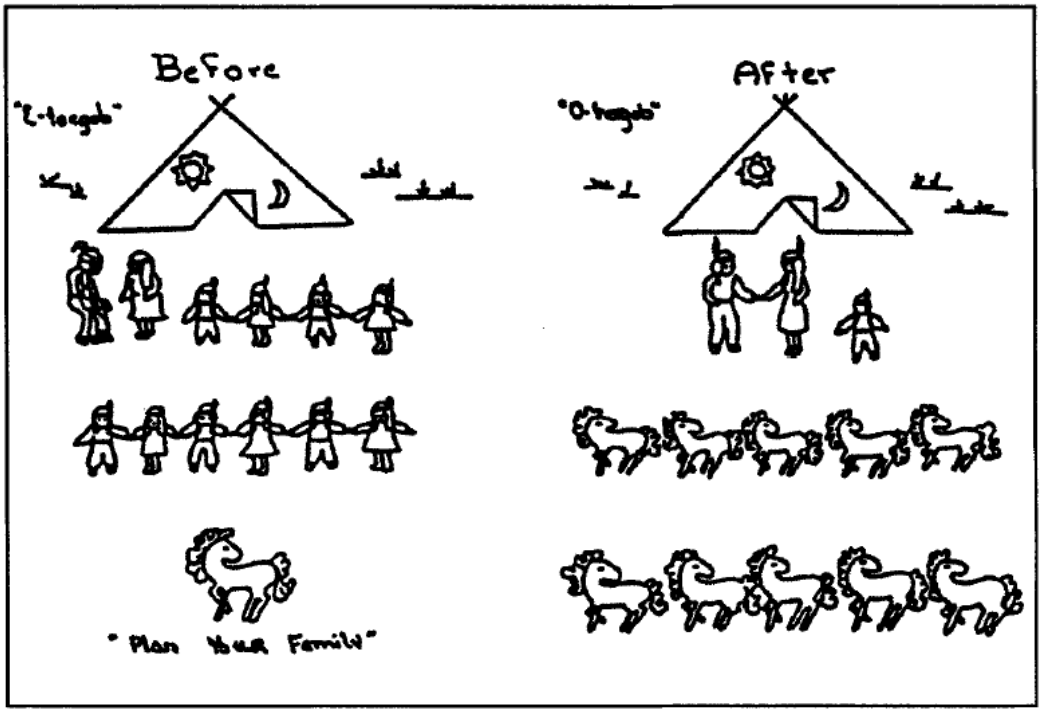
The resurgence of eugenic movements in the 1960s, following their their post-World War II decline, coupled with Malthusian concerns over overpopulation, resource scarcity, and the perceived social and economic burdens of a growing population, provide a plausible explanation for coercive sterilization practices over this period, targeting women of color, Native Americans, and Hispanics. Although no comprehensive official statistics exist, the loss of reproductive autonomy is likely to have affected thousands of women in the U.S. between 1950 and 1980 (Kluchin, 2020).

Malthusian concerns were also reflected in federal policy. In 1969, President Nixon described population growth as *'one of the most serious challenges to human destiny in the last third of this century'* (Nixon, 1969) and viewed birth control methods of *all types* as a potential solution to this issue. Consistent with this perspective, the Department of Health, Education, and Welfare expanded family planning programs aimed at poor and disadvantaged populations under the Economic Opportunity Act of 1964. Similarly, in 1965, the Indian Health Service (IHS), established in 1955 within the Department of Health, Education, and Welfare, began providing family planning services to American Indians.

Native Americans were considered a primary target for family planning programs due to their high fertility rates and the poor economic conditions of women on reservations (Ralstin-Lewis, 2005). Lawrence (2000) reports that the average number of children per woman among American Indians was above three, compared to an average of two children among white women.[2] Despite the availability of free family planning services, contraceptive use among American Indian women remained strikingly low (Temkin-Greener et al., 1981). To incentivize their use, the 1970 Family Planning Services and Population Research Act fully subsidized (up to 90 percent) the cost of sterilization to Medicaid and Indian Health Service patients, hence indirectly providing financial incentives for physicians to perform sterilizations (Shepherd, 2021). At the same time, the Department of Health, Education and Welfare launched information campaigns in the early 1970s promoting the benefits of sterilization (Figure 1). While directives required that sterilizations should only be performed on individuals at risk, and with valid informed consent, physicians at Indian Health Service facilities frequently disregarded these requirements, with doctors pressurizing women into sterilizations (Kluchin, 2020).

[2]The average number of children per woman among some tribes, e.g., Navajo and Apache, was even higher, around 4.

Figure 1: Family Planning and American Indians



Note: A 1974 Department of Health, Education and Welfare pamphlet.

Figure 2: Timeline

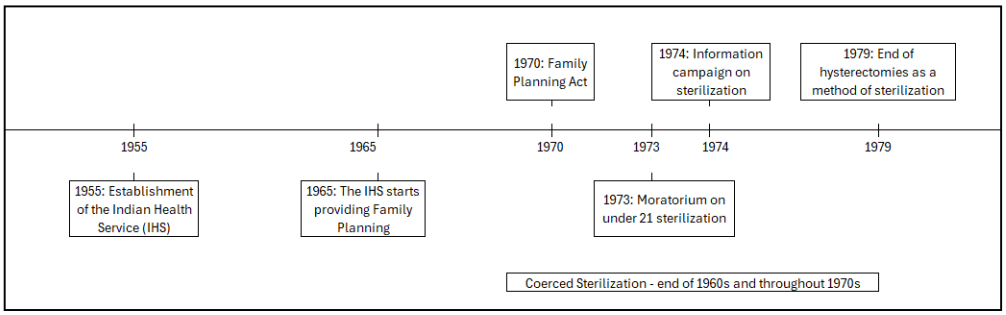


Figure 2 provides the timeline for the introduction of family planning services and sterilizations. According to several reports (Lawrence, 2000), coerced sterilizations began in the late 1960s and intensified throughout the 1970s, until 1979, when IHS formally prohibited hysterectomies as a method of sterilization or population control (North et al., 2000). This implies that coerced sterilization began prior to the 1970 Family Planning Act and a few years after the IHS started providing family planning services, thereby allowing us to evaluate the impact of these potentially confounding policies when examining dynamic treatment effects (see Section 6).

3 Data

We use four main data sources. First, we collect retrospective fertility information from the IPUMS 1990 5% U.S. State Sample, which reports the total number of children ever born to each female respondent.[3] Our sample includes parents (the household head and their spouse/partner) and household head's parents, within the age of 15 and 90.[4]

[3]Data for the IPUMS 5% U.S. Census State Sample are provided by Ruggles et al. (2024). The 1980 Census reports the total number of children ever born. However, this sample is too close to the treatment period, leading to a censored fertility distribution because children born after the treatment period (i.e., after 1980) are not reported. Conversely, more recent censuses (since 2000) report only the number of children currently in the household, leading to an undercount of children who have already left.

[4]We exclude individuals who are not yet of reproductive age (i.e., below 15) and those above 90 (i.e., born before 1900) as they are unlikely to have had children during the treatment period (1970s) and, therefore, unlikely to provide cohort variation. In one of the robustness checks, we restrict the sample to women between the age of 20 and 75. The

Our second data source is the National Health Interview Survey (NHIS), an annual survey that collects information on health, healthcare access, and health behaviors.[5] We use the sample over the period 1980-1995, which includes more than 7,000 American Indians. Data on American Indians as a racial category is only available from 1979 onward, hence preventing the use of earlier survey waves. In line with recent censuses, the NHIS includes information only on children still residing in the household. By limiting the sample to years up to 1995, we assume that the eldest children in a treated household were in their mid-twenties by 1995 and hence still likely to be household members.

To evaluate the intergenerational transmission of fertility choices, we use the IPUMS 2000 5% sample of the U.S. Census and the 2023 Panel Study of Income Dynamics - Social, Health, and Economic Longitudinal File (PSID-SHELF).[6][7] Both datasets have potential issues: the IPUMS 2000 5% sample allows us to analyze the children of treated households who are still residing within the household. However, this may lead to sample selection: for instance, children in extended families are more likely to remain in the household longer, potentially causing an upward bias since they are also more likely to have more children. The PSID-SHELF dataset, on the other hand, includes only a small number of American Indians (372 in our sample), and the number of treated individuals is even smaller, raising concerns about sample representativeness. Appendix A provides details about the construction of these datasets, while Tables A1-A5 report summary statistics for the relevant variables.

4 Treatment Definition

Identifying American Indian households impacted by forced sterilization is a major challenge, since individual-level data on Native American women forcibly sterilized are not available. As discussed in Section 2 (Figure 2), Indian Health Service (IHS) hospitals began operating in 1955 and started providing family planning services to Native Americans in 1965. It was only towards the end of the 1960s until 1979 that forced sterilization was prac-

results hold across the two samples.

[5]Data for the National Health Interview Survey are provided by Blewett et al. (2024).

[6]Data for the PSID-SHELF are provided by Pfeffer et al. (2023).

[7]Children of households potentially exposed to forced sterilization are of a reproductive age (i.e. between 20 and 35 years old) in 2000.

ticed at a larger scale in IHS facilities (Lawrence, 2000; Ralstin-Lewis, 2005). According to extensive evidence (Kluchin, 2020), American Indian women underwent tubal ligations or hysterectomies at the time of childbirth or alongside other abdominal surgeries, often without their informed consent. On the basis of this evidence, we measure the likelihood of exposure to coerced sterilization using proxies for the loss of fertility during this period and define the treatment group as the cohort of Native American women whose youngest child was born between 1965 and 1979.[8] We mitigate potential confounding factors, such as menopause or broader fertility trends, by comparing women born in the same year. Figure B1 in Appendix B shows the distribution of mothers' age at last birth in our sample.[9] The average age at last birth is around 28, which compares reasonably well with the average in the population. Carlson and Guzzo (2021), for example, report that the median age at last birth among women aged 45–49 in 2021 is close to 31, which, considering changes in the distribution of age at motherhood over recent decades, appears broadly consistent with the average in our sample.

From an empirical standpoint, it is essential to validate the definition of treatment. To do so, we proceed in three steps. First, we exploit information on women's age at last birth to test whether using the year of birth of the last child is a reasonable proxy for identifying treatment exposure. Medical evidence shows that peak fertility occurs from the late teens through the late 20s, with a gradual decline beginning around the age of 30. Coerced sterilization, therefore, should lead to a marked reduction in the age at last birth for Native American women whose peak fertility occurred during the 1970s. In other words, we expect the last child to be born when fertility is at its highest. Figure 3 plots the differential trend between Native American and White women by birth cohort. The horizontal axis reports the year in which a woman turns 15 with 1965 being the reference year; hence zero denotes a woman who turns 15 in 1965, +1 a woman who turns 15 in 1966, +2 a woman

[8]The definition of the variable in the census is "Age of youngest own child in household". The fact that the variable refers to the youngest child in the household does not seem to be an issue in terms of selection. Almost 90 percent of mothers born after 1940 who have a child report the age of the youngest child. This percentage is almost 95 percent for mothers born after 1950, 94 percent for those born after 1960, and 85 percent for those born after 1970. Hence the pattern seems consistent across cohorts. In addition, there is no significant difference across races (88 percent for Native Americans after 1940, 93 percent after 1950 and 93 percent after 1960).

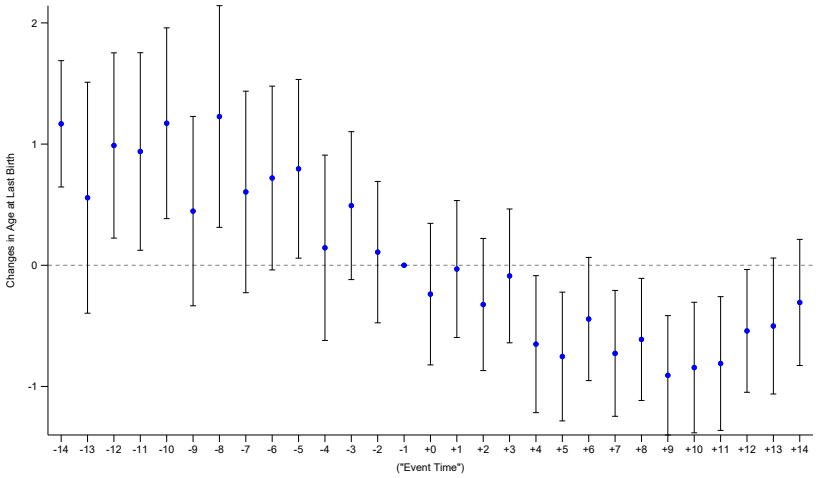
[9]We trim the top and bottom 1 percent of the distribution because the age at last birth appears to fall outside feasible ranges.

who turns 15 in 1967 and so on[10]. The vertical axis shows the difference in age at last birth between Native American and White women who turn 15 in a given year. Although the figure captures a simple correlational difference and should not be interpreted causally, it reveals a marked decline in the age at last birth among Native American women who were in their peak fertility during the 1970s, compared to White mothers and across cohorts. For women unlikely to be affected by sterilization (i.e., those toward the end of peak fertility in the 1970s), the differential trend is positive and significant, consistent with the idea that before the sterilization era Native American women had more children and a likely later age at last birth. The difference in the age at last birth begins to decrease for women likely to have been exposed to sterilization, and declines significantly for those in their peak fertility during the 1970s. The reduction becomes statistically significant for women who turned 15 in 1969 (i.e., event period +4) and decreases further for those who turned 15 in subsequent periods. When coerced sterilization ceased to be practiced, the difference in age at last birth begins to increase again (i.e., starting with women who turned 15 in 1979). This reduction in the age at last birth for Native American women during this specific period suggests a higher probability of having a last birth during the years when mass sterilization at IHS facilities was practiced, and supports the use of the youngest child's birth cohort as a proxy for treatment definition.

Second, we test whether the youngest child's birth is a valid proxy for treatment exposure by exploiting the 1973 moratorium on sterilizations for women under the age of 21, using the IPUMS 1990 5% U.S. State Sample. The moratorium, introduced in 1973 (Figure 2), creates a sharp age-based cutoff, allowing us to compare women who turned 20 in cohorts around 1973 and to test whether the regulation shifted mothers' age at last birth. Specifically, we examine whether the age at last birth for women aged 20 (i.e., those unlikely to be sterilized after the moratorium) increases above the age threshold specified in the regulation. Column 1 in Table 1 shows that women who turned 20 before the moratorium (i.e., age 20 in 1972) were more likely to have their last child at age 20 (i.e., when sterilization before age 21 was still possible).

[10]The estimated model is the following: $Y_{m,r,t} = \alpha_t + \gamma_r + \beta_\tau \cdot \delta_n \cdot \mathbf{1}(Birth_Year + 15 - T_{1965} = \tau) + \rho X_{mrt} + \epsilon_{mrt}$. Where $Y_{m,r,t}$ is the age at last birth of a mother m of race r and birth cohort t, α_t are birth cohort FE, γ_r are race fixed effects, and $\mathbf{1}(Birth_Year + 15 - T_{1965} = \tau)$ is a dummy for how many years before/after 1965 the mother turns 15, which is interacted with a dummy for Native American women (δ_n). The coefficient β_τ therefore captures the difference for women who turn 15 τ years away from 1965

Figure 3: Mother's age at last birth



Note: The dependent variable is age at last birth. The horizontal axis reports years when a mother turns 15 with 0 denoting Native American women who turn 15 in 1965, +1 women who turn 15 in 1966, -1 women who turn 15 in 1964 and so on. The vertical axis reports changes in the differential age at last birth. We exploit variation over cohorts and between Native American and White women. Controls include: *i*) Region FE; *ii*) Mother cohort FE; *iii*) Marital status; *iv*) Race; *v*) Relation to the head; *vi*) Urban/rural location; *vii* citizenship status; *viii* birthplace; *ix* primary sampling units FE). Clustered standard errors at the primary sampling unit. 95% Confidence intervals reported.

Column 2, by contrast, provides evidence that women who turned 20 after the moratorium (i.e., age 20 in 1975) were more likely to have their last child at age 21 (i.e., when sterilization was permitted under the moratorium). These results suggest that, among women of similar age, the moratorium effectively decreased (albeit did not eradicate) the sterilization of women under the age of 21. This exercise, based on a sharp age-based cut-off, appears to validate the use of the youngest child cohort for the treatment definition.

Finally, we rely on the medical literature (Clarke-Pearson and Geller, 2013), which focuses on the genital disorders associated with permanent sterilization. For a small number of women in the sample (almost 9%), the 1980-1995 National Health Interview Survey (NHIS) provides information on whether the woman experienced gynecological issues in the last year, such as inflammatory disorders, infertility, and chronic gynecological conditions, which can be caused by sterilization (Clarke-Pearson and Geller, 2013). To further validate the treatment definition, we estimate the treatment effect on whether the woman had any gynecological disorder in the last year. Controlling for the

Table 1: The Effect of the Moratorium

	(1) Age at Last Birth = 20	(2) Age at Last Birth = 21
NA*Aged 20 in 1975	0.0125	0.0180*
	(0.00858)	(0.0101)
NA*Aged 20 in 1974	0.00501	-0.00391
	(0.00841)	(0.0102)
NA*Aged 20 in 1973	0	0
	(.)	(.)
NA*Aged 20 in 1972	0.0161*	-0.0000543
	(0.00941)	(0.0106)
NA*Aged 20 in 1971	-0.00773	0.00804
	(0.00782)	(0.0110)
Adj.R-squared	0.006	0.006
Observation	313,514	313,514
Clusters	1,723	1,723
Sample Mean	0.021	0.028
Mother Cohort FE	Yes	Yes
Race FE	Yes	Yes
Other FE	Yes	Yes

Notes: The dependent variable is a dummy equal to one if the last child was born at the age of 20 (Model 1) or at the age of 21 (Model 1). The treatment variable is a dummy indicating whether a woman turned 20 in a given year, interacted with a dummy for American Indian women. White and Native American women are kept in the sample. Controls include: *i*) Primary sampling unit FE; *ii*) Individual cohort FE; *iii*) Marital status; *iv*) Race; *v*) Relation to the head; *vi*) Rural/urban location; *vii*) citizenship status; *viii*) birthplace). Clustered standard errors at the primary sampling unit. *** p<0.01, ** p<0.05, * p<0.1.

number of children in the household to exclude the effect of parity (another likely cause), Table 2 shows that Native American women potentially exposed to sterilization are more likely to report gynecological issues by almost 3 percentage points than white women. Given that the share of women reporting such issues in the sample is close to 3.4 percent, exposure to treatment doubles the probability of experiencing gynecological issues. Although exploratory given the small sample size, this evidence seems to support the validity of the treatment as a proxy for (coerced) sterilization of Native American women.[11]

[11]The sample includes only 176 treated women out of 388 American Indian women.

Table 2: Long-run gynecological Issues

	(1)	(2)
	Gynecological issues	
ATT	0.0295**	0.0295**
	(0.0149)	(0.0149)
Adj.R-squared	0.003	0.004
Observation	48,075	48,075
Clusters	298	298
Treated	176	176
Sample Mean	0.033	0.033
Mother Cohort FE	Yes	Yes
Race FE	Yes	Yes
Child Cohort FE	Yes	Yes
Other Controls	No	Yes

Notes: The dependent variable is a dummy indicating whether the woman had any gynecological issues over the previous 12 months, based on the 1980-1995 National Health Interview Survey. Controls include: *i*) Region FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Survey year FE; *v*) Marital status; *vi*) Race; *vii*) Relation to the head; *viii*) Number of children. Clustered standard errors at the primary sampling unit. *** p<0.01, ** p<0.05, * p<0.1.

5 Econometric specification

We examine the effect of potential exposure to coercive sterilization on short-run and long-run outcomes and estimate a classical difference-in-differences model as follows:

$$Y_{mrtc} = \alpha + \beta \mathbb{I}70_c * NA_r + \sigma_r + \gamma_c + \delta_t + \rho X_{mrtc} + \epsilon_{mrtc}$$

where Y_{mrtc} is the outcome variable for mother m, of race r, from birth cohort t, with youngest child's birth cohort c (i.e. parity, health outcomes, labour market outcomes). The variable $\mathbb{I}70_c$ is an indicator taking the value of 1 if the youngest child was born between 1965 and 1979 and 0 otherwise, while NA_r is an indicator taking the value of 1 for Native American women and 0 otherwise. Aging and changes in fertility preferences are other potential reasons why women might stop having children during the period under consideration, and hence could be correlated with exposure to forced sterilization. To attenuate the bias, the model also includes mother's cohort fixed effects

(δ_t). Differences across races are captured by race fixed effects (σ_r). The inclusion of the youngest child's cohort fixed effects(γ_c) forces the estimator to exploit variation among women who gave birth to their last child in the same year. Hence, the estimator considers women born in the same year and, among these women, compares those whose last child is born in the same year. Finally, the specification includes a set of control variables, X_{mrtc}, namely Public Use Microdata Areas (PUMAs) boundaries fixed effects, birth place fixed effects, marital status, urban/rural residency, citizenship, gender, and relation to the head (i.e., whether the individual is the spouse, mother, partner, etc.). Standard errors are clustered at the primary sampling units, depending on the dataset used.

6 Parity and Coerced Sterilization

Having validated our treatment definition, we evaluate the effect of coerced sterilization on parity by using the 1990 US Census retrospective information on the total number of children ever born. Figure B2 in Appendix B shows the overall trend in the average number of children ever born for Whites, African Americans, and American Indians, based on the birth year of the last child, to illustrate the variance exploited by the treatment. The average number of children declines across groups for cohorts born after the 1960s, which, as documented in the literature, is likely due to family planning methods introduced during that decade, following the approval of Enovid (i.e., the birth control pill) by the FDA. However, the reduction in the average number of children ever born for American Indians is significantly larger, declining from nearly five children per woman to fewer than three. The reduction among African Americans is also larger compared to Whites, but is not as pronounced as that of American Indians. While African Americans were also targeted by sterilization programs in the 1960s, the reduction in fertility for this group is unlikely to be primarily due to such programs, as the relative number of African American women forcibly sterilized appears to have been relatively small during this period.

We estimate equation 5, whereby the dependent variable is the number of children ever born to a mother. Since the estimator compares women whose last child is born in the same year (controlling for the birth-year of the mother), the estimated effect on the number of children in 1990 is likely to reflect the impact on completed fertility.

The possibility of heterogeneous treatment arising from the cohort variation in the treatment represents a potential concern when estimating the average treatment effect on the treated (ATT). To decide whether the TWFE is a valid estimator, or whether an estimator robust to heterogeneous treatment would be preferable, we follow the approach outlined by De Chaisemartin and d'Haultfoeuille (2020) to evaluate the impact of negative weighting. The test reveals that 16 ATTs receive a positive weight, and none receive negative weights. Therefore negative weighting does not affect the computation of the ATT. Moreover, the minimum standard deviation of the treatment effect ($\sigma(\Delta)$), across the treated (g,t) cells required for the ATT to be zero is approximately 9.3. This value is substantially larger than zero, indicating that the ATT could only be zero under an implausibly high degree of treatment heterogeneity. This, in turn, suggests that the TWFE estimates (B_{fe}) may be interpreted causally.

Column 1 in Table 3 presents the estimated effect of exposure to forced sterilization on the total number of children ever born. The estimated coefficient is negative and statistically significant at the 5% level, indicating a reduction of approximately 2.6 percent in the total number of children among Native American women compared with the overall sample average. In Column 2, the dependent variable is a dummy indicating whether a woman reports having more than one child. For Native American women exposed to forced sterilization, the probability of having more than one child decreases by 6 percentage points, or approximately 8 percent relative to the overall mean. In Columns 3 and 4 of Table 3 we estimate the changes in the probabilities of having more than two children and more than three children respectively. Native American women's probability of having more than two children decreases by approximately 11.2 percent (Column 3), while the probability of having more than three children decreases by 6.5 percent (Column 4), both relative to the overall mean. These results suggest that exposure to sterilization was significantly stronger after the second child, seemingly to force Indian American households to conform to the family size norms prevalent among whites.[12]

Table C2 in Appendix C reports results using the estimator proposed by

[12]Table C1 in Appendix C reports estimates restricting the sample to women born between 1940 (i.e., 25 years old by 1965) and 1970 (i.e. entering in childbearing age after the end of the sterilization period). As discussed earlier, more than 90% of women report the age of last birth of their children for this cohort, with no significant difference by race. Estimated effects are even larger, despite a loss of significance in Model 4 due to the larger standard errors.

Gardner (2022), which, similar to Borusyak et al. (2021), uses an imputation approach to construct a suitable control group and to show that estimated effects are robust to heterogeneous treatment. Point estimates in Table C2 are the same as those in 3, confirming the absence of issues related to a negative weighting of the ATE.

Table 3: The effect of sterilization on parity

	(1)	(2)	(3)	(4)
	Nr Children	Nr Children>1	Nr Children>2	Nr Children>3
ATT	-0.0754**	-0.0648***	-0.0500***	-0.0135**
	(0.0303)	(0.00587)	(0.00750)	(0.00664)
Adj.R-squared	0.297	0.122	0.189	0.219
Observation	2,035,797	2,035,797	2035797	2,035,797
Treated	7,047	7,047	7,047	7,047
Sample Mean	2.653	0.785	0.4200	0.204
Clusters	1,726	1,726	1,726	1,726
Mother Cohort FE	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes	Yes
Other FE	Yes	Yes	Yes	Yes

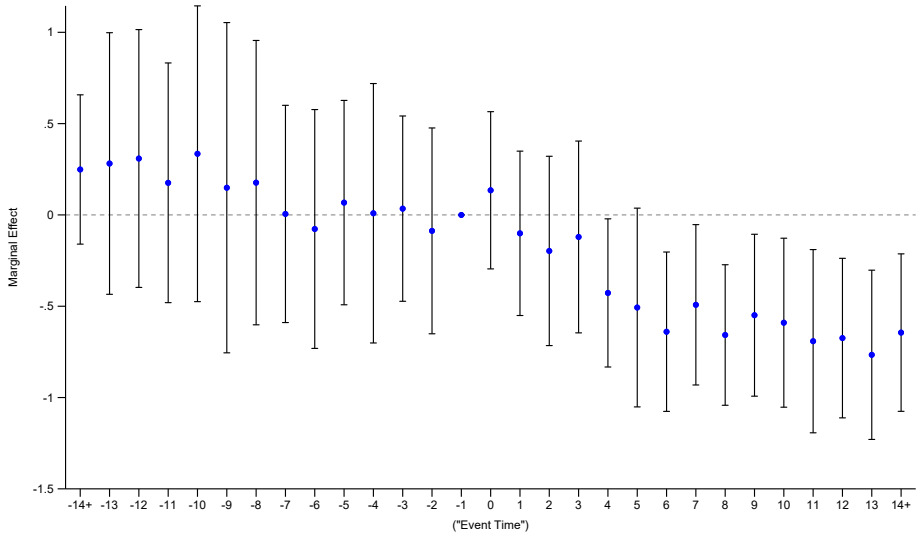
Notes: The dependent variable is the number of children ever born (Model 1) and dummies for more than one child in the household (Model 2), more than 2 children in the household (Model 3), and more than 3 children in the household (Model 4). Controls include: *i*) PUMA FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Race; *v*) Marital status; *vi*) Citizenship; *vii*) Birth place; *viii*) Relation to the head; *ix*) Urban/rural location. Clustered standard errors at the PUMA level. *** p<0.01, ** p<0.05, * p<0.1.

Next, we isolate and disentangle the effect of the family planning services from forced sterilization by conducting an event study. Figure 2 shows the timeline of the setup of the Indian Health Service (IHS) in 1955, as well as the provision of family planning by the IHS and the subsequent sterilization period during the 1970s. Given that Native American women are less likely to use contraception (Lawrence, 2000; Temkin-Greener et al., 1981) and given the timing of forced sterilization, we would expect to observe a decline in parity for Native American women in the 1970s, but not in the 1960s. Figure 4 presents the dynamic treatment effect on parity, using 1965 as the reference

year. Prior to the treatment, there is no significant difference in the number of children ever born for Native American women with respect to the overall sample. The treatment effect becomes statistically significant for American Indian women whose youngest child was born after 1969, i.e. more than four years after the IHS started providing family planning, and it remains constant in subsequent event periods. The lack of significant effects for earlier cohorts (up to 1969) suggests that any potential impact of family planning is minimal. This aligns with existing literature indicating a limited use of contraceptive methods among American Indians due to cultural and gender norms. Doran (1972), for instance, interviewed Navajo women who had delivered at the Gallup Indian Medical Center (GIMC) and found that traditional beliefs — such as the idea that a woman is of no worth to a man unless she can bear him children — were key barriers to contraception adoption. The timing of the observed treatment effect also coincides with the *Jessin v. County of Shasta* ruling in 1969, which recognized sterilization as an acceptable family-planning method, hence providing doctors the legal foundation to perform sterilizations. Quite interestingly, the effect precedes the 1970 Family Planning Services and Population Research Act, which subsidized sterilizations at Medicaid and Indian Health Service, and the information campaign about sterilization, which started around 1973. Point estimates seem to suggest that these two initiatives had little additional effect on fertility.

Kluchin (2020) argues that the civil and reproductive rights movements of the 1950s and 1960s provided *'neo-eugenic'* advocates with new opportunities, leading to a renewed wave of sterilizations among African Americans. For example, Sinderbrand (2005) notes that African Americans accounted for 60 percent of those sterilized in North Carolina during the 1960s. However, by the late 1960s, the total number of sterilizations in the state had declined significantly, with only 290 procedures performed between 1966 and 1968 (State Library of North Carolina, 1968). This equates to roughly 90 annual sterilizations among African Americans in a population of about 1.2 million, a rate unlikely to significantly impact the estimated effects. In Appendix C, we test the effect of sterilization exposure among American Indians compared to either African Americans (Table C3) or Whites (Table C4). For treated American Indian women, the average number of children ever born decreases by approximately 2.7 percent relative to the mean when compared to White women. Additionally, the probability of having more than two children decreases by 13.6 percent relative to the mean. Compared with African Americans, the reduction in the probability of children ever born is not dissimilar, with a decrease of about 2.9 percent relative to the mean.

Figure 4: Forced sterilization - event study



Note: The dependent variable is the number of children ever born. The vertical axis reports changes in the number of children ever born. The horizontal axis reports event periods, where 0 is 1965. Controls include: i) PUMA FE; ii) Individual cohort FE; iii) Youngest child cohort FE; iv) Race; v) Marital status; vi) Citizenship; vii) Birth place; viii)Relation to the head; ix) Urban/rural location. Clustered standard errors at the PUMA level. 95% confidence intervals.

In Table C5 in Appendix C, we test the robustness of the effect using data from the NHIS for the period 1980–1995. Unlike the 1990 US Census, the NHIS provides information only about the number of children currently residing in the household, which is likely to influence both the mean and variance of the fertility distribution. This bias in the distribution of fertility is also likely to be group-specific. For instance, children in extended families are more likely to remain in the household for longer periods, which could lead to an upward bias[13]. The results in Table C5 largely confirm the negative effect of sterilization on fertility. As expected, the estimated effect is larger than the one obtained using data on the total number of children ever born. In Model 1, the total number of children in the household decreases by nearly 9 percent relative to the mean, compared to a 2.6 percent reduction in the total number of children ever born. Similarly, the probability of having more than two children decreases by approximately 25 percent, compared to an 11.2

[13]For example, if white children are more likely to leave the household earlier, the observed change in fertility due to sterilization would be compared to a smaller change in fertility in the untreated group. This difference would result in an upward bias.

percent reduction reported in Table 1.

7 Heterogeneity

This section explores the heterogeneous effects of exposure to coerced sterilization on parity across several dimensions. First, we explore the treatment effect across the 28 tribes in our sample. Second, we investigate whether coerced sterilization was targeted at specific tribes with a preference for larger families. We do so by looking at predetermined birth spacing across tribes, Murdock (1967)'s postpartum sex taboos indicator, and historical fertility by tribe. Third, we explore the role of the eugenic ideology and Malthusian fears in the 1960s, based on a newspaper sentiment analysis.

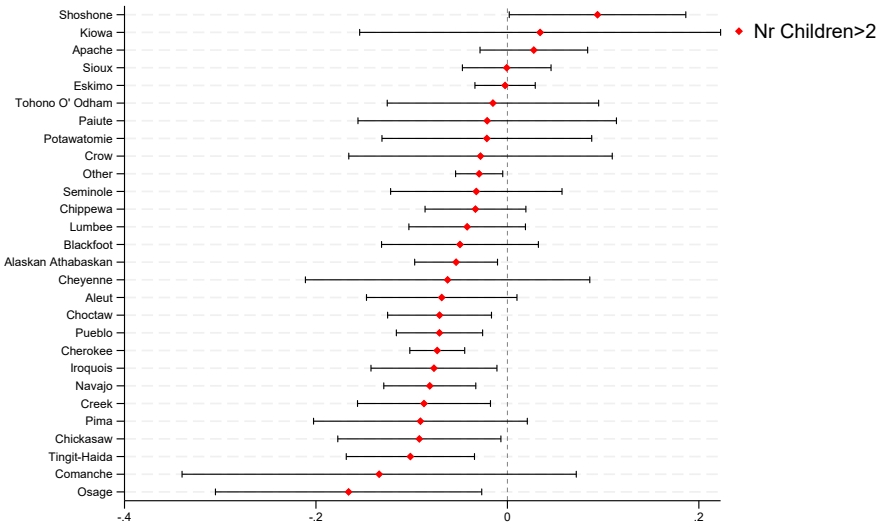
7.1 Heterogeneity by tribe

In Figure 5, we exploit information on tribal affiliation to estimate the impact of sterilization exposure on the probability of having more than two children, differentiating by tribe.[14]. While small sample sizes for some tribes result in large standard errors, several important patterns emerge. The Osage tribe is the most affected, with the probability of having more than two children decreasing by nearly 17 percentage points. For the Comanche and Chickasaw tribes, the reduction ranges from approximately 10 to 15 percentage points. Other tribes, including the Tlingit-Haida, Aleut, Iroquois, Pima, Choctaw, Cherokee, Chippewa, Navajo, and Creek, also experience significant declines. In contrast, the Shoshone tribe is the only group where the probability of having more than two children raises. This increase is likely due to the broader provision of health care by the Indian Health Service (IHS): according to Kunitz (1976), the Shoshone tribe experienced the highest infant mortality in the 1960s. Hence, access to the IHS might have reduced infant mortality among this specific group, eventually leading to an increase in the probability of having more than two children, as shown in Figure 5.[15]

[14]We focus on the probability of having more than two children as this is the measure for which we observe with the largest impact (Table 3)

[15]Figure B2 in Appendix B shows changes in the probability of having more than one, two, and three children across tribes.

Figure 5: Average Treatment Effect by Tribe



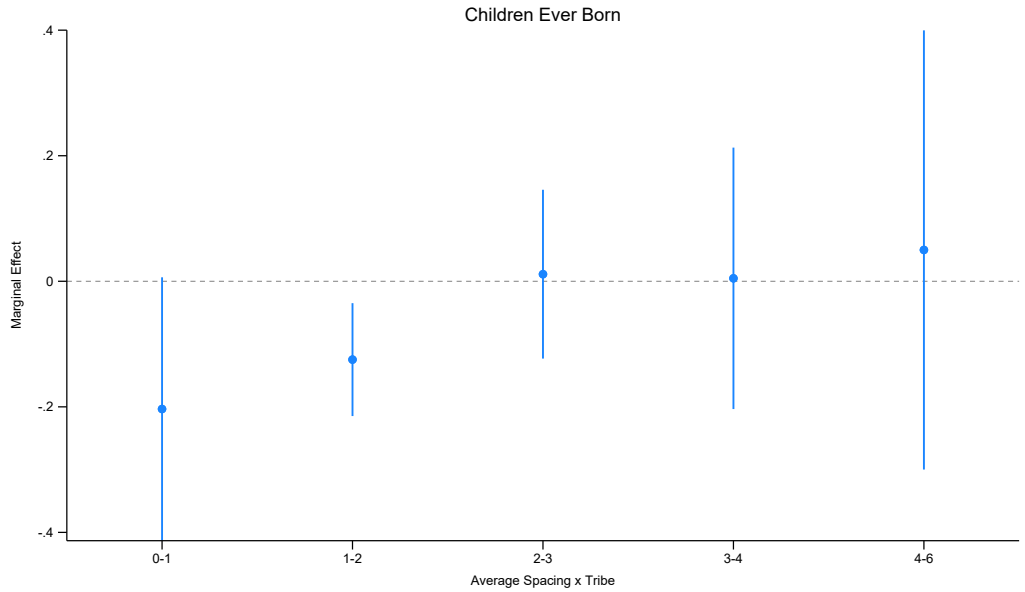
Note: The dependent variable is a dummy for whether the number of children ever born is above two. The horizontal axis reports changes in the probability of having more than two children. Controls include: *i*) PUMA FE; *ii*) Individual cohort FE; *iii*) Youngest child cohort FE; *iv*) Race; *v*) Marital status; *vi*) Citizenship; *vii*) Birth place; *viii*)Relation to the head; *ix*) Urban/rural location. Clustered standard errors at the PUMA level. 95% confidence intervals.

7.2 Heterogeneity by family size preferences

Birth spacing. To gain a better understanding of treatment heterogeneity by tribe, we construct a proxy for traditional fertility preferences at the tribal level, measured as the average birth spacing across tribes for women who were at least 35 years old by 1965, that is, women close to the end of their childbearing years.[16] We expect tribes with a larger expected number of children, i.e. a shorter spacing between births, to be more targeted by coercive sterilization. Figure 6 reports heterogeneous treatment effects by average birth spacing at the tribal level. Tribes with a birth interval shorter than one year tend to have about 0.2 fewer children than the untreated sample, and this effect is significant at the 10 percent level despite large standard errors due to the small number of observations. The change in the number of children for tribes with average spacing between one and two years is approximately

[16] Average birth spacing is measured using the IPUMS 1990 5% U.S. State Sample, described in Section 3. Ideally, such a measure of traditional fertility preferences would be based on women who have completed their fertility. However, there are very few American Native women born before 1920 in the IPUMS 1990 5% U.S. State Sample.

Figure 6: Heterogeneous Effect by Tribe Birth Spacing



Note: The dependent variable is the number of children ever born. The horizontal axis reports the birth-interval by tribe. The vertical axis reports changes in the number of children ever born. Controls include: *i*) PUMA FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Race; *v*) Marital status; *vi*) Citizenship; *vii*) Birth place; *viii*) Relation to the head; *ix*) Urban/rural residency. Clustered standard errors at the PUMA level. 95% confidence intervals.

−0.12 and is statistically significant at the 5 percent level. The treatment effect is not statistically significant for tribes with longer birth intervals. This heterogeneity in the treatment effect is consistent with potential targeting of specific Native American tribes with preference for larger families, in line with Malthusian fears of overpopulation and eugenic beliefs.

Post-Partum Abstinence. We use Murdock (1967)'s ethnographic information on post-partum sex taboos to provide an alternative measure of spacing between births. Although the two measures have different purposes, the relation between the duration of post-partum sex abstinence and birth spacing is mechanical (i.e., the longer the abstinence, the longer the spacing).[17] Figure B4 in the Appendix confirms the results on birth spacing: Native American women in tribes whose postpartum abstinence is less than a month experience a larger parity reduction (at the 10% significance level), while the estimated

[17]Data on post-partum sex taboo in Murdock (1967) are available only for a selected number of tribes (17 out of the 28 tribes).

differential effect for Native American women in tribes that abstain longer is not statistically significant.

7.3 Eugenic beliefs & Malthusian fears

Attitudes towards Native Americans. One of the explanations for coerced sterilization is grounded in the revival of an eugenic ideology in the 1960s. To capture such a channel, we conduct a newspaper sentiment analysis on Native Americans at the beginning of the 1960s[18] and generate a sentiment score on Native Americans at the state level.[19]. We find that a one standard deviation in the negative sentiment about Native Americans within the state almost doubles the estimated effect of potential exposure to coerced sterilization on the number of children (Column 1 in Table 4).[20] Column 2 of Table 4 reports the effect when the sentiment score is measured at the tribe level. Native American women belonging to tribes with a greater negative sentiment score experience a larger reduction in the number of children: a one standard deviation change is associated with a further decrease in the number of children of almost 0.05.

Malthusian Fears. Malthusian fears on overpopulation and its consequences on the welfare state are equally an alternative explanation provided for such a practice. To capture such a channel, we also conduct a newspaper sentiment analysis about population growth at the beginning of the 1960s[21] and generate a measure of negative sentiment about population growth at a state level. Column 3 of Table 4 reports the heterogeneous effect of the treatment depending on concerns about population growth. A one standard deviation in the negative sentiment associated with population growth leads

[18]The analysis is based on newspapers reported in the Chronicling America (chroniclingamerica.loc.gov) between 1960 and 1963. The query search for positive/negative words associated with Native American, American Indian, Indian reservation", Indian affairs, Indian bureau, Bureau of Indian Affairs, Indian tribe, Indian tribes, tribal council, tribal land, reservation Indians, and specific tribes (i.e., Navajo, Cherockee, Sioux, Apache, etc.). Data is aggregated first at the state and then at the tribe level.

[19]A search at a lower geographical level is not possible as *i* the 1990 Census does not report small counties in which individuals could be identified; *ii* the newspaper search does not return results when conducting the analysis at a county level.

[20]Because of the symmetry in the index, a one standard deviation in the positive sentiment about Native Americans almost cancels the estimated effect on the number of children.

[21]We look at words related to population growth, population increase, urban growth, rapid population, population boom, migration growth, city growth, suburban growth, and variation of these.

Table 4: Sentiment analysis

	(1)	(2)	(3)
	Nr Children	Nr Children	Nr Children
Treatment	-0.0864**	-0.0888**	-0.0625*
	(0.0335)	(0.0345)	(0.0321)
Treatment*Neg Sentiment on NA - State	-0.0890**		
	(0.0372)		
Treatment*Neg. Sentiment by NA Tribe		-0.0547*	
		(0.0293)	
Treatment*Negative Pop growth - State			-0.0369***
			(0.0142)
Adj.R-squared	0.264	0.266	0.266
Observation	1,954,955	2,084,973	2,019,181
Treated	6,038	5,939	9,929
Mother Cohort FE	Yes	Yes	Yes
Race FE	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes

Notes: The dependent variable is the number of children ever born. Controls include: *i*) PUMA FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Race; *v*) Marital status; *vi*) Citizenship; *vii*) Birth place; *viii*) Relation to the head; *ix*) Urban/rural location. Sentiment score variables as described in the text (Section 7.3). Clustered standard errors at the PUMA level. *** p<0.01, ** p<0.05, * p<0.1.

to a reduction in the number of children by an additional 0.036. This means that the estimated effect increases by almost 50%, confirming that women in states where population growth was a major concern were more likely to be targeted.

7.4 Historical characteristics

Number of Children in 1930. Given that our analysis relies on retrospective data, it is not possible to assess whether the treatment effects vary according to socio-economic characteristics or pre-treatment conditions. However, the 1930 Census provides information on Native Americans and individuals' tribal affiliations. We collapse the 1930 census data at the state, race, and tribe levels, and then match information from the 1930 census with data from the 1990 census to test differential effects depending on pre-treatment conditions. Column 1 in Table C6 in the Appendix shows the differential effect depending on the number of reported children in 1930 to test whether women in tribes who used to have a larger number of children are likely to experience a larger reduction in the number of children in 1990 (i.e., whether they are more likely to be targeted). Treated women in tribes with a larger number of children in 1930 have a much larger reduction in the number of children in 1930. The differential effect decreases by almost 0.19 for each additional child. For example, the estimated effect for women with one child is about -0.04 and the reduction becomes larger for each additional child.

By Age of Marriage in 1930. Column 2 in Table C6 in the Appendix reports the differential effect by women's age at marriage, which we use as a proxy for age at first birth. The estimated differential effect is both positive and negative, indicating that women in tribes that used to marry at a later age experienced a much smaller reduction in the number of children in 1990. The estimated effect approaches zero for women who, in 1930, married at age 27.5 years.

By Literacy in 1930. Column 3 of Table C6 in the Appendix reports the differential effect by literacy in 1930 (i.e., whether they could read/write in English), which we use as a proxy for the assimilation of Native Americans. The estimated reduction in the number of children in 1990 decreases as the share of individuals who can read/write within the tribe increases, and becomes zero when that share is close to 62

By Residence at Marriage in 1930. Finally, we test whether the estimated effect changes depending on whether the husband is present in the

household in 1930, which we use as a proxy for domestic/family organization (i.e., single female household head). However, the estimated differential effect is not significant (Column 4, Table C6).

8 The Impact on Health and Economic Outcomes

8.1 Health and Labor Market Outcomes

Lawrence (2000) argues that the inability to conceive and bear children had profound emotional and psychological consequences, affecting not only the women themselves but also their families, friends, and the broader Indian community. To evaluate the consequences of coerced sterilization, we use health information from the NHIS and socioeconomic data from the 1990 US Census.

Table 5 reports the estimated effects of sterilization on health outcomes using the same empirical methodology applied to fertility (equation 5). Column 1 examines the probability that individuals self-report poor health. Native American women exposed to forced sterilization are nearly 1.7 percentage points more likely to self-report a health level classified as poor. When compared to the mean, this effect corresponds to an increase of almost 15 percent. In Column 2, the dependent variable is a dummy denoting whether the woman reports any health issue. The change in the probability of reporting health issues for women likely to be exposed to sterilization increases by almost 4.3 percentage points. In Column 3, the probability of having more than one week of bed disability in the past year rises by nearly 2.5 percentage points, or almost 19 percent, when compared to the mean. Lastly, in Column 4, Native American women exposed to forced sterilization are 7 percentage points more likely to report being drunk in the last fourteen days. We use this measure as a proxy for alcoholism, which is usually associated with poor mental health status. All these estimated effects are statistically significant at the 5 percent level except the effect on bed disability, which is significant at a 10 percent level.

Next, we explore the effect of exposure to coerced sterilization on socioeconomic conditions. As discussed in Section 2, the loss of reproductive autonomy disrupted traditional family structures. Column 1 of Table 6 presents the effect of exposure to forced sterilization on the probability of single-headed

Table 5: The effect of sterilization on health status

	(1)	(2)	(3)	(4)
	Poor Health	Health Conditions	Bed Disability	Alcohol Consumption
ATT	0.0172***	0.0419**	0.0252*	0.0716***
	(0.00548)	(0.0187)	(0.0141)	(0.0182)
Adj.R-squared	0.035	0.032	0.011	0.153
Observation	291,497	257,274	290,679	23,435
Treated	1035	899	1030	63
Sample Mean	0.027	0.794	0.134	1.763
Clusters	298	298	298	288
Mother Cohort FE	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes

Notes: The dependent variable is a dummy for whether self-reported health is poor (Column 1), whether the reported number of health conditions is greater than zero (Column 2), a dummy for at least one week of bed disability in the last 12 months (Column 3), and an indicator on whether the individuals has drunk alcohol in the last 2 weeks (Column 4). Controls include: *i*) Region FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Survey year FE; *v*) Marital status; *vi*) Race; *vii*) Relation to the head. Clustered standard errors at a primary sampling unit. *** p<0.01, ** p<0.05, * p<0.1.

households, which we interpret as a measure of family disruption. The probability of a single-headed household increases by nearly 7 percent for Native American women exposed to forced sterilization, compared to the mean. Columns 2 to 5 explore the economic impact of the health outcomes presented in Table 5. Native American women exposed to forced sterilization report a higher probability of work disability[22] increases by approximately 3.2 percentage points, or nearly 37 percent relative to the mean. Deteriorated health outcomes are the likely reason for the observed lower labor force participation (Column 3), which decreases for treated Native American women by more than 2.9 percentage points (equivalent to a 4.4 percent reduction relative to the mean). This reduced labor force participation leads to a decrease in total

[22]Work disability is a binary variable equal to one if the woman reports any work-related disability.

household income (Column 4) of almost $1740, nearly 4 percent. This effect is relatively larger - around 5 percent - when household income is replaced with a measure of individual income (Column 5).

Table 6: The effect of sterilization on socio-economic outcomes

	(1)	(2)	(3)	(4)	(5)
	Single-Headed Household	Disability	LFP	HH Income	Individual Income
ATT	0.015***	0.033***	-0.029***	-1767***	-512.8***
	(0.003)	(0.005)	(0.007)	(382.4)	(165.3)
Adj.R-squared	0.915	0.140	0.164	0.298	0.118
Observation	2,088,643	2,088,643	2,088,595	2,088,643	2,088,595
Treated	7,214	7,214	7,214	7,214	7,214
Sample Mean	0.226	0.087	0.638	43,238.87	9,619.943
Clusters	1,726	1,726	1,726	1,726	1,726
Mother Cohort FE	Yes	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes	Yes

Notes: Dependent variables are: an indicator for single-headed household (Column 1), a dummy for reported work disability (Column 2), labor force participation (Column 3), household income (Column 4) and individual income (Column 5). Controls include: *i*) PUMA FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Race; *v*) Marital status; *vi*) Citizenship; *vii*) Birth place; *viii*) Relation to the head; *ix*) Urban/rural location. Clustered standard errors at the PUMA level. *** p<0.01, ** p<0.05, * p<0.1.

These results confirm the large ramifications for Native American women experiencing such trauma. Family structure was undermined. Health was badly affected. As a result, both labor force participation and income decreased.

8.2 Investment in Children

According to the quantity-quality (Q-Q) trade-off (Becker, 1981), parents are likely to devote more resources to investing in their children when fertility declines. However, the Q-Q framework considers ceteris paribus conditions in which socioeconomic factors remain constant. Consequently, the positive

effect on child investment becomes less certain when family dynamics, health, and economic conditions are adversely affected.

We use data from the 1990 U.S. census to examine the effects of exposure to forced sterilization on investment in children. Census data report information on children living in the household, which could introduce sample selection issues, as these children are likely to have fewer opt-out options. However, given the prevalent family structure among Native American households, we would expect white children to be much more likely to leave the household of origin than American Indian children. Consequently, the mean and variance of the education distribution in the control group may be relatively lower, potentially biasing the estimates toward zero.

Children of women exposed to forced sterilization were likely to be between the ages of 10 and 21 in 1990.[23] Some of these children are likely to have completed their education by 1990, while others may still be enrolled in educational programs. For this reason, the estimated model includes a control for whether the child is still in education. Table 7 reports the estimated impact of Native American mothers' exposure to forced sterilization on the probability of the child completing the 8^{th} degree (Column 1), the 12^{th} degree (Column 2) and any college (Column 3), on the basis of equation 5. In order to account for intergenerational preferences on education, we include additional control variable, namely the employment status and the education level of the household head. Compulsory education in most states is between the ages of 6 and 16[24]. For this reason, the probability of the child completing at least the 8th grade is not statistically significantly affected.[25] However, the probability of completing either the 12th grade or any college significantly decreases by nearly 2.9 and 4.2 percentage points, respectively. These changes in probability amount to a reduction in the likelihood of completing the 12th grade by almost 12.6 percent relative to the mean, and a reduction in the likelihood of completing any college by close to 39 percent for children of Native American women exposed to forced sterilization.

[23]Figure 4 shows that households most likely to be affected by sterilization are those with the youngest child born after 1969.

[24]Compulsory school attendance laws in the U.S. vary by state, with some states requiring attendance to start at age 5, while others impose a minimum drop-out age of 17.

[25]We look at the probability of completing the 8th grade (rather than the 9th grade) for consistency with estimates using data from the NHIS reported in Table **??** in Appendix C, where grades 9, 10, and 11 are grouped together.

Table 7: The effect of sterilization on Education

	(1)	(2)	(3)
	Grade 8	Grade 12	College
ATT	-0.003	-0.026***	-0.043***
	(0.002)	(0.004)	(0.004)
Adj.R-squared	0.883	0.755	0.432
Observation	3,283,888	3,283,888	3,283,888
Treated	13,491	13,491	13,491
Sample Mean	0.582	0.226	0.113
Clusters	1,726	1,726	1,726
Individual Cohort FE	Yes	Yes	Yes
Race FE	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes
Other Control	Yes	Yes	Yes

Notes: The dependent variable is a dummy for whether the highest completed level of education is grade 8 (Column 1), grade 12 (Column 2), or any college (Column 3). The sample in Column 1 is restricted to children above 14; in Column 3 it is restricted to children above 18; in Column 3 it is restricted to children above 23. Controls include: *i*) PUMAs FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Race; *v*) Birthplace; *vi*) Household head marital status; *vii*) Household head citizenship; *viii*) Household head gender; *x*) Household head urban/rural location; *xi*) Household head Duncan Socioeconomic Index; *xii*) Household head highest education Level; *xiii*) Household head labor force participation; *xiv*) Child currently in education indicator. Clustered standard errors at a PUMAs level. *** p<0.01, ** p<0.05, * p<0.1.

To evaluate the robustness of these results, we repeat the same exercise using survey data from the NHIS over the period 1980-1995, which allows us to exploit the annual variation. Looking again at children whose mothers had been exposed to the treatment, we find a similar negative effect on the probability of completing further education. The probability of completing the 8^{th} grade in Table C5 in Appendix C is not significantly affected, nor is the probability of completing the 12^{th} grade. However, there is a significant reduction in the probability of completing any college, amounting to almost 3.5 percentage points, or nearly 32 percent relative to the mean. This effect is not far from the 39 percent reduction in the probability of completing any college estimated using data from the US Census in Table 7.

9 Intergenerational Transmission

The economic evidence on medical negligence shows a long-standing culture of medical distrust (Alsan and Wanamaker, 2018) that can potentially spread to future generations. If children of parents likely exposed to the treatment tend to avoid family planning methods because of their parents' experiences, then one should expect them to have more children compared to a control group that tends to use contraception.

To estimate the intergenerational transmission, we begin with the 2023 Panel Study of Income Dynamics - Social, Health, and Economic Longitudinal File (PSID-SHELF). The PSID-SHELF is a longitudinal study that follows the descendants of households originally sampled in 1968. It reports information about children, which can then be linked back to the family of origin. After linking children to parents, the sample includes 74 treated individuals out of 342 American Indians in the dataset. The relatively small number of treated individuals is likely to compromise representativeness. For this reason, we supplement the estimation results from the PSID-SHELF sample with estimates using the IPUMS 2000 5 percent sample of the US Census. The 2000 U.S. Census sample is particularly useful, as children of Native American women exposed to forced sterilization should be between 20 and 35 years old by 2000 and therefore all of reproductive age. However, the 5 percent US Census limits the analysis to children still living with their parents, which, of course, would again cause sample selection problems. However, the two sources together should provide a clear indication of the potential intergenerational effect of the trauma.

Panel A of Table 8 reports estimates using the PSID-SHELF dataset. The number of children of Native American women exposed to coerced sterilization further drops to 58, once controls are included. We find that fertility for treated Native American offsprings increases by almost 0.5, which, compared to the average number of children in the sample, corresponds to an average increase of nearly 50 percent. The probability of having more than one child (Column 2) increases by almost 15.7 percentage points (nearly 50 percent compared to the mean), and the probability of having more than two children (Column 3) increases by almost 10 percentage points (significant at a 10 percent level). The effect on the probability of having more than three children (Column 4), on the other hand, is not significantly affected by the treatment. However, this loss of significance for the latter reflects the relatively low number of women in the sample (and hence in the treatment group) with more than three children.

Panel B reports estimates using the 5 percent US Census sample and focusing on individuals of age 20 or above. The average number of children in this sample is much smaller (i.e., close to 0.14), reflecting the selection issue in this sample. This sample selection generates an upward bias. However, the estimates confirm the positive impact of parents' trauma on their children's fertility. The estimated number of children in Column 1 drops by almost 82 percent. The probability of having more than one child (Column 2), more than two children (Column 3), and more than three children (Column 4) increases by nearly 3.5, 1.7, and 0.9 percentage points, respectively.

Table 8: Intergenerational Transmission

Panel A				
	(1)	(2)	(3)	(4)
	Nr of Children	Children 1	Children 2	Children 3
ATT	0.517**	0.157**	0.102*	0.0388
	(0.196)	(0.0741)	(0.0581)	(0.0446)
Adj.R-squared	0.255	0.242	0.125	0.067
Observation	20643	20643	20643	20643
Treated	58	58	58	58
Sample Mean	1.045148	.3214649	.1530785	.0618127
Clusters	52.000	52.000	52.000	52.000
Parent Cohort FE	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes	Yes
Other FE	Yes	Yes	Yes	Yes
Panel B				
	(1)	(2)	(3)	(4)
	Nr of Children	Children 1	Children 2	Children 3
ATT	0.0830***	0.0285***	0.00918	0.00646*
	(0.0263)	(0.00915)	(0.00574)	(0.00377)
Adj.R-squared	0.149	0.085	0.038	0.017
Observation	370,516	370,516	370,516	370,516
Treated	1,867	1,867	1,867	1,867
Sample Mean	0.1875	0.0442	0.0129	0.0036
Clusters	2,071	2,071	2,071	2,071
Parent Cohort FE	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes	Yes
Other FE	Yes	Yes	Yes	Yes

Notes: The dependent variable is the number of children ever born (Model 1) and dummies for more than one child in the household (Model 2), more than 2 children in the household (Model 3), and more than 3 children in the household (Model 4).

Panel A reports the impact of sterilization fertility using data from the IPUMS-SHELF. Controls include: *i*) Individual cohort FE for the parent and his/her child; *ii*) Youngest child birth cohort FE; *iii*) State FE for the parent and his/her child; *iv*) Parent's race; *v*) Parent's education; *vi*) Parent's number of children; *vii*) Parent's employment status; *viii*) Parent's salary income and wage; *ix*) Children's gender ; *x*) Children's married; *xi*) Children education level; *xii*) Children's relation to the head; *xiii*) Children's employment status; *iv*) Children's salary income and wage. Clustered standard errors at the state level. *** p<0.01, ** p<0.05, * p<0.1.

Panel B reports estimates using data from the 2000 US Census. Controls include: *i*) Individual Cohort FE for the parent and his/her child; *ii*) Youngest child birth cohort FE; *iii*) PUMA FE; *iv*) Child race; *v*) Child gender; *vi*) Child Duncan socioeconomic index; *vii*) Child education; *viii*) Gender of the household head ; *vii*) Marital status of the head ;*ix*) Number of children of the head; *x*) Duncan socioeconomic index of the head; ; *xi*) Education level of the head; *xii*) An indicator for extended family. Clustered standard errors at the PUMA level. *** p<0.01, ** p<0.05, * p<0.1.

10 Conclusions

The IHS has provided an important healthcare service for American Indians since it was founded in 1955. However, physicians working at IHS facilities often operated under the assumption that Native people were morally, mentally, and socially defective (Lawrence, 2000). This presumption, combined with a government narrative that birth rates should be reduced due to Malthusian fears, led to the mass sterilization of American Indians. Women who went into hospitals for tonsillectomies or appendectomies often came out with tubal ligations or salpingectomies.

Using different data sources, we show that this mass sterilization had a large impact on fertility, which then led to deep social and economic ramifications. Future generations may also have been affected by the creation of a culture of medical mistrust and lower reliance on family planning methods.

These social and economic consequences persist today, with American Indians having some of the highest rates of suicide and alcoholism in the nation (Leavitt et al., 2018). To what extent this trauma explains such poor health outcomes is something that still needs to be better understood.

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Appendix A - Data Description

IPUMS 1990 5% US Census State Sample

The 1990 5% State sample is a 1-in-20 national random sample of the population. The file is hierarchical in structure, meaning that a housing unit record is followed in sequence by records for the individuals in that housing unit. The variable *relate* identifies household members and their relation to the head of the household.

We include the household head, their spouse/partner, and parents (*relate=1, 2, 5, 11*) in the analysis of fertility and economic outcomes. Data on children ever born are reported only for women, i.e., the information on children ever born is reported by the head if she is female or the spouse if the head is male. Parents and partners will also report information on children ever born if they are women and have had children. We exclude household members aged below 15 because they are unlikely to have children, and those aged above 90. In one of the robustness checks we replicate the analysis focusing only on individuals between the ages of 20 and 75.

For the analysis of investment in children, we retain only observations on the household head's children (*relate=3*), excluding children-in-law. We then merge children's characteristics with information about the household head (*relate=1*) using the household identifier (*serial*) to control for parental characteristics. Children for whom information on school attendance is unavailable (i.e., those under 3) are excluded from the sample.

IPUMS NHIS 1980-1995

The National Health Interview Survey collects information on the health, health care access, and health behaviors of the U.S. population. Each record represents an individual, and similar to the U.S. Census, individual records are organized into households. To evaluate health consequences, we restrict the observations to those related to the household head and their spouse (*relate=10, 21, 22*). Furthermore, similar to the analysis conducted using the 1990 U.S. Census sample, we drop individuals under 15 and above 90.

To evaluate investment in children, we follow the same steps as for the U.S. Census 5% sample, which are: *i)* we keep individual characteristics related to the child of the householder (*relate=41*); *ii)* we merge children's characteristics

with information related to the head of the household (*relate=10*) using the household identifier (*serial*) to control for parental characteristics.

PSID-SHELF

The Panel Study of Income Dynamics–Social, Health, and Economic Longitudinal File (PSID-SHELF) provides a harmonized longitudinal dataset for the Panel Study of Income Dynamics (PSID). The dataset covers the period from 1968 to 2019. We use the long version of the file, which provides information for each person over time.

To link children's information to parents, we first reshape the dataset using child identifiers to capture fertility information for each child over time. Since characteristics may change over time and we only need to exploit cross-sectional variation, we compute the mode or maximum value for each variable to obtain the most frequent or maximal value. For example, for variables such as employment status and marital status, we report the mode to reflect the prevalent employment and marital status over the period. For variables like the number of children, education levels, and family size, we take the maximum value to capture the total number of children or the highest educational level, for instance. We then collapse the dataset (at the median value) by child ID to avoid inflating standard errors. This information is subsequently merged with data on the child's parent to obtain a measure of the most recent child born to that parent. Therefore, we have a single observation per child, along with information about that child's parent.

IPUMS 2000 5% US Census Sample

We use the 2000 5% US sample to complement the analysis on the intergenerational transmission of fertility. To obtain a measure of the fertility of children born to given parents, we follow the same procedure used to evaluate investment in children, which is: *i)* we keep observations related to children of the household head (*relate=3*), excluding children in law; *ii)* we then merge children characteristics with information about the household head (*relate=1*) using the household identifier (*serial*). Children below 15 are dropped as below reproductive age. We also drop individuals of age above 90.

Table A1: Summary statistics - 1990 US Census

	Obs.	Mean	SD	Min	Max
Child Ever Born	2,035,797	2.653	1.641	1	12
Nr Children > 1	2,035,797	0.785	0.410	0	1
Nr Children > 2	2,035,797	0.420	0.493	0	1
Nr Children > 3	2,035,797	0.204	0.403	0	1
Spouse not Present	2,035,797	0.226	0.4189	0	1
Disability	2,035,797	0.086	0.281	0	1
Labor Force Participation	2,035,763	0.638	0.481	0	1
Wage and Salary Income	2,035,763	9,568.1	12,689.6	0	197,927
Race	2,035,797	1.505	1.396	1	7
Relation to the Head	2,035,797	1.989	1.396	1	11
Marital Status	2,035,797	1.877	1.579	1	6
Urban/Rural	2,035,797	1.662	0.473	1	2
Citizenship	2,035,797	0.269	0.799	0	3

Table A2: Summary statistics 1990 US Census (5% Sample)

	Obs.	Mean	SD	Min	Max
Grade 8	3,444,513	0.587	0.492	0	1
Grade 12	3,444,513	0.230	0.421	0	1
College	3,444,513	0.114	0.318	0	1
Race	3,444,513	1.577	1.490	1	7
Child - Gender	3,444,513	1.472	0.499	1	2
Head - Gender	3,444,513	1.250	0.433	1	2
Head - Marital Status	3,444,513	1.804	1.498	1	6
Head - Highest Education Level	3,444,513	6.588	2.537	0	11
Head - Duncan Socioeconomic Index	3,444,513	37.156	26.119	0	96
Head - Labor Force Participation	3,444,513	1.850	0.357	0	2
Head - Urban/Rural	3,444,513	1.654	0.476	1	2
Head - Citizenship	3,444,513	0.281	0.813	0	3
Child - School Attendance	3,444,513	1.705	0.456	1	2

Table A3: Summary Statistics NHIS

	Obs.	mean	SD	Min	Max
Gynecological Issues	48075	.0333437	.1795344	0	1
Number of Children	292,430	1.921	1.038	1	9
Nr Children > 1	292,430	0.587	0.492	0	1
Nr Children > 2	292,430	0.225	0.418	0	1
Nr Children > 3	292,430	0.072	0.259	0	1
Poor Health Indicator	291,498	0.027	0.162	0	1
Health conditions	257,277	0.794	1.227	0	16
Bed Disability	290,680	0.134	0.341	0	1
Alcohol consumption	23,446	0.763	0.425	0	1
Race	292,430	1.534	1.976	1	15
Relation to Household Head	292,430	17.656	5.074	10	22
Marital Status	292,430	16.050	10.865	0	99

Table A4: Summary Statistics PSID-SHELF

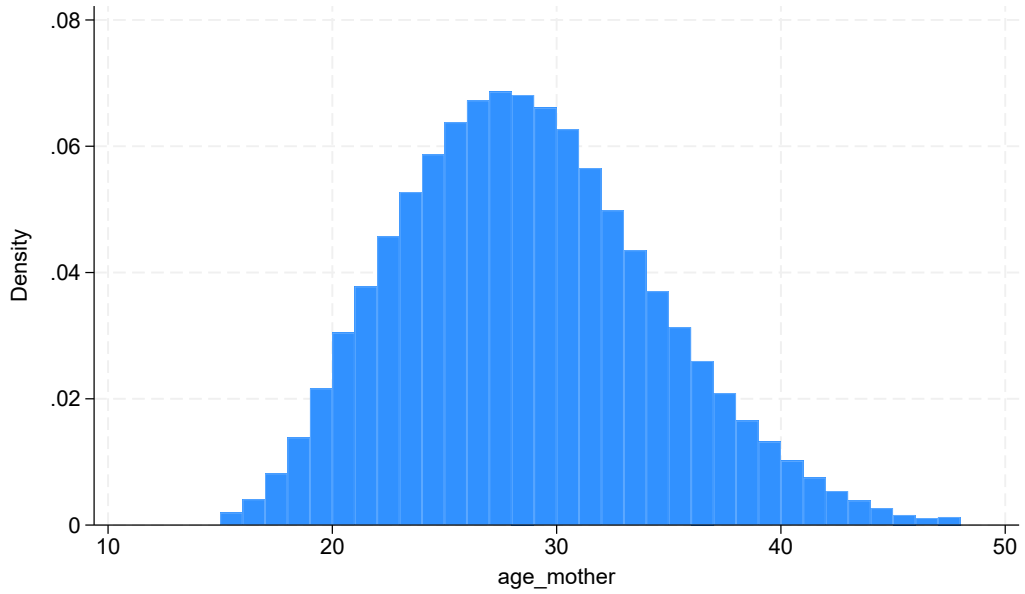
	Obs.	Mean	SD	Min	Max
Nr. of Children	40,488	0.572	1.159	0	16
Children >1	40,488	0.175	0.380	0	1
Children >2	40,488	0.083	0.276	0	1
Children >3	40,488	0.0347	0.180	0	1
Parent - Earning (real $ 2022)	40,352	41,866.54	40,640.4	0	1,185,335
Child - Earning (real $ 2022)	39,913	46,353.64	50,170.7	0	1,567,172
Parent - Race	37,489	3.206	3.742	1	14
Child - Gender	40,488	1.492	0.500	1	2
Child - Married	39,094	0.694	0.461	0	1
Parent - Highest Education Level	40,239	1.650	1.162	0	4
Child - Highest Education Level	22,888	1.501	1.110	0	4
Child - Relation to Ref. Pers	39,411	291.344	67.756	100	490
Parent - Nr of Children	40,488	3.671	2.242	1	20
Parent - Employment Status	40,387	0.673	0.453	0	1
Child - Employment Status	22,779	0.565	0.476	0	1

Table A5: Summary statistics 2000 S Census (5% Sample)

	Obs.	Mean	SD	Min	Max
Nr of Children	1,479,495	.1263634	.4902299	0	9
Children > 1	1,479,495	.0295053	.1692182	0	1
Children > 2	1,479,495	.0095141	.097075	0	1
Children > 3	1,479,495	.0029436	.0541748	0	1
Race	1,479,495	1.949	1.993	1	9
Gender	1,479,495	1.456	0.498	1	2
Head - gender	1,475,177	1.325	0.468	1	2
Head - marital status	1,475,177	2.100	1.653	1	6
Head - nr of chidlren	1,475,177	2.123	1.215	1	9
Duncan Socioeconomic Index	1,479,495	22.586	23.259	0	96
Head - Duncan Soc. Index	1,475,177	34.718	26.430	0	96
Education level	1,479,495	5.283	2.076	0	11
Head - education level	1,475,177	6.474	2.588	0	11
Dummy for extended family	1,479,495	0.081	0.272	0	1

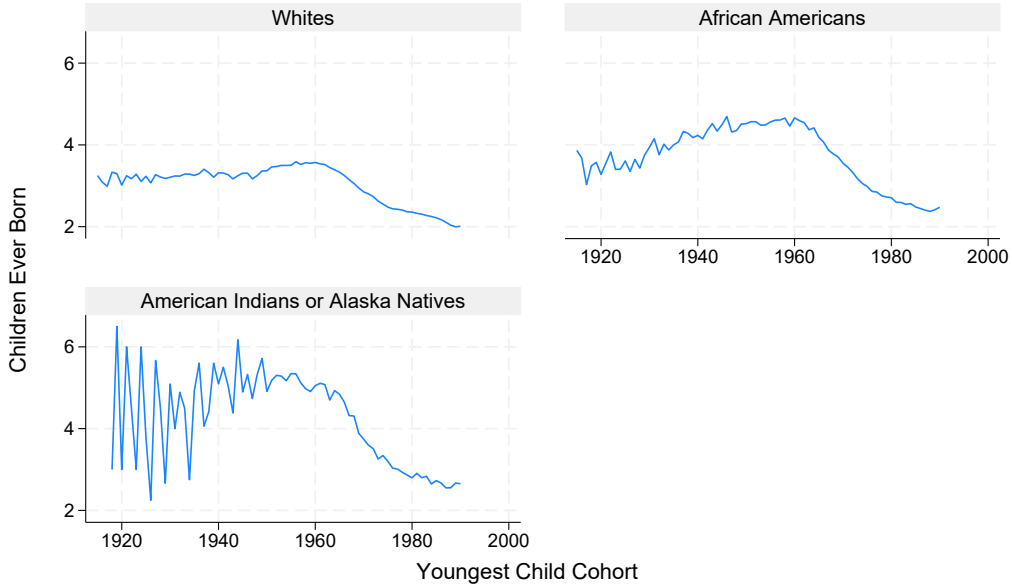
Appendix B - Figures

Figure B1: Distribution of mother's age at last birth



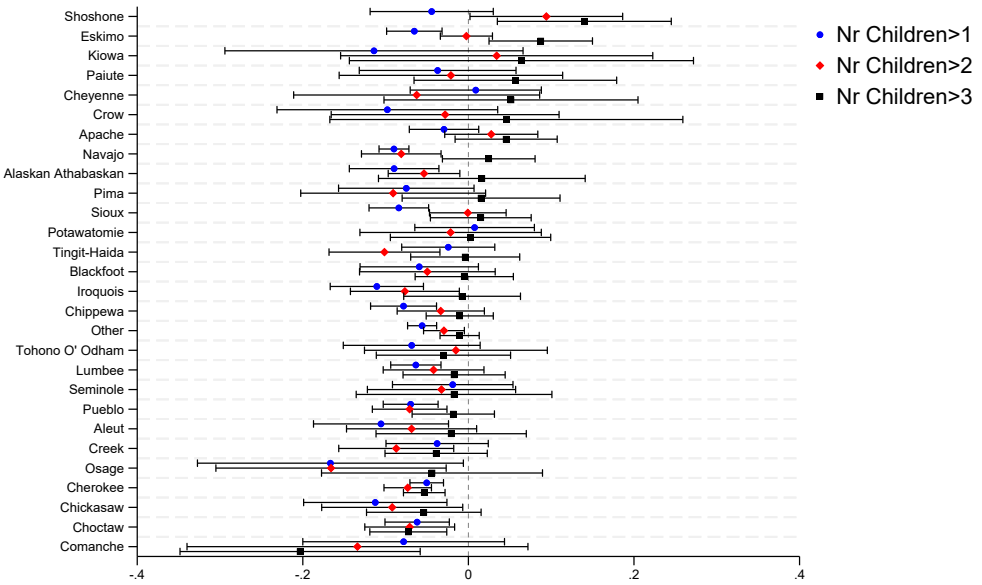
Note: The graph shows the distribution of mothers' age at last birth using the 1990 US Census (5% sample).

Figure B2: Average number of children by race



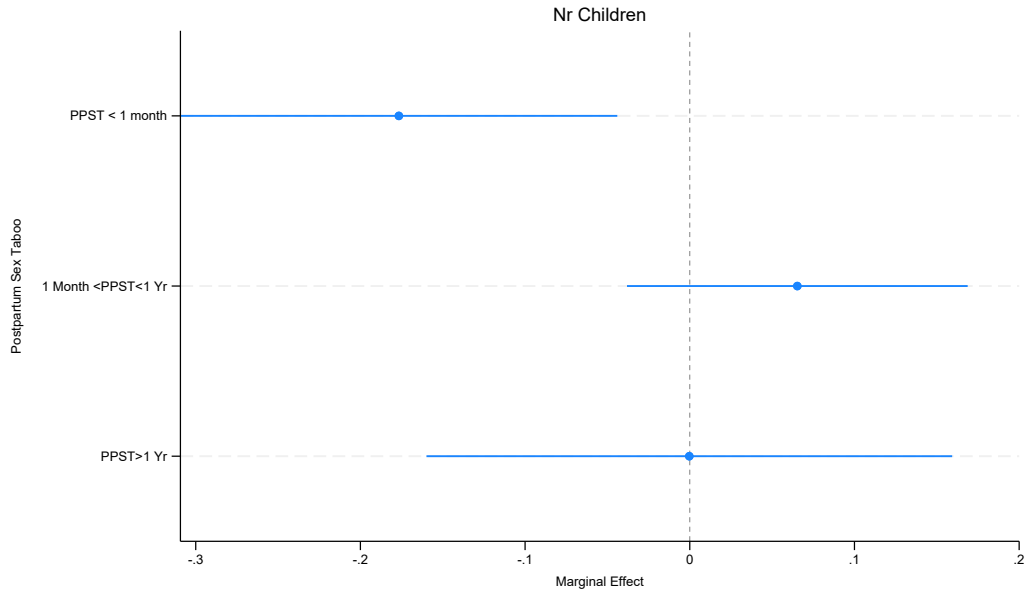
Note: The graph shows the average number of children ever born by race and over the birth year of the last child. The plot reports the number of children for Whites, African Americans, and American Indians. Other races are excluded. The larger variability for earlier cohorts among American Indians is due to the relative small number of observations for those years.

Figure B3: Average Treatment Effect by Tribe



Note: The dependent variable is the number of children ever born. The horizontal axis reports changes in the probability of having more than one, two, or 3 children. Controls include: i) PUMA FE; ii) Individual cohort FE; iii) Youngest child cohort FE; iv) Race; v) Marital status; vi) Citizenship; vii) Birth place; viii) Relation to the head; ix) Urban/rural location. Clustered standard errors at the PUMA level. 95% confidence intervals.

Figure B4: Heterogeneous Effect by Tribe Birth Spacing - Murdock (1967) indicator



Note: The dependent variable is the number of children ever born. The vertical axis reports the birth interval by tribe, using the Murdock (1967) indicator of post-partum intercourse taboo (less than a month, between 1 and 12 months, more than a year). The horizontal axis reports changes in the number of children ever born. Controls include: i) PUMA FE; ii) Mother cohort FE; iii) Youngest child cohort FE; iv) Race; v) Marital status; vi) Citizenship; vii) Birth place; viii) Relation to the head; ix) Urban/rural residency. Clustered standard errors at the PUMA level. 95% confidence intervals.

Appendix C - Tables

Table C1: The effect of sterilization on parity - Women born in 1940-1970

	(1)	(2)	(3)	(4)
	Nr Children	Nr Children>1	Nr Children>2	Nr Children>3
ATT	-0.120***	-0.0717***	-0.0505***	-0.0107
	(0.0279)	(0.00655)	(0.00849)	(0.00825)
Adj.R-squared	0.204	0.108	0.133	0.128
Observations	1,641,663	1,641,663	1,641,663	1,641,663
Treated	5,686	5,686	5,686	5,686
Sample Mean	2.352	0.761	0.355	0.138
Clusters	1,726	1,726	1,726	1,726
Mother Cohort FE	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes

Notes: The dependent variable is the number of children ever born (Model 1) and dummies for more than one child in the household (Model 2), more than 2 children in the household (Model 3), and more than 3 children in the household (Model 4). Controls include: *i*) PUMA FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Race; *v*) Marital status; *vi*) Citizenship; *vii*) Birth place; *viii*) Relation to the head; *ix*) Urban/rural residency. Clustered standard errors at the PUMA level. *** p<0.01, ** p<0.05, * p<0.1.

Table C2: The effect of sterilization on parity - Gardner (2022) estimator

	(1)	(2)	(3)	(4)
	Nr Children	Nr Children>1	Nr Children>2	Nr Children>3
ATT	-0.0791***	-0.0648***	-0.0500***	-0.0139**
	(0.0298)	(0.00588)	(0.00754)	(0.00670)
Adj.R-squared	0.297	0.122	0.189	0.219
Observation	2,035,797	2,035,797	2,035,797	2,035,797
Treated	7,047	7,047	7,047	7,047
Sample Mean	2.653	0.785	0.420	0.204
Clusters	509	509	509	509
Mother Cohort FE	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes	Yes
Other FE	Yes	Yes	Yes	Yes

Notes: The dependent variable is the number of children ever born (Model 1) and dummies for more than one child in the household (Model 2), more than 2 children in the household (Model 3), and more than 3 children in the household (Model 4). Controls include: *i*) PUMA FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Race; *v*) Marital status; *vi*) Citizenship; *vii*) Birth place; *viii*) Relation to the head; *ix*) Urban/rural location. Clustered standard errors at the PUMA level. Estimation method following Gardner (2022). *** p<0.01, ** p<0.05, * p<0.1.

Table C3: The effect of sterilization on parity - Black and Native American mothers

	(1)	(2)	(3)	(4)
	Nr Children	Nr Children>1	Nr Children>2	Nr Children>3
ATT	-0.0878***	0.00671	-0.0244***	-0.0241***
	(0.0313)	(0.00592)	(0.00680)	(0.00688)
Adj.R-squared	0.292	0.096	0.169	0.221
Observation	251,694	251,694	251,694	251,694
Treated	7,213	7,213	7,213	7,213
Sample Mean	3.064	0.773	0.499	0.301
Clusters	1,719	1,719	1,719	1,719
Mother Cohort FE	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes

Notes: The sample is restricted to Black and Native American mothers only. The dependent variable is the number of children ever born (Model 1) and dummies for more than one child in the household (Model 2), more than 2 children in the household (Model 3), and more than 3 children in the household (Model 4). Controls include: *i*) PUMA FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Race; *v*) Marital status; *vi*) Citizenship; *vii*) Birth place; *viii*) Relation to the head; *ix*) Urban/rural location. Clustered standard errors at the PUMA level. *** p<0.01, ** p<0.05, * p<0.1.

Table C4: The effect of sterilization on parity - White and Native American mothers

	(1)	(2)	(3)	(4)
	Nr Children	Nr Children>1	Nr Children>2	Nr Children>3
ATT	-0.0661**	-0.0785***	-0.0535***	-0.0113*
	(0.0316)	(0.00600)	(0.00751)	(0.00660)
Adj.R-squared	0.249	0.116	0.176	0.197
Observation	1,709,559	1,709,559	1,709,559	1,709,559
Treated	7,214	7,214	7,214	7,214
Sample Mean	2.491	0.763	0.391	0.1786
Clusters	1,726	1,726	1,726	1,726
Mother Cohort FE	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes

Notes: The sample is restricted to White and Native American mothers only. The dependent variable is the number of children ever born (Model 1) and dummies for more than one child in the household (Model 2), more than 2 children in the household (Model 3), and more than 3 children in the household (Model 4). Controls include: *i*) PUMA FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Race; *v*) Marital status; *vi*) Citizenship; *vii*) Birth place; *viii*) Relation to the head; *ix*) Urban/rural residency. Clustered standard errors at the PUMA level. *** p<0.01, ** p<0.05, * p<0.1.

Table C5: The Effect of Sterilization on Fertility - NHIS data

	(1)	(2)	(3)	(4)
	Nr Children	Nr Children>1	Nr Children>2	Nr Children>3
ATT	-0.149***	-0.0309*	-0.0567***	-0.0276*
	(0.0475)	(0.0186)	(0.0197)	(0.0160)
Adj.R-squared	0.182	0.174	0.109	0.065
Observation	292,429	292,429	292,429	292,429
Treated	1,037	1,037	1,037	1,037
Sample Mean	21.921	0.587	0.225	0.072
Clusters	298	298	298	298
Mother Cohort FE	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes

Notes: The dependent variable is the number of children in the household (Model 1 and dummies for more than one child in the household (Model 2), more than 2 children in the household (Model 3), and more than 3 children in the household (Model 4). Controls include: *i*) Region FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Survey year FE; *v*) Marital status; *vi*) Race; *vii*) Gender; *viii*) Relation to the head. Clustered standard errors at the primary sampling unit. *** p<0.01, ** p<0.05, * p<0.1.

Table C6: The effect of sterilization on parity - Heterogeneity with pre-conditions

	(1)	(2)	(3)	(4)
	Nr Children	Nr Children	Nr Children	Nr Children
ATT	0.148*	-0.942**	-0.270	-0.133
	(0.0811)	(0.453)	(0.187)	(0.104)
ATT*Nr of Children 1930	-0.190**			
	(0.0822)			
ATT*Age at Marriage 1930		0.0460**		
		(0.0217)		
ATT*Literacy 1930			0.423**	
			(0.214)	
ATT*Spouse Away 1930				0.191
				(0.146)
Adj.R-squared	0.290	0.290	0.291	0.290
Observations	1,939,028	1,909,951	1,938,214	1,924,993
Treated	2,955	2,460	2,955	2,876
Sample Mean	2.628	0.198	2.627	2.627
Clusters	1,726	1,713	1,726	509
Mother Cohort FE	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes	Yes
Other FE	Yes	Yes	Yes	Yes

Notes: The dependent variable is the number of children ever born Controls include: *i*) PUMA FE; *ii*) Mother cohort FE; *iii*) Youngest child cohort FE; *iv*) Race; *v*) Marital status; *vi*) Citizenship; *vii*) Birth place; *viii*) Relation to the head; *ix*) Urban/rural location. Clustered standard errors at the PUMA level. *** p<0.01, ** p<0.05, * p<0.1.

Table C7: The effect of sterilization on Education - NHIS data

	(1)	(2)	(3)
	Grade 8	Grade 12	College
ATT	0.0137	0.00635	-0.0291**
	(0.00954)	(0.0112)	(0.0127)
Adj.R-squared	0.689	0.550	0.255
Observation	389,312	389,312	389,312
Treated	1,599	1,599	1,599
Sample Mean	0.493	0.245	0.106
Clusters	298	298	298
Cohort FE	Yes	Yes	Yes
Race FE	Yes	Yes	Yes
Child Cohort FE	Yes	Yes	Yes
Other FE	Yes	Yes	Yes

Notes: The dependent variable is a dummy for whether the highest completed level of education is grade 8 (Model 1), grade 12 (Model 2), or any college (Model 3). Controls include: *i*) Region FE; *ii*) Individual cohort FE; *iii*) Youngest child cohort FE; *iv*) Survey year FE; *v*) Marital status of the head; *vi*) Gender; *vii*) Gender of the head; ; *viii*) Race; *ix*) Employment status of the head; *x*) Education level of the head. Clustered standard errors at the primary sample unit level. *** p<0.01, ** p<0.05, * p<0.1.