Long-run Intergenerational Impact of Abortion Legalization in the U.S. *

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Abstract: Previous research has shown that the legalization of abortion in the U.S. during 1969-1973 led to significant improvements in the health, educational, and economic outcomes of women directly affected by this policy. In this study, I analyze how children born to these women and exposed in-utero to abortion legalization, fare in life, particularly in terms of lifecycle health. To examine this, I leverage the state-level variation in changes to abortion laws predating *Roe v. Wade* as well as the changes brought about by *Roe v. Wade* and implement difference-in-difference and event study techniques on data from restricted-use administrative microdata on births and deaths in the U.S. I find evidence that the likelihood of cohorts conceived under legal abortion surviving improves throughout the life course, though the magnitude varies depending on age and specification.

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1 Introduction

In 1973, the United States Supreme Court's decision in the *Roe v. Wade* case declared state abortion laws that imposed restrictions unconstitutional and legalized abortion across the United States. Since 1973 several states have pursued increasingly stringent abortion policies (Pabayo et al., 2020), thereby limiting access to what is deemed as essential reproductive healthcare (Fay et al., 2022). As of 2022, more than 1,380 restrictive laws have been enacted at the state level, with almost half of them being passed in the last decade (between 2012 and 2022), curbing access to abortion (Guttmacher-Institute, 2022). In stark contrast, merely 175 laws have been enacted in the last decade by a limited number of states, aimed at protecting access to abortion (Gaj et al., 2021; Nash and Ephross, 2022). Consequentially, the reproductive healthcare landscape has shifted tremendously over the past few decades causing individuals to experience substantial changes in their ability to obtain abortion. Under these circumstances and in light of the Supreme Court ruling on *Dobbs v. Jackson Women's Health Organization* on June 24, 2022, which overturned *Roe v Wade*, it remains important to examine the long-term implications of access to legal abortion.

Looking at the long-term consequences of the shift in the legal status of abortion will help us develop a comprehensive understanding of the value of subsidizing access to safe and legal abortion care and the costs that ensue due to restricting access. This paper takes a historical vantage point and examines the long-term intergenerational impacts of abortion legalization which occurred in the late 1960s and early 1970s. This was the time when individual states began reforming and repealing their long-standing 1800s-era anti-abortion legislation, which was closely followed by the national legalization by the *Roe v. Wade* decision. To examine the long-term link, I measure the life-cycle health outcomes of children conceived under legal abortion, focusing primarily on cohort survival. While previous studies provide evidence of improved socio-economic outcomes at birth (Gruber et al., 1999) and improvements in later-life outcomes such as lower likelihood of adolescent drug use (Charles and Stephens, 2006) and involvement in crime (Donohue and Levitt, 2001), research focusing principally on the life-cycle health of cohorts conceived under the legal regime is scant. The resultant effect of abortion legalization on cohort life-cycle health can take interesting turns, with a culmination of impacts due to compositional change in women commencing pregnancy, giving births, desirability and timing of the pregnancies, and cohort size.

The legalization of abortion in the U.S. during 1969-1973 has been documented to have substantial impacts on the lives of individuals contemporaneously affected by this policy. Access to abortion influenced the fertility and pregnancy rates (Levine et al., 1999; Ananat et al., 2009; Guldi, 2008; Lahey, 2014b), which have been shown to have a downstream effect on maternal health (Tietze, 1975; Clarke and Mühlrad, 2021; Farin et al., 2022), educational attainment (Angrist and Evans, 1996; Jones et al., 2021), labor force participation, finances (Kalist, 2004; Jones et al., 2021), as well as family dynamics and empowerment for individuals making pregnancy decisions under legal abortion (Bitler and Zavodny, 2001; Myers, 2017). Additionally, existing evidence suggests that children born to these women with access to legal abortion were more likely to experience improved living circumstances and socio-economic conditions (Gruber et al., 1999; Ananat et al., 2007, 2009), showed a lower likelihood of suffering infant homicide (Kalist and Molinari, 2006), or to be involved in adolescent drug use and crime (Charles and Stephens, 2006; Donohue and Levitt, 2001). Yet it remains to be investigated if the influences of early-life or *in-utero* exposure to legalized abortion persist in health outcomes over life in terms of improved survival.

To understand the long-term effect of abortion availability, this research capitalizes on the quasi-experimental setting resulting from different states legalizing abortion over the years between 1969 and 1972, before the nationwide legalization through *Roe v. Wade* in 1973. I employ restricted-use Vital Statistics Natality and Mortality data and a difference-in-difference and event study design to analyze whether cohorts exposed to abortion legalization at conception exhibited improved health, measured by survival, relative to unaffected cohorts. The death certificate records contain information on the place of birth and age of the deceased and I use this to determine if individuals were exposed to legal abortion in utero. I incorporate two-way fixed effects (TWFE) specification as well as Interaction-Weighted (IW) estimator from Sun and Abraham (2020) to account for staggered adoption timing, weights, and controls. The availability of administrative data for a longer time-span and the recent developments in the causal inference literature helped me to identify the causal long-term impacts of legal abortion on cohort health, which could potentially vary depending on the timing of the adoption of legal abortion.

The findings suggest that cohorts exposed to legal abortion at conception had improved survival probability, persisting into adulthood. My main analysis uses decade-wise cumulative survival probability for cohorts and finds that having abortion legalized in the state of birth at the time of conception improves survivorship by 0.1 to 0.4 percent. My research findings suggest that the likelihood of cohorts conceived under legal abortion surviving the first decade (ages 0-9)[1] of their lives get markedly better than cohorts born under the pre-legalization era. This implies that the probability of surviving the most vulnerable time of life improves. The health gain during childhood potentially translates to long-term health and findings suggest significant improvement in cohorts' survival in the middle age (ages 45-49). The rationale of a potential long-term existing influence of abortion legalization emanates from the extant evidence on improved socio-economic and health outcomes of women giving birth (Myers, 2017; Lindo and Pineda-Torres, 2021; Jones et al., 2021; Farin et al., 2022), and better life standards of the children during childhood (Gruber et al., 1999; Ananat et al., 2009).

I then investigate whether and to what extent the impact of the legalization of abortion on the life-cycle survivorship of cohorts who were exposed to the legal abortion regime in utero varies depending on gender and race. I observe relatively larger improvements in the white population, among those aged 30-49, and longer-term persistence of health improvements in women. Cause-of-death analysis reveals reduced acute and accidental deaths in the first decade

[1]Age 0 means the first year of life, in infancy, before turning 1. Similarly, age 9 means during the 9th year of life, before turning 10.

which persists later in life, during ages 30-49. Additionally, improved immunity to infectious diseases is observed in terms of reduced mortality caused by infectious diseases. however, not much of an impact is discernible for these cohorts conceived under legal abortion in terms of mortality due to chronic diseases.

The findings highlight that access to legal abortion can have far-reaching implications spreading over generations. Re-emphasizing the far-reaching impacts of legal abortion remains important in light of the recent U.S. Supreme Court ruling in *Dobbs v. Jackson Women's Health Organization*, which potentially led to individuals across the nation encountering significant, abrupt alterations in their ability to obtain reproductive healthcare.

The remainder of the paper is structured as follows: Section 2 describes the existing relevant literature and the research contribution of this paper. Section 3 presents the policy changes legalizing abortion, and discusses the potential channels by which abortion legalization could impact lifetime health outcomes. Section 4 describes the data, and section 5 explains the empirical strategy. Section 6 documents the results, and section 7 discusses the sensitivity analyses and robustness checks, and Section 8 concludes. Section 9 presents the figures and tables.

2 Related Literature

A wide range of theoretical and empirical work has looked into the impact of abortion reforms on abortion rates and found that restrictive abortion laws like public funding restrictions, and parental involvement laws reduce the incidence of abortion (Levine et al., 1996b; New, 2011; Brown et al., 2020). Papers looking into the effect of abortion legalization on pregnancy-related outcomes - Angrist and Evans (1996); Levine and Staiger (2004); Wright and Katz (2006); Guldi (2008) found a decline in fertility rates. There is mixed evidence on whether abortion legalization helps improve the health of cohorts conceived under legal abortion. Miller et al. (1988) found no discernible impact of abortion legalization on neonatal mortality; Bauman and Anderson (1980) found that the 1970s abortion legalization did not have a significant impact on infant mortality, but had a modest effect in reducing fetal deaths. However, Grossman and Jacobowitz (1981) found abortion legalization in the 1960s-70s to be a substantially important determinant of improved infant health. Pabayo et al. (2020) found that restricting access to abortion services increases the risk of infant mortality. A handful of work looks into the effect of abortion legalization on non-health socio-economic outcomes: Donohue and Levitt (2001) attributed significantly lower crime rates to abortion legalization; Ananat et al. (2004) found cohorts born in locations with a higher abortion rate to have improved later life outcomes.

A review of the literature shows that there has been no empirical work that looks into the causal impact of abortion legalization in the late 1960s leading up to nationwide abortion legalization in 1973 (*Roe vs Wade*) on long-run intergenerational health outcomes, and this is where this paper aims to contribute. While research regarding women of child-bearing age continued, attention also turned to the impact of abortion on infants. One issue is the number of infants born or fertility. Levine et al. (1996a) and Klerman (1999) have estimated that cohorts exposed to legalized abortion are about 5% smaller than they would otherwise be. Selection will occur if births are not lowered randomly throughout the population but are tied to important personal characteristics. Grossman and Jacobowitz (1981) were the first to take up the issue of selection when they examined the birth weights and mortality rates of infants exposed to abortion legalization. The researchers' analysis found improvements in both measures, and the authors attributed these to the disproportionate abortion of unintended, higher-risk pregnancies. Gruber et al. (1999) built on this concept and estimated that the marginal child would be 60% more likely to live with only one parent, 45% more likely to live in a household receiving welfare, and 40% more likely to die in infancy, relative to the average child. Lutchen (2011) is an unpublished dissertation that examines the effect of abortion legalization on the adult health of the next generation. Lutchen (2011) measures adult health by mortality rates of the children born to women directly impacted by abortion legalization, particularly when they are aged between 20-30 years.

The findings of this paper add to the work by Gruber et al. (1999); Ananat et al. (2004) with analogous findings, and mirror the findings in Lahey and Wanamaker (2022). Lahey and Wanamaker (2022) analyzes the nineteenth-century abortion restrictive laws using census data, and finds that larger cohorts resulting from lack of accessibility and availability of abortion experience increased mortality at younger ages, mainly driven by infectious diseases. Lahey and Wanamaker (2022) also finds improved health at older ages, and attributes this to increased immunity emanating from experiencing heightened infectious disease waves. The current paper differs from Lahey and Wanamaker (2022) in three aspects - the nature of the policy under consideration, the timeframe of analysis, and the data used. Lahey and Wanamaker (2022) uses the census data, and I use administrative microdata from death and birth certificates, which potentially gives more accurate information on the survival of cohorts. I analyze the impact of abortion legalization in the late twentieth century as opposed to the restrictive abortion laws of the nineteenth century analyzed in Lahey and Wanamaker (2022). Lastly, because of the timing of the policies Lahey and Wanamaker (2022) could observe cohorts born under restrictive abortion laws till their old age, but I can observe cohorts conceived under abortion legalization till their middle age (50s).

Gruber et al. (1999); Ananat et al. (2004) looked into the liberalization of abortion access in the 1960s and 1970s, and based their research design on Levine et al. (1999) and used census data to examine the difference in outcomes for cohorts born in repeal states and non-repeal states. The current research design accounts for the national legalization by *Roe v. Wade* as well, with a more concentrated focus on health outcomes in terms of survival. While Gruber et al. (1999) considers infant mortality separately, and Ananat et al. (2004) considers survival rate per 100,000 reproductive-aged women, they do not uptake a comprehensive analysis on the cohort health like this paper. However, the findings in Gruber et al. (1999); Ananat et al. (2004) help rationalize the findings of current research. Similar research designs were used by Charles and Stephens (2006) who found that adolescents born in repeal states were less likely to use drugs than the rest of their birth cohorts born elsewhere. Using similar terminology and conceptualization of *marginal child*, Kalist and Molinari (2006) provides evidence that increased abortion availability reduced unwanted births and consequentially reduced the expected number of infant homicides. Findings from the current research complement the findings of this group of research which look specifically into the outcomes of children and how abortion legalization affects them.

Maternal health is one important aspect of the link between abortion legalization and the passing of health benefits to the next generation.[2] Farin et al. (2022) examines the improvement of maternal health following abortion legalization and finds that it was particularly important for reducing maternal and abortion-related deaths of non-white women giving birth. Legal abortion reduced non-white maternal mortality by 30-50%, with little impact on overall or white maternal mortality. They also find early state-level legalizations to be crucial and more important than the *Roe v. Wade* decision itself. I discuss similar potential channels through which abortion legalization could potentially impact cohort population health and relevant literature in Section 3.3.

3 Background

3.1 Changes in Abortion Laws in the 1960s and 1970s

Abortion remained a crime in state legal statutes until the 1960s (Mohr, 1979; Merz et al., 1996; Reagan, 1997; Lahey, 2014a).[3] A brief timeline of the changes in abortion laws is presented in Figure 2. Focusing on the period of decriminalization of abortion, Figure 1 shows the geographic distribution of the states changing their anti-abortion regulations in the late 1960s and 1970s. Before the national legalization of abortion by the enactment of *Roe v. Wade* in 1973, states changed their anti-abortion statutes in mainly two different ways – some enacted modest reforms to then-existing restrictive laws (*reform states*), and some states completely invalidated all criminal abortion laws (*repeal states*).[4]

From 1966 to 1972 sixteen states implemented modest reforms that authorized decriminalization of abortion under limited circumstances (Merz et al., 1996; Myers, 2021).[5] Out of these

[2] Verma and Scott (2020) summarizes different studies analyzing the links between maternal mortality, abortion access, and care utilization, highlighting its importance and significant policy implications.

[3] Early common law in the United States considered abortion legal until *quickening*, which is the stage of pregnancy at which the pregnant person feels the movements of the fetus for the first time. However, starting from the early 1800s and by the end of the century an increasing number of states passed laws to severely restrict the practice of abortion (CDC, 1970; Reagan, 1997). Connecticut was the first state to adopt anti-abortion laws in 1821 (Liu, 2008), and by 1868, 36 states had different variations of similarly restrictive laws including anti-poisoning statutes (Krannich, 1980; Law et al., 1989; Rubin, 1994). Eventually, by the start of the 20th century, except for the provision of *therapeutic* abortions, abortion was "essentially illegal" throughout the U.S. (Krannich, 1980; Reagan, 1997).

[4] Table B.1 lists the two groups - repeal and reform states in panels A and B respectively.

[5] For instance, in 1966, Mississippi authorized abortion in cases of pregnancies resulting from rape (Roemer, 1971).

sixteen states, thirteen states adopted abortion reforms along the lines of the Model Penal Code (MPC) which permitted legal abortion only under the following conditions: (i) when conducted by a licensed medical practitioner, (ii) in cases where the pregnant woman's physical or mental health would be significantly compromised by continuing the pregnancy, (iii) when there are severe physical or mental abnormalities in the fetus, or, (iv) in situations where the pregnancy stems from rape or incest (Roemer, 1971; Merz et al., 1996). Additionally, two other states – New Jersey and Vermont are considered as reform states for my analyses. Both of these states had court rulings in 1972 which although invalidated the then-existing statutes which considered abortion as a criminal offense, did not have clear wordings to enact allowances on the provision of legal abortion (Myers, 2017, 2021). The *reform* states are marked in orange color in Figure 1.

Abortion became widely available in five states by 1970 (Levine et al., 1999) - fully legal in California in 1969, and in New York, Washington, Alaska, and Hawaii in 1970.[6] Additionally, the District of Columbia (DC) legalized abortion in 1971 (Myers, 2021). These states made elective abortion legal until the viability of the fetus and established abortion as "*a matter for decision by the woman and her physician*" (Roemer, 1971). The *repeal* or *early legal* states are marked in green color in Figure 1.

In 1973, the United States Supreme Court decision on *Roe v Wade* together with the companion decision of *Doe v Bolton*, declared all restrictive state abortion laws unconstitutional, and thus legalized abortion nationally (in all states). The states marked in blue in Figure 1 did not have any kind of legal changes before *Roe v. Wade* and had abortion legalized only after the *Roe v. Wade* decision in 1973.[7]

3.2 Incidence of Abortion and Abortion Care in the 1960s and 1970s

Figure 2 shows that the number of legal abortions performed in the US increased substantially as a rising number of states decriminalized abortion over 1969-1973. The total number of legal abortions elevated from 22,670 in 1969 to 615,831 in 1973, to 1,300,760 in 1981. The abortion data comes from digitizing CDC Abortion Surveillance Reports (CDC, 1969-1980). CDC started reporting abortion incidence by the state of occurrence in 1969, and the data collection depends on *voluntary* federal-state partnership (Saul, 1998).[8] The data suggests that abortion was quite

[6] California is the only state which had adopted MPC-like abortion reforms (in 1967) authorizing abortion under limited circumstances and then later in 1969 repealed all restrictive anti-abortion statutes to legalize abortion completely (Merz et al., 1996; Myers, 2017, 2021)

[7] These states are addressed as *Roe v. Wade* states. The states are categorized and referred to as *reform*, *repeal* or *Roe v. Wade* depending on their legislative history, the extent and timing of abortion legality, following Myers (2017); Farin et al. (2022).

[8] The data is mostly reported by state health departments, and occasionally by individual hospitals and facilities. Although the reporting areas covered only 10 states in 1969, it soon covered all 50 states and DC by the time the 1973 data was published (CDC, 1979), and the number of states from which statewide abortion data got reported increased from 8 in 1969 to 36 in 1974 (CDC, 1976). Despite the concerns of partial reporting or non-reporting of data by different reporting areas (Krannich, 1980; Saul, 1998; Kortsmit, 2020), this remains the best account of abortion incidence data which is publicly available for the timeframe of analysis. Another source of abortion incidence data comes from the survey of abortion providers conducted by the Alan Guttmacher

prevalent in the years before *Roe v. Wade*, with the number of abortions per reproductive age women occurring in the repeal states being substantially greater than in other states.

Before the introduction of modest reforms in the mid-1960s or the initial legalization of abortion in 1969, there existed "a well-established illegal abortion service with a variety of components" (Potts et al. (1977), p.169). The pre-1960s criminalization of abortion did not completely deter abortion but led to an illegal clandestine system of abortion care that was unsafe and posed severe risks to the overall well-being of individuals seeking abortion (Rubin, 1994; Reagan, 1997).[9] To obtain a legal abortion women had to make arrangements for therapeutic abortion (abortions performed out of medical necessity) in their state of residence, travel across states, or opt for international travel. During the 1950s and 1960s, when abortion availability was severely thwarted and air travel became easier, women traveled abroad to Japan, Mexico, and England for abortions (Rubin, 1994; Reagan, 2019). All of these options came with their own set of challenges and were inaccessible to women from disadvantaged backgrounds, thus deepening the inequality in access to legal abortion.

Therapeutic abortions were administered under a stringent framework, where the agreement of two physicians regarding the medical necessity of the procedure was mandated, alongside hospital review boards overseeing physicians' decisions to perform therapeutic abortions (Law et al., 1989; Rubin, 1994; Reagan, 1997). Women in states where abortion was a criminal offense had to travel across state borders to find safe and legal abortions. Traveling across states within the U.S. or internationally was hinged upon the ability to avail financial resources to cover the costs of transportation, accommodation, and abortion care. Consequently, access to therapeutic abortion or "abortion travel" was predominantly limited to women from higher socioeconomic backgrounds who were better equipped to navigate the complexities of the medical care system. (Gold, 2003; Reagan, 2019; Farin et al., 2022). This also implied that access to safe and legal abortion differed starkly by race. In the pre-1965 period 93-94% of therapeutic abortions were performed on white individuals (Gold et al., 1965; Tietze, 1968).[10]

Abortion care in the U.S. was "overwhelmingly concentrated in large cities on the east and west coasts" (Weinstock et al., 1976) in the pre-1973 period.[11] The landscape of abortion care in the United States began to change when the *Roe v. Wade* ruling was decided in 1973. The service among abortion providers started to expand throughout the US, although mostly concentrated in metropolitan areas (Sullivan et al., 1977).[12] Over time, this led to the sharp

Institute (AGI), which was initiated in 1973. However, this particular data source is not publicly available.

[9]Estimates suggest that only about eight thousand legal abortions occurred annually in the U.S. in the mid-1960s (Westoff and Westoff, 1971; Krannich, 1980). On the contrary, an estimated amount of 300,000 to one million illegal abortions were performed annually in the U.S. in the mid-1960s (Callahan, 1970; Liu, 1977; Krannich, 1980).

[10]Gold et al. (1965) found in an examination of therapeutic abortions conducted in New York City between 1951 and 1962, that out of 4,703 reported abortions, 93% were performed on white individuals. The ratio for whites was more than five times higher than that for non-whites and 26 times higher than that for Puerto Ricans. The trend continued into the mid-1960s, the ratio of legal abortions performed on the white was twice as high as the black ratio Tietze (1968).

[11]These facilities catered to the abortion needs of resident and non-resident (traveling) women. In the first six months of legalizing abortion, 36,000 non-resident women received abortions in New York.

[12]During 1975, around 2,400 non-hospital clinics, public and private hospitals, and private physicians' offices

decrease in out-of-state abortion from 43.8% (in 1972) to 7.4% (in 1980), accompanied by a corresponding increase of in-state abortion (from 56.2% in 1972 to 92.6% in 1980) (CDC, 1983).

Increasing access to legal abortion led to the rapid rise of abortion rates, peaking in the late 1970s to 1990s. The rise of abortion incidence alongside a decline in birth rate led to the national ratio of legal abortions per 1,000 live births increasing from 3.5 in 1969 to 128.5 in 1971 (CDC, 1970; Smith and Bourne, 1973).[13] Once abortion was legalized nationally, there was one legal abortion per four live births in 1974 (CDC, 1976). Simultaneously, illegal abortions were estimated to reduce from 130,000 in 1972 to 17,000 in 1974 (Cates and Rochat, 1976). Furthermore, following the legalization of abortion, there was a gradual reduction in the racial gap in women availing abortion, albeit modestly. Among women undergoing legal abortion, approximately 33% were nonwhite in 1977, a gradual noticeable increase compared to 19% in 1971 (CDC, 1979).

3.3 Potential Channels through which abortion legalization could influence long-term health

How might exposure to legal abortion during early childhood or the gestational year lead to differences in long-term health outcomes? In this section, I present a brief conceptual discussion on the potential channels through which exposure to legal abortion could affect the long-term health of children conceived during that time.

i. Improvement in maternal outcomes:

The impact of access to legal abortion for mothers could potentially have substantial direct and indirect effects on children's health. Maternal health is one important aspect of passing on health benefits to the next generation. Legal abortion contributed to women's overall health and well-being by reducing the incidence of unsafe abortions and the associated health risks (CDC, 1999; Clarke and Mühlrad, 2021; Farin et al., 2022). Clarke and Mühlrad (2021) find that the legalization of abortion in Mexico DF resulted in a sharp drop in maternal morbidity and a slower decline in abortion-related morbidity. Farin et al. (2022) found that abortion legalization was particularly important for reducing maternal and abortion-related deaths of non-white women giving birth. Legal abortion reduced non-white maternal mortality by 30-50%, with little impact on overall or white maternal mortality.[14] This can have positive implications for their ability to participate in education and the workforce, and consequentially help improve the lifetime

provided legal abortions, more than double of that in 1974 (Sullivan et al., 1977)

[13] This was mainly driven by the repeal states. The number of abortions per 1000 live births was around 344 in California, 901 in New York, 160 in Alaska, 261 in Hawaii, and 703 in DC (Smith and Bourne (1973), Table 2).

[14] Hawkins et al. (2020); Jarlenski et al. (2017) found that fiscal and legislative changes reducing women's access to family planning and reproductive health services have contributed to rising maternal mortality rates. Verma and Scott (2020) summarizes different studies analyzing the links between maternal mortality, abortion access, and care utilization, highlighting its importance and significant policy implications. Addante et al. (2021) examining data from 1995 to 2017 found that states with restrictive abortion laws have higher maternal mortality than states that either protect or are neutral towards abortion.

health outcomes of their offspring.

Besides the immediate health effects, legal abortion helped women gain more control over their childbearing decisions, making them more likely to pursue educational and career opportunities, leading to increased human capital investments (Angrist and Evans, 1996; Kalist, 2004; Jones et al., 2021; Abboud, 2023). This substantially improved the earning potentials and actual earnings of women.[15] Legal abortion helped reduce *shotgun* marriages in young women (Myers, 2017), which could potentially improve subsequent family formation aspects such as a higher likelihood of improved spousal matching, and stable marriage, potentially leading to higher household income.

The culmination of all these effects of legal abortion on women has strong implications for the life experience of the children born to these women. These children are more likely to be born in households with higher income and parental investments. Currie and Almond (2011) posits household income (during early childhood) to be one of the strongest determinants of adult health.

ii. Unwanted births are avoided:

The appropriate timing and desirability of a pregnancy depends on several factors, for instance, the educational or career aspirations of the woman, labor market considerations, and the financial situation of both of the birth partners. An unintended birth could force a woman to enter an undesired marriage, stay in an undesired marriage, or face single parenthood. Lack of *wantedness* or desirability of the birth may affect prenatal and childhood investments. These important aspects of early life environment are important for individual well-being throughout the life cycle (Almond and Currie, 2011; Currie and Almond, 2011; Almond et al., 2018).

The increased availability and accessibility to safe and legal abortion care helped in terminating mistimed or unintentional pregnancies and reducing unwanted births. Bitler and Zavodny (2002b) gleans evidence that abortion legalization led to a reduction in the number of unwanted children, by using the rate of adoption of children as a proxy. The lower number of unwanted children led to lower rates of child abuse and neglect, as suggested by the lowered total reported rates of child maltreatment (Bitler and Zavodny, 2002a).[16] Wanted children are treated better (David, 2006) and exhibit improved health at birth (Corman and Grossman, 1985; Gruber et al., 1999).

iii. Family size:

Abortion served as a method of fertility management utilized almost equally by women without children and those with more than one child (CDC (1983), p. v).[17] Legal abortion

[15] Abboud (2023) found that by postponing motherhood by merely one year, young women experienced an 11% increase in hourly wages later in their careers. Jones et al. (2021) provides evidence that access to legal abortion also increased the likelihood of working in a managerial role or professional occupation, increased family income and personal earnings, and lowered the likelihood of living in poverty.

[16] Similarly, Mitrut and Wolff (2011) finds that the lift of the abortion ban in Romania decreased the number of abandoned children.

[17] CDC (1969-1980) abortion surveillance data for reporting states show that among women obtaining abor-

leading to smaller family sizes contributes to each child who is eventually born having more tangible (material) and intangible (parental time) resources. Additionally, as posited by Becker (1993) and discussed in Bailey (2013); Bailey et al. (2019), having a smaller number of children in the household "lowers the *shadow* price of the *quality* of the children" and increases parental investment in each child.

iv. Cohort size:

Smaller cohort size, resulting from reduced fertility after the legalization of abortion, makes more *public* resources available to each child in the birth cohort (Easterlin, 1978). A decreased cohort size has been linked to reduced transmission rates of communicable diseases Cummings et al. (2009); Liu et al. (2014). This is because a smaller number of children implies fewer individuals highly susceptible to diseases, resulting in decreased disease incidence, as well as a decreased number of individuals likely to experience prolonged infection due to lower immunity, thereby reducing contagion (Geard et al., 2015; Lahey and Wanamaker, 2022). Conversely, larger cohorts have been linked to worse health outcomes (Soldo et al., 2006) and also worsened economic outcomes such as decreased educational attainment and worse labor market outcomes (Bound and Turner, 2007).

v. Selection effect:

Selection effect refers to the effect emanating from changes in the composition of women giving birth (Clarke and Mühlrad, 2021), and the composition of pregnancies carried to term and children who are born. For example, an instance of *selection out of parenthood* would be, if after legalization, abortion is availed dominantly by women from lower socio-economic backgrounds and fewer children are born to these women. Furthermore, if riskier pregnancies with more adverse fetal health are terminated, then healthier fetuses who are more likely to have better lifetime health are *selected into birth*. Thus, these selection effects emanating from the *missing* poorest, unhealthiest births potentially lead to improved health and socio-economic outcomes for the *average* children who are born after legal abortion. Selection effects are widely studied in research analyzing the impact of policies affecting fertility decisions e.g. legal abortion (Gruber et al., 1999; Ananat et al., 2004, 2007, 2009)[18]; legal access to pill and family planning programs (Ananat and Hungerman, 2012; Bailey, 2013).

All the potential channels discussed so far, except the last one, can be grouped and addressed as *resource effect*.[19] By allowing women to manage their fertility decisions, plan family size, and by improving maternal health, raising overall human capital investment prospects and labor market outcomes, legal abortion facilitates the births of *wanted* children in households with more resources dedicated towards them. Additionally, being part of smaller families and smaller

tions, 49.2% in 1970, and 58.4% in 1980, did not have any previous live births.

[18] See Section 2 for discussion of the findings.

[19] Bailey et al. (2019) uses the term "resource effect" to address the effect family planning programs have on the economic and living circumstances of children by means of directly raising the income of the parents. I use the term in a slightly broader sense to identify all the channels that make more resources available to children conceived under legal abortion, that could potentially impact their lifetime health.

cohorts ensures more household and public resources for these children. These resource effects have the potential to improve the contemporaneous health of children born during abortion legalization, and greater health in early life may make subsequent investments in child development more productive leading to better lifetime health. Findings in Evrard (1972); Grossman and Jacobowitz (1981); Joyce et al. (1988) suggest that legal abortion was an important factor in the declining rates of perinatal, neonatal, and infant mortality; and Almond and Currie (2011); Currie and Almond (2011); Almond et al. (2018) highlights the compounding effect the early-life environment can have on adult health.

In light of the existing evidence, in-utero or early-life exposure to abortion legalization can be expected to improve lifecycle health outcomes through increases in resources, changes in selection, or a combination of both.

4 Data

4.1 Cumulative Survival Probability

To understand the long-term health impact of legal abortion on cohorts exposed in-utero to abortion legalization I explore the variation in age-specific cohort-level survival and cause-specific mortality. The data for the analyses in this paper have been gleaned mainly from three sources - Vital Statistics Mortality and Natality data and IPUMS USA data (Ruggles et al., 2021).

The count of deaths for a given race or gender by-birth-state-by-birth-year comes from the mortality microdata for 1959-2018 from the National Vital Statistics System (NVSS) of the *National Center for Health Statistics (NCHS) Multiple Cause of Death Files* (NCHS, 2005-2019) for the cohort survival and cause-specific mortality measures. The mortality data for the period 1959 to 2004 is available through the Center for Disease Control and Prevention (CDC) and National Bureau of Economic Research (NBER, 1959-2004). For the 2005-2018 period, I leverage the restricted-use data available upon request from the NCHS. These national records compile data from death certificates issued by each U.S. state, digitized versions are available from 1959 onwards. To get the birth cohort size and race-specific and gender-specific birth counts for each state I use the *Natality Detailed Files*, U.S. Vital Statistics (NVSS, 1959-1968; NCHS, 1968-1980).[20] One limitation of the vital Statistics mortality and natality data is that for some specific years, they are based on partial samples (NCHS, 1969, 1976; Mathews et al., 2005).[21]

[20] NCHS (1968-1980) contains more complete data which allows computation of live births by gender and race for each state. However, NVSS (1959-1968) contains information on state-wise live births by race only but not by sex. Although data on live births by sex for 1959-1967 is available at CDC/NCHS (1939-1964, 1965-1979), these data are not in usable form. So, I use census data on the gender-specific under-age-one population to calculate the sex ratio (Mathews et al., 2005) by state, and then along with total births from NVSS (1959-1968) I obtain a close approximation for live births by gender and race for each state for the years 1959-1967.

[21] Mortality data for 1972 is based on 50 percent sample of death certificates (NCHS, 1976). Relevant to the period of my analysis, 50 percent sample of birth certificates was used for 1951-1954, 1956-1966, and 1968-1971,

The *Multiple Cause-of-Death* Data provides the number of overall deaths for each state by *underlying cause of deaths (ucod)*. For extracting data specifically for cause analysis I use codes for *ucod* for International Classification of Disease (ICD) modules 7, 8, 9, and 10. Since the *ucod* codes are updated with each ICD module, several sources had to be used to identify the exact codes and ICD modules applicable for the period of study, namely, the public use data file documentation NVSS website, Hoyert (2007), WHO (2019) and specific ICD modules.

I use mortality data from 1959 to 2018 to track the long-term health of cohorts conceived between 1959 and 1980. This allows me to observe ten birth-year cohorts in the pre-abortion-legalization period and seven birth-year cohorts after *Roe v. Wade* was enacted. In my data, the oldest cohort exposed to abortion legalization during their gestational periods consists of individuals conceived in California in 1969, who reached the age of 49 in 2018. Therefore, throughout my analysis, I focus on survival and mortality in the first fifty years of life.

The death certificate data include information on the state of birth and age at death of the deceased individuals. I use this information to determine if the deceased person was exposed to legal abortion during their gestational year, which I calculate as (year of birth - age of death -1). An important assumption is that the decedent (essentially their mother) was in the state of birth during the complete gestational period (*in-utero*), i.e., from the conception of pregnancy to completion. Therefore, implying that the decision about the continuance and completion of pregnancy was cognisant of the abortion policy environment of that state at that year. One limitation of the data is that the death certificates do not include information on the state of birth for the period 1964-1978, which I substitute with the state of residence information. This decision should not be very problematic, given that "only 2 to 4 % of the births or deaths in the US occurred in state other than the state of the mother's or decedent's residence" (NCHS (1968), p. 42).

I create the ***cumulative survival probability*** for each period of life using the following steps. The construction of this outcome variable is conceptually similar to that of Lahey and Wanamaker (2022), who use successive census data to find *decadal survival rate*, which captures the " number of people born in a given state and year who survived to the time of the census as a share of the number who were observed in the previous census".[22]

1. For each gestational year y and state s specific cohort g I start with the birth cohort size, N_{gi}, obtained from birth certificate data. i represents the period or interval of life under consideration for the outcome.

2. From the death certificates, I use the age at death of the decedents to identify the period of life they survived up to. I get the number of decedents who were conceived in year y and died in the period or interval of life i under consideration and denote it as D_{gi}. The period of life represents specific age groups considered for the outcome variable, it can

and the sampling rate was reduced from 50 percent to 20 percent for the 1967 natality data (NCHS, 1969; Mathews et al., 2005).

[22] Lahey and Wanamaker (2022) calculates the *decadal survival rate* of each cohort born in state s in year y as S_{dys} = [count in D+1|birth year y; birth state s]/[count in D|birth year y; birth state s]

be the first decade of life (ages 0-9) or the first five years of life (ages 0-4) and continued thereon. For ease of discussion, henceforth, I consider decades as the interval or period of life under consideration.

3. I get the number of individuals who survive at the end of the first decade, denoted as $S_{g1} = N_{g1} - D_{g1}$. Using this, I obtain the survival probability for the first decade, p_{g1}, which is S_{g1}/N_{g1}, this can be thought of as the proportion surviving among those conceived in year y and state s, i.e., those at risk of death in the first decade.

4. The number of individuals at risk of dying at the beginning of the first decade is N_{g1} (birth cohort size), and it is S_{g1} at the beginning of the second decade, $S_{g(i-1)}$ for each subsequent decades. Survival probability at the beginning of the first decade is 1, since everyone in the birth cohort is alive at time 0, $C_{g0} = 1$, and survival probability at the end of the first decade is $C_{g1} = p_{g1} = S_{g1}/N_{g1}$.

5. For the second decade, $i = 2$, the number of individuals conceived in y and state s surviving is, $S_{g2} = S_{g1} - D_{g2}$, and survival probaility in the second decade is $p_{g2} = S_{g2}/S_{g1}$. The cumulative survival probability of cohort g in the second decade, conditional on surviving through the first decade is $C_{g2} = p_{g1} * p_{g2} = C_{g1} * p_{g2}$. In general, $C_{g(i+1)} = C_{gi} * p_{g(i+1)}$ give the cumulative survival probability of cohort g conceived in state s and y for the $(i + 1)$th decade of their lives, conditional on their survival through decade i.

4.2 Measures of Population and State Characteristics

Since my main analysis depends on the differential timing of the legalization of abortion across states for its identifying variation, it is important to control for the onset of relevant policies which may affect reproductive decision-making and confound the estimates obtained. I control for state-level policies that might affect fertility directly or indirectly. I code for the years of legal access to the pill as well as access to the pills by minors following Myers (2021); years of implementation of unilateral divorce laws are taken from Gruber (2004) via Wolfers (2006), and year of enactment of equal pay laws are taken from Myers (2017). Additionally, I control for population demographic characteristics and state characteristics. I derive the proportion of the population within each age and race category, as well as the share of the population by educational attainment from the IPUMS U.S. Census data spanning the years 1950 to 1990 (Ruggles et al., 2021). To generate the variables for my analysis I linearly interpolate the years between the census decades and obtain annual estimates. I also use state-wise data for per-pupil education expenditure from NCES (1959-1980), and for income per capita from Jordan and Grossmann (2020).

4.3 Summary Statistics

Figure 4 summarizes the decade-wise cumulative survival probability for cohorts of children conceived between 1958 and 1980 observed in the death certificates for the years 1959-2018. The cumulative probability of survival changes little for cohorts conceived early 1960s, i.e., cohorts conceived by women who generally did not have access to legal abortion. The probability of survival rose noticeably between 1964 and 1974 gestational year, for cohorts of children who were conceived by women making fertility decisions during the period of rapid successive reforms and repeals of anti-abortion statutes. These trends support the view that the legalization of abortion potentially led to improved lifetime health for children born during that time. The improvement of survivorship is most prominent for cohorts conceived between 1968 and 1973. For these cohorts, the cumulative probability of surviving through the fifth decade of life shows a sharp increase. There is a gradual improvement in the likelihood of surviving through the first three decades of life for the latter-conceived cohorts.[23]

Table 1 presents the summary statistics for outcome variables measuring cumulative survival probability for each decade for each subgroup, and control variables for population and state characteristics by groups of states with different legal statuses of abortion policies. Following Farin et al. (2022), here the states are categorized into three groups: those that enacted early legalization of abortion (referred to as "early-legal" states), those that underwent abortion reforms ("reform states"), and states solely governed by the *Roe v. Wade* decision. The unweighted pre- and post- mean of all the variables used for the main analyses is separated by these categories and presented in Table 1 for easy comparison of state-level characteristics and outcomes. The state population and the share of high-school educated population are the highest for the *early-legal* states.

5 Empirical Strategy

5.1 Difference-in-Differences

To understand if abortion legalization has an impact on the lifetime health of the cohort c, conceived in state s and year y I estimate a series of difference-in-difference regressions in the form of the following equation:

$$ln[\mathrm{C}_{syi}] = \alpha + \beta \text{Legal Abortion}_{st} + \mathbf{X}'_{sy}\gamma + \lambda_y + \delta_s + \epsilon_{syi} \quad (1)$$

Here, the dependent variable, log of C_{syi}, is the cumulative survival probability of each state-year-of-conception specific cohort (sy) for each specific period or interval of life considered, i. For the main analyses, I consider decades for the interval, so $i = 1, 2, .., 5$, for the five decades considered. In other words, cumulative survival in the first decade of life will measure the survivorship of the cohort through the first ten years of their life, when they are aged 0-9.[24] $LegalAbortion_{st}$ denotes legalization of abortion in state s and time t. $LegalAbortion_{st}$ captures the *grouped* post-period reflecting if the year of conception of the cohort is after

[23] Appendix Figure A.1 shows the decade-wise mortality rate for cohorts conceived between 1958 and 1980.

[24] In some supplementary analyses, I use cumulative survival probability for a smaller interval, e.g., five years, where $i = 1, 2, ..10$.

abortion legalization in their state of birth, i.e., $y \geq t$. I consider *state of conception* information equivalent to the information on *state of birth* for all of the presented analyses.

$\mathbf{X}_{sy}$ is the set of state-specific time-varying control variables for relevant policies and demographic characteristics. $\mathbf{X}_{sy}$ include policies concurrent to legal abortion which could impact fertility decisions: (i) pre-1973 abortion reforms which made legal abortion permissible under limited circumstances, these reforms were fundamentally different than the *full* legalization of abortion[25] (ii) general access to the pill and minors' access to the pill (Bailey, 2006, 2010; Ananat and Hungerman, 2012; Bailey et al., 2012) (iii) unilateral divorce, could affect family dissolutions (Gruber, 2004; Wolfers, 2006) (iv) equal pay laws, potentially impacting women's income and labor supply. The set of demographic controls in $\mathbf{X}_{sy}$ includes the share of white reproductive-age (ages 15-44) females, the share of reproductive aged females who are non-white, the share of high school graduates, log of per capita income, and the log of per pupil spending.

δ_s is the state fixed effect accounting for time-invariant state characteristics. λ_k captures the year fixed effects. These fixed effects respectively control for unobservable differences that exist across states or take place over time. The regressions are weighted by the number of people in respective age-group-state-year cells. For example, for regressions with dependent variable as *cumulative survival probability in each decade of life*, it will be the size of the *population at risk of dying at the beginning of a decade.* Thus, for the first decade of life, ages 0-9, the regression is weighted with the state-year-specific total number of births (birth cohort size). For the following decade's (ages 10-19) outcomes, the weight equals the number of cohort individuals who remained alive at the end of the first decade (or at the beginning of the second decade). ϵ_{syi} is the regression error. For each regression, the standard errors are clustered by the state of birth.

5.2 Event Study Models

Besides the difference-in-difference estimation, I use an event-study design to analyze the impact of legal abortion on cohort lifetime health. The event study design helps (i) to check if there is any pre-existing trend in age-group-specific cohort survival leading up to the legalization of abortion, and (ii) to track how the treatment effect varies and how the outcome evolves over the post-period when abortion is legal. I estimate the following equation:

$$ln[\mathrm{C}_{syi}] = \alpha + \sum_{m=-6, m\neq -1}^{5} \beta_m \text{ Legal Abortion}_{sm} + \mathbf{X}'_{sy}\gamma + \lambda_y + \delta_s + \epsilon_{syi} \tag{2}$$

[25] As discussed in Section 3 and Myers (2017); Farin et al. (2022), the permissibility and availability of legal abortion was significantly different under the *full* legalization of abortion and the modest (MPC-like) abortion reforms that were in place pre-1973. Therefore, following Myers (2017); Farin et al. (2022), I control for abortion reforms that authorize legal abortion only under limited circumstances and consider *full* legalization of abortion as treatment. *Full* abortion legalization was brought about by states repealing abortion laws in the pre-1973 period and then nationally by *Roe v. Wade* in 1973. As a supplementary exercise, I test the impact of passing *any abortion reform* (no distinction made based on the extent of abortion legality) in Section 7.

All the elements in equation 2 are the same as those in equation 1, except for the set of indicator variables $LegalAbortion_{sm}$ which measures the passage of legal abortion in state s during period $m = 0$. Here, $m = y - t$, t is the year of legalization of abortion and y is the year of conception.[26] The periods $m = -6, -5, ..., -2$ consider the years leading up to the legalization of abortion. The post-treatment dummy variables, $LegalAbortion_{sm}$, for periods $m = 0, 1, 2, .., 5$ captures the *treatment* effect of abortion legalization. To avoid collinearity, the periods before $m = -6$ and after $m = 5$ are binned with the left and right endpoints respectively (Borusyak et al., 2021; Schmidheiny and Siegloch, 2023). Binning at the endpoints *somewhat* addresses the issue that in the current research setting, there is no *never-treated* group since abortion was legalized in all states in 1973 (Farin et al., 2022). Another strategy to address the lack of a *clear* comparison group and prevent collinearity, would be to omit two pre-periods (Borusyak et al., 2021; Schmidheiny and Siegloch, 2023). However, following Farin et al. (2022), I opt for binning, as opposed to excluding two pre-treatment periods, because this captures the effect of legal abortion extrapolated from the secular linear trend in age-group-specific cumulative survival probabilities over the study period (Schmidheiny and Siegloch, 2023).

5.3 Potentials Challenges to the Validity of the Empirical Design

The aforementioned DID and event-study specifications analyze the impact of complete legalization of abortion, as evidenced by select states repealing anti-abortion laws before 1973 and by the nationwide legalization enacted by *Roe v. Wade* in 1973, on cohort lifetime health. Utilizing canonical two-way fixed effects (TWFE) specification in such a research context, which involves staggered policy adoption timing (treatment) and potential variation in treatment effects across states or over time, is prone to generating biased estimates (Baker et al., 2022). Recent advances in econometric theory (Borusyak et al., 2021; Sun and Abraham, 2020; Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021) provide evidence that TWFE estimators can make improper comparisons between treated groups and produce estimates outside of the bounds of the true treatment effect (Farin et al., 2022). For instance, for units treated at two different times, using the later-treated group as a control before its treatment begins and then the earlier-treated group as a control after its treatment begins (Goodman-Bacon, 2021).

To address these concerns related to the canonical TWFE, I use the Interaction-Weighted (IW) estimator from Sun and Abraham (2020) as an alternative estimator. As exhibited in Farin et al. (2022), the IW estimator can easily incorporate the covariates and population weights necessary to study the impact of abortion legalization.[27] To implement the IW estimator, I consider the *Roe v. Wade* states as the comparison group and estimate the equation 2. The *Roe v. Wade* states are the states that legalized abortion only after the *Roe v. Wade* ruling in

[26] $\mathbf{X}_{st}$ contains the state-level fertility and family policy controls and demographic variables. The fixed effects for year of conception and state of birth, λ_y and δ_s control for the various unobservable differences across regions or changes that occur over time. The regressions are weighted by the number of people in respective age-group-state-year cells. In all of the regression for each age-group, I cluster the standard errors by state of birth, because sequential observations from the same state are not independent.

[27] Moreover, Sun and Abraham (2020) has been shown to perform similarly to the Callaway and Sant'Anna (2021) estimator (Baker et al., 2022).

1973 and did not have any reform decriminalizing abortion before 1973. Here, I keep the event study fully saturated (i.e. no binning at any endpoint), since the last-treated group, the *Roe v. Wade* states serves as a control group for the the IW estimation.

5.4 Cause of death analysis

The analysis of causes of death will shed light on the findings from this study on how legalized abortion affects cohort survival. The cause of death analysis involves estimating equation 1 for each decade of life, with cause-specific mortality rates as the outcome variable. I consider three broad groups of causes, namely, infectious diseases, chronic diseases, and acute diseases (following Lahey and Wanamaker (2022)). The causes included in each of these categories and the ICD codes used to accumulate the death counts for the period of analysis are presented in Appendix Table B.5. The death counts for the first five decades of life (ages 0-49) for the cohorts conceived between 1959 and 1980 are calculated using the death certificate data for the years 1959-2018. I take the inverse hyperbolic sine of the mortality rates. The inverse hyperbolic sine function approximates the natural logarithm of mortality while preserving zero observations (Bellemare and Wichman, 2020). Its advantage lies in its ability to accommodate zero values, making it a preferable alternative to more simplistic methods such as adding a constant to the natural logarithm of mortality (Bellemare and Wichman, 2020). Moreover, Farin et al. (2022) shows that the inverse hyperbolic sine function provides estimates that closely resemble the alternatives like the natural logarithm of mortality plus one or simply the natural logarithm itself. The outcomes used in these analyses measure cause-specific deaths per 100,000 reproductive-aged females (i.e. females aged between 15 and 44).

6 Main Findings

To investigate the impact of being conceived under legal abortion on lifetime survival, I visualize the coefficients of the difference-in-difference estimations in Figure 4. Panel (a) shows the results for the outcome of decade-wise cumulative survival probability and plots the coefficients for separate regressions for each decade of the cohorts' lifespan. Panel (b) in Figure 4 shows the difference-in-difference estimates focusing on cumulative survival probabilities within smaller age intervals, specifically, five-year age groups. The circles symbolize estimates from regressions with no controls and the squares symbolize estimates where I include the state-specific time-varying policy variables and demographic variables.

The findings reveal that legalizing abortion in the birth state during the conception year boosts survival rates in the initial decade of life (ages 0 to 9), by 0.06 percent, translating to a 3.18 percent rise over the pre-legalization average of cumulative survival probability. While health gains persist into later decades, these estimates lack statistical significance. However, when examining smaller age brackets, a noteworthy increase in survival emerges for ages 45 to 49, with legal abortion linked to a significant rise in later adult life. Cohorts conceived and born under legal abortion experience a 0.16 percent increase in survival during their later years, equating to a 2.92 percent increase over the pre-legalization survival rate. These enhancements in later-life survival are conditional on survival through the earlier stages of life, highlighting a more pronounced impact on later-life stages.

I visualize the impact of legal abortion on cohort survival probability in an event-study design in Figure 6. Each graph is for each decade of cohorts' lifespan and plots the coefficients obtained using both a canonical two-way fixed effects estimation and interaction-weighted estimator from Sun and Abraham (2020). The IW specification compares cohorts treated early in early-legalization states against those in states treated through the enactment of *Roe v. Wade*. To ensure valid comparisons and avoid improper assessments between newly treated and already-treated groups, the IW specification considers exclusively the effect leading up to and including 1973, the year of *Roe v. Wade*. Figure 6, alongside the subsequent event study plots in Figures 7, 8, 9, and 10, displays coefficients within the primary event window. However, it is worth noting that as discussed in the empirical strategy section (Section 5), the TWFE estimation incorporates binned endpoints and the IW estimation is fully saturated.

The event-study estimates in Figure 6 show that legal abortion improves early-life mortality (in decade 1) and mid-life survival (decades 4 and 5, aged 30 to 49). Overall, the IW estimates show a clear improvement in survival than the TWFE estimates. The improvement in survival for cohorts exposed to legal abortion during the gestational year is most prominent for later life, in decade 5, with the coefficients consistently significant at the 5% level beginning one year after the legalization of abortion. For the improvements in earlier decades, (decades 1, 3, 4) the coefficients are significant for later-conceived cohorts (two or three years after legalization), but stay statistically significant until the last period. No noticeable decline is seen for survival in the second decade, as per the TWFE estimates. The TWFE estimates from the specification without any control fail to show any noticeable improvement in survival. The estimates for all decades show a relatively flat pre-period, with the exception of the TWFE estimates for decade 5.[28]

The observed survival increase (health gain) during the initial decade of life aligns with existing evidence that indicates a strong association between abortion accessibility (typically measured by the number of abortion providers) and significant improvements in infant health outcomes, such as reduced instances of low birth weight, infant mortality, and neonatal mortality (Evrard, 1972; Grossman and Jacobowitz, 1981; Joyce, 1987; Gruber et al., 1999). The magnitude of the observed enhancement in survival mirrors the findings of Gruber et al. (1999), who documented a modest decrease in infant mortality by 0.05 percent after the legalization of abortion in repeal states. The present findings suggest improvement in survival rates in the first decade of life, ranging from 0.1 to 0.2 percent.

Overall, the results suggest that abortion legalization increased survivorship early in life, and subsequently, the gains in health experienced in early life help contribute to better health in

[28] This might be capturing the later-life health benefits of cohorts born just before abortion legalization due to smaller family size (Bailey, 2013).

the long term, in the late 40s. This adds to the evidence of persistence of health gains (Bleakley, 2007; Baird et al., 2016; Hoehn-Velasco, 2021) or loss (Currie and Almond, 2011; Almond and Currie, 2011; Almond et al., 2018) from early life to later life. Moreover, the smaller cohort size due to abortion legalization, as exhibited by the evidence on reduced birth rates (Levine et al., 1999; Gruber et al., 1999; Guldi, 2008), and subsequent better disease environment and resource availability (Easterlin, 1978) help explain the improvement of early and later life health. This discussion also aligns with the "scarring effect", and suggests the reduction of this effect due to improved childhood health. The elevated "wantedness" of children who are conceived and born under legal abortion (Bitler and Zavodny, 2002a,b) can have childhood health improvement due to improved parental investment. These gains in health during the early years of life may translate to enhanced survival and improved health in later life.[29]

6.1 Heterogeneity in effects by gender and race

Having abortion legalized in the state of birth during the gestational year increases survival in the first decade of life for female children, and no significant gain for male children (figure 5). The increment becomes more prominent for survival into the fifth decade of life for women in their 40s. However, having been conceived and born under legal abortion does not have any significant differential impact on the lifetime survival of men. Panel (a) and (b) in Figure 5 show that the estimates differ to a great extent for female and male children conceived under legal abortion, both in terms of statistical significance and magnitude, all the effect is seen in the female population.

The gender-specific findings, although analyzing change in abortion laws in the opposite direction, are in contrast with the findings in Lahey and Wanamaker (2022). The contrast lies in the gender-subgroup of the population exhibiting the change in the laws and also the direction of change in outcome. Findings in Lahey and Wanamaker (2022) show prominent effects of restrictive abortion laws on both men and women, but more prominently for men, whereas the findings in this paper show more prominent findings for women. The increase in survivorship due to the legalization of abortion in the first decade mirrors the decrease in survivorship due to the criminalization of abortion studied in Lahey and Wanamaker (2022). However, Lahey and Wanamaker (2022)'s findings for men show a continued decrease in survivorship caused by abortion restrictions well into their 40s, conversely no such prolonged effect for women.

The event-study plots show dynamic treatment effect over the post-period after legalization in Figure 7 for women only, Figure 8 for men only, Figure 9 for nonwhite population, and Figure 10 for the white population. Figure 7 shows significant improvements in the survival of women over their lifetime, starting from the cohorts conceived one year of legalization, and no strong evidence of any pre-existing trend. On the contrary, Figure 8 exhibits a significant effect of being exposed to legal abortion during the gestational year only under the IW specification

[29] There is a plethora of evidence of early-life health distress translating to adverse later-life health status, for example, Barker (1990); McEniry (2013); Bozzoli et al. (2009).

where early-legalized states are being compared against *Roe v. Wade* states, but no discernible effect in the TWFE estimates.

The results in Panel (c) and (d) in Figure 5 indicate that legal abortion during the year of conception increases survival in the first decade of life for children born to white women. Having survived the first four decades of life, the survival of the white population improves further in the fifth decade of life. On the contrary, no significant effect on survivorship is observed for nonwhite children, and in terms of magnitude, the effect on health seems to deteriorating for the nonwhite population, however, the estimates are not statistically significant from zero. Existing literature (Joyce et al., 1997; Angrist and Evans, 1996; Farin et al., 2022) suggests that abortion legalization was substantially more significant in improving the health and economic outcomes of nonwhite women. In line with this evidence, cohort survival of nonwhite populations would be hypothesized to be impacted more than their white counterparts. However, as seen in Panel c and d of Figure 5, the nonwhite population does not experience a significantly greater impact of legal abortion. In line with these findings, the event study graphs in Figure 9 show that there is no discernible effect seen for the nonwhite population under any specification. Figure 10 shows markedly improved survival outcomes for cohorts conceived under legal abortion.

6.2 Evidence from Cause of Death Analysis

The effects of exposure to legal abortion on cause-specific mortality rates are shown in Figure 11 for the whole population, and Tables B.2, B.4, and B.3 for the race-specific and gender-specific subgroups of populations. The specific causes included in the categories infectious, acute, and chronic, are listed in Appendix Table B.5. The circles and squares in Figure 11 represent point estimates for a coefficient on the presence of legal abortion in the state of birth and year of conception in specifications without and with controls, respectively.

The mortality rate for infectious diseases reduced significantly for decades 2 to 5 (between the ages 10-49) of the lives of the cohorts exposed to legal abortion (Panel a, Figure 11). This implies that cohorts who were conceived under legal abortion were significantly less susceptible to infectious disease during later life or had better immunity than their counterparts. However, no significant effect is discernible for infectious mortality rate for younger ages (first decade, ages 0-9), as the smaller cohort size hypothesis and subsequent better disease would suggest. In other words, later-life immunity due to increased disease burden at younger ages via the *scarring effect* channel is not observed for these cohorts. Instead, what is observed is that despite being part of smaller cohorts and supposedly being exposed to disease environments to a lesser extent, the cohorts conceived under legal abortion exhibit better immunity at later stages of life. The overall pattern for race and gender-specific subgroups is similar, with the reduction in infectious mortality most prominent in the later decades of life (ages 30-49). However, the gain in health in terms of reduced infectious mortality is not persistent for men (Panel D, Table B.2). The effect of being exposed to legal abortion is most noticeable for the nonwhite-only and female-only populations respectively.

Considerable improvement in childhood health outcomes is observed from the reduction in chronic and acute mortality rates for the first decade (ages 0-9) of life (Panel b and c, Figure 11). Mortality rates are reduced to a greater extent for acute and accident causes (Panel b). This, also accompanied by the most prominent reduction in acute mortality for men in their 40s (Panel D, Table B.3), implies potentially lower incidence of risky behavior in adults (and thus the improvement in survival in decades 4 and 5, seen in Panel b, Figure 11). Additionally, the direct effect of *wantedness* and a healthier childhood environment can be linked to the reduction in mortality during the first decade of life.

The effects for later life chronic mortality are not very clear (for decades 2 to 5), and this implies that the health gains during childhood did not translate to improvement in internal health conditions, worsening of which may lead to chronic conditions like cancer, diabetes, etc. In the subgroup-level analysis in Table B.4, after controlling for state-level policy and demographic variables, the only prominent effect to the extent of a 4.5 percent reduction in chronic mortality in decade 5 of life is observed for women only.

7 Robustness Checks

In this section, I conduct several checks to assess the robustness of the main findings across various model specifications and treatment variable definitions. These robustness checks are necessary to account for different factors that determined access to legal abortion before *Roe v. Wade* , for example, travel to repeal states, abortion reforms which authorized abortion under specific circumstances, etc. Furthermore, the legalization of abortion in the US coincided with numerous concurrent policies that could impact fertility and family planning choices, potentially influencing overall cohort health outcomes.

Figure 12 shows the results considering different state-level policies that could directly impact cohort survival probabilities. The policies included here are namely equal pay laws, unilateral divorce, access to the pill by general adult women, and minors' access to the pill, and decade-wise cumulative survival probabilities are considered as the outcome. As seen in Figure 12, no discernible impact is obtained for any of the policies. This supports the main finding that improved health outcomes for cohorts can be attributed to being conceived under legal abortion.

As CDC (1969-1980) records, before *Roe v. Wade* almost one-third of the abortions were performed on women traveling from out-of-state. After *Roe v Wade*, there was a noticeable shift towards "performance of abortions in a woman's state of residence" resulting in almost ninety percent of women undergoing abortion in their state-of-residence (CDC, 1979). As discussed in Section 3, women seeking abortion opted to travel within the country and internationally to obtain safe and legal abortion (Gold, 2003; Reagan, 2019).[30] This implies that there might be

[30]For example, in 1972, over 100,000 women traveled from a different state to obtain an abortion in New York City Gold (2003). Also, the number of abortions in states with liberal access and no residence restriction,

spillover effects of legal abortion on neighboring or nearby states affecting birth cohorts born in these states and their subsequent health outcomes. Considering the cities – Los Angeles, San Francisco, Buffalo, New York City, and DC in the states NY, CA, and DC, I calculate the states within 500 miles of these cities as states that had access to legal abortion by travel (Joyce et al., 2013; Myers, 2017; Farin et al., 2022).

Panel a in Figure 13 shows that expanding the definition of having access to legal abortion prior to *Roe v. Wade* as being within 500 miles of early-legal states (CA, DC, and NY) does not have any noticeable effect on the cohorts' health. However, when these states (within 500 miles proximity of CA, DC, and NY) are considered as *contaminated* controls and dropped from the analysis, substantial improvement in cohorts' health is noticed during their middle age (age 30-49) which can be attributed to being conceived under legal abortion. The results of this check can be seen in Panel b of Figure 13. In the two aforementioned analyses, I do not consider states in close proximity to Washington which legalized abortion in 1970 because Washington had a residency restriction on women seeking abortion from out-of-state. Women had to be residents of Washington from at least 30 days before the procedure, to be able to have legal abortions (Gold, 2003), essentially rendering the procedure inaccessible for women from neighboring states like Idaho and Oregon.

One other aspect of the current research setting that needs further discussion is the presence of abortion reforms which provided access to legal abortion, albeit in limited circumstances, before the 1973 court institution of *Roe v. Wade*. In the main analysis, the focus is kept on full legalizations allowed by complete decriminalization of abortion by repeal states and then national legalization by *Roe v. Wade*, and pre-1973 abortion reforms were controlled for. In the robustness check, I run the regressions by dropping the states with pre-1973 reforms, and panel c in Figure 13 shows that the results obtained do not differ much from the baseline findings.

California is the only state which had early abortion reforms and then complete repealing of anti-abortion statutes. There has been disagreement in the interpretation of legal statutes on the year in which California adopted abortion legalization to the full extent. To address this in the robustness check I consider California to have completely legal abortion in 1970, instead of 1969 (as considered in the main analysis). The results as shown in Panel d in Figure 13 show that the new definition leads to effects of legal abortion slightly higher in magnitude than the baseline findings. Cumulative survival probabilities for decade 5 for cohorts conceived under legalization are markedly better. Additionally, I also test the robustness of the main findings with respect to the legal abortion statutes being unclear in terms of *de facto* access to abortion in New Jersey and Vermont. Panel e, Figure 13 shows that the results are similar to the main findings even when these two states are dropped. Lastly, I consider the impact of including state-specific linear time trends in the regressions, and the results are shown in panel f of Figure 13.

like New York and California, experienced a decline of 23% in the procedures reported by providers after *Roe v. Wade* (Weinstock et al., 1976), suggesting they served significant numbers of out-of-state women prior to the legalization of abortion through *Roe v. Wade* (Farin et al., 2022).

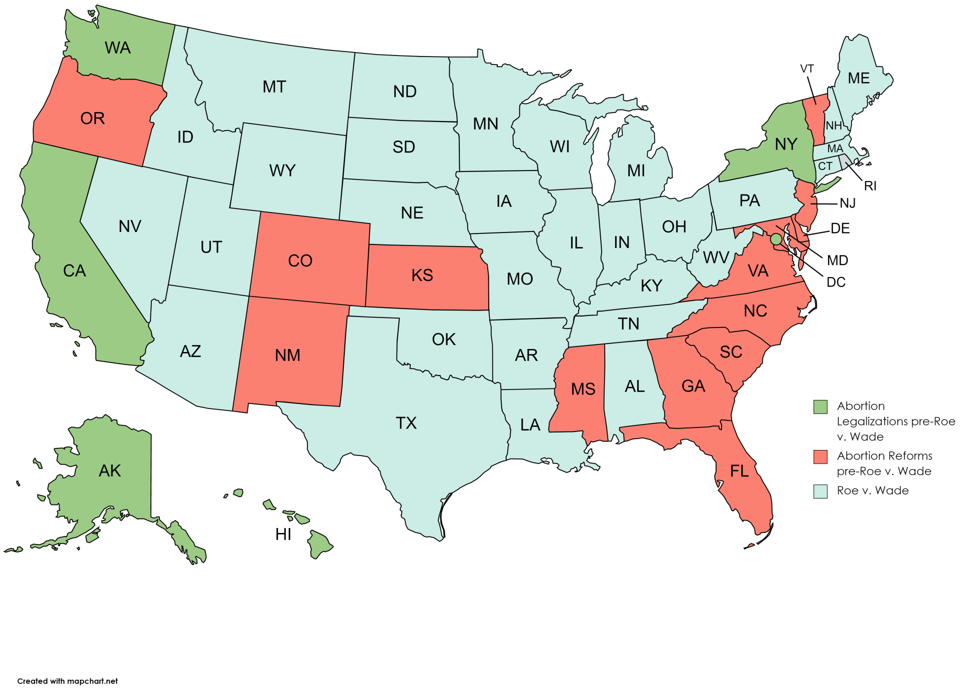
8 Conclusion

The findings of this paper provide detailed evidence on the long-term intergenerational health impact of abortion legalization in the U.S. Cohorts conceived in states with legalized abortion exhibit better life-cycle health. However, the magnitude of improvement in the likelihood of survival of these cohorts varies with age. The findings suggest that cohorts conceived under the legal abortion regime have improved survival in the first decades of their lives, and improvement in early childhood health persists well into adulthood in the fifth decade of life. The improvement is most pronounced in the white and female populations, respectively. Moreover, cause-of-death analysis reveals a reduction in acute and accidental deaths during the first decade of life, followed by lower mortality rates from infectious diseases in later years.

With recent legal developments and shifts in abortion access, including the landmark U.S. Supreme Court ruling in *Dobbs v. Jackson Women's Health Organization*, understanding the multifaceted impacts of abortion policies on population health is more crucial than ever. By offering insights into the far-reaching consequences of abortion legalization, this paper contributes significantly to the ongoing discourse surrounding reproductive healthcare access and its implications for public health.

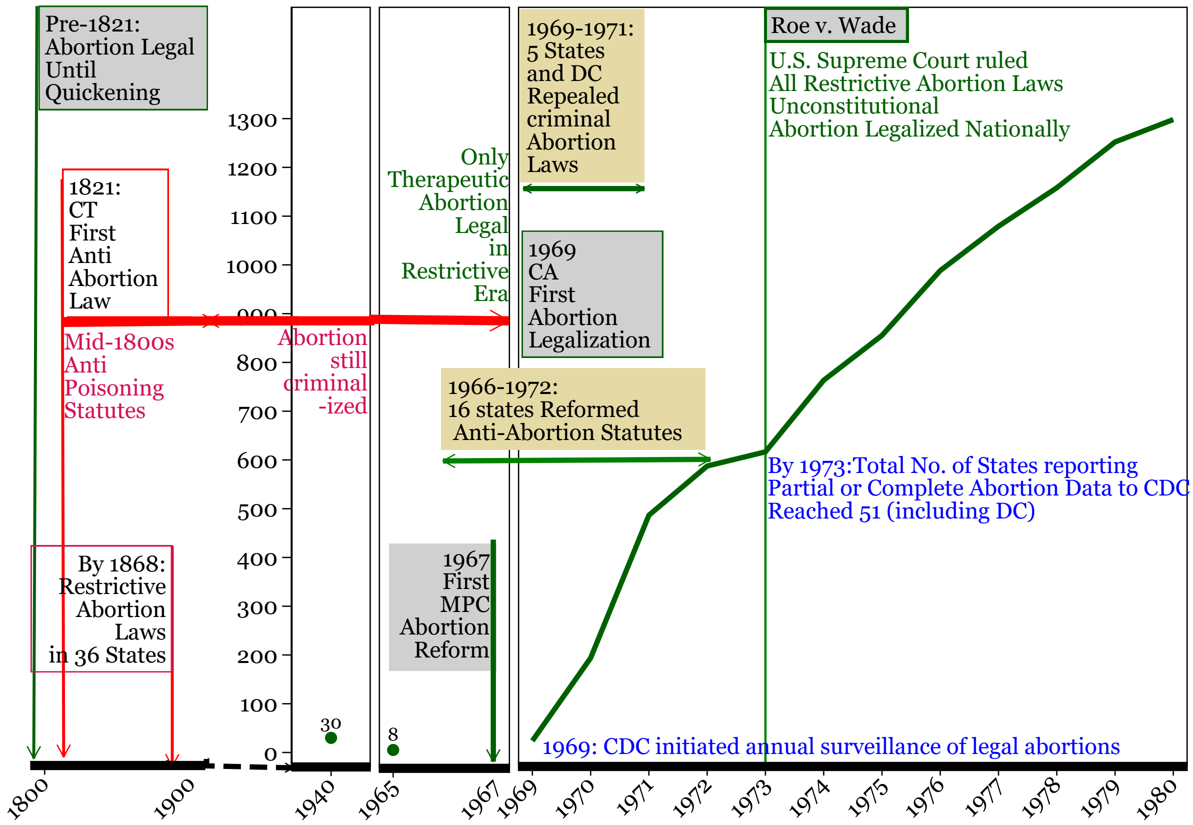
9 Figures

Figure 1: Geographic Distribution and Timeline of Abortion Regulations in the US, till 1973



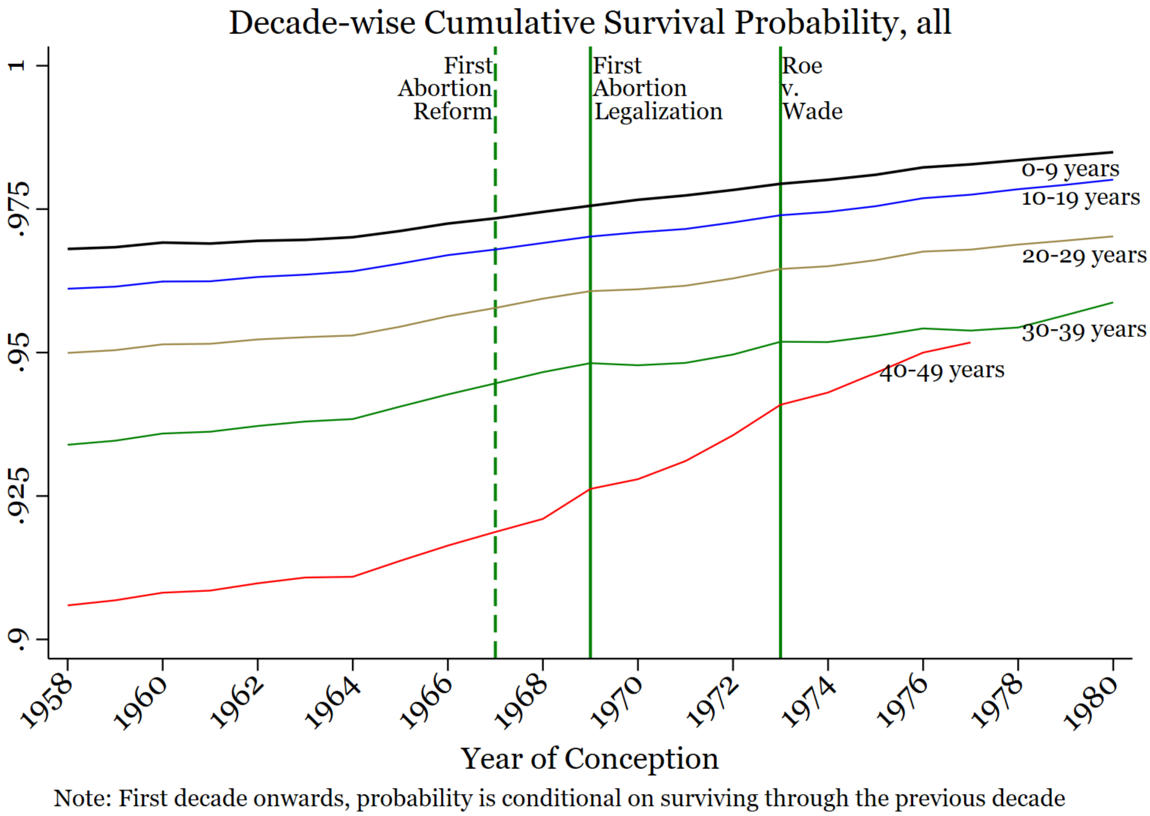
NOTES: : In the map, the green-colored states repealed their anti-abortion laws voluntarily (i.e., adopted full abortion legalization), and are referred to as "early-legal/repeal states." The blue-colored states allowed elective abortion only after the 1973 national decision. They did not have any abortion reforms before the Roe v. Wade decision was implemented in 1973 and are referred to as *Roe v. Wade* states. Specific legalization dates are as follows: 1969–CA; 1970–NY, AK, HI, WA; 1971–DC; 1973–National (Roe v. Wade). The orange-colored states brought limited changes to their criminal abortion laws in the pre-1973 period, making abortion permissible only under specific circumstances; these are referred to as "reform" states. Specific reform dates are as follows: 1966–MS; 1967–CO, NC, CA; 1968–MD; 1969–AR, DE, NM, GA, OR; 1970–SC, KS, VA; 1972–FL, VT, NJ.
SOURCE: Rubin (1994); Merz et al. (1996); Myers (2017, 2021); Farin et al. (2022)

Figure 2: Brief Overview of Changes in Abortion Regulations in the US and Abortion Incidence (20th Century, 1969-1980)



Notes: Here the vertical-axis represents *annual abortion incidence in thousands*. The total number of legal abortions for the period 1969 to 1980 comes from CDC Abortion Surveillance Reports (CDC, 1969-1980) and Table 1 of CDC (1979) – is shown by the green solid line graph. The green dots corresponding to 1940 and 1965 are estimates of the total number of legal abortions (Krannich (1980), Table 1). The dates and description of legislative changes are compiled from CDC (1969-1980); Krannich (1980); Merz et al. (1996); Myers (2017); Farin et al. (2022). MPC stands for the Model Penal Code on abortion, composed by the American Law Institute, which declares abortions to be legal only under specific circumstances: (i) if performed by a licensed physician, (ii) if the continuation of the pregnancy would severely diminish the physical or mental health of the pregnant woman, (iii) if the fetus has a grave physical or mental defect, or (iv) if the pregnancy resulted from rape or incest. Abortion reforms from 1966 to 1972 include the authorization of legal abortion in case of rape in MS (1966); MPC reforms by 13 states (1967 - CO, NC, CA; 1968 - MD; 1969 - AR, DE, NM, GA, OR; 1970 - SC, KS, VA; 1972 - FL); and court rulings which enacted unclear allowances for abortion (1972 - VT, NJ). States that repealed all anti-abortion statutes are 1969 - CA; 1970-NY, AK, HI, WA; 1971 - DC.
Source: CDC (1969-1980, 1979); Krannich (1980); Merz et al. (1996); Myers (2017); Farin et al. (2022)

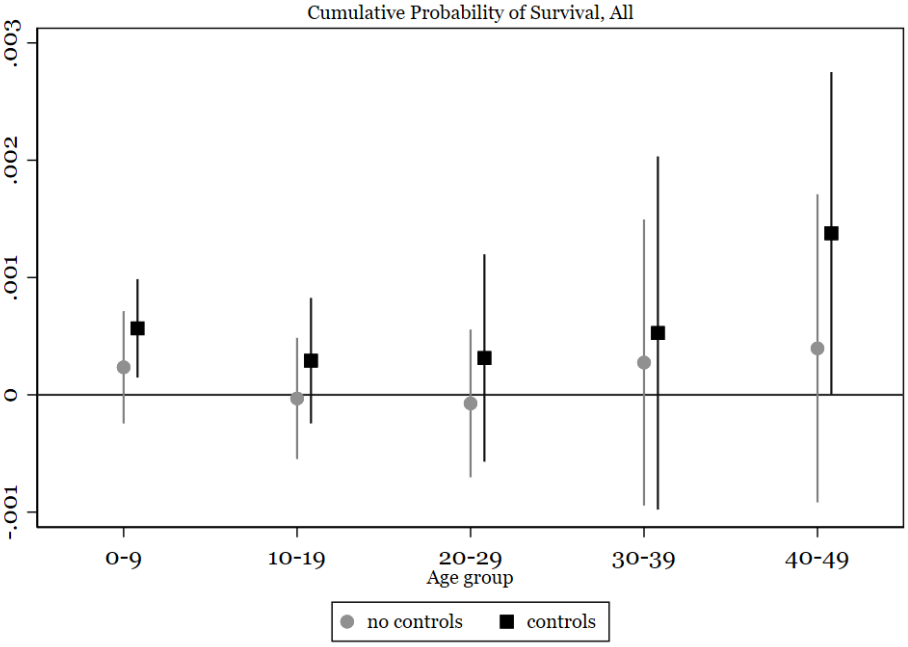
Figure 3: Decade-wise Cohort Survival Probability by Year of Conception, 1959-1980



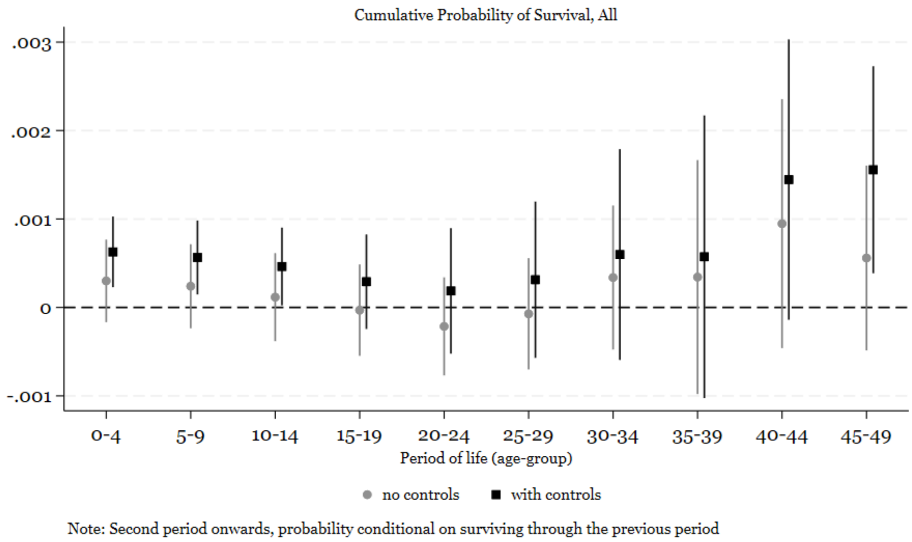
Notes: The cumulative survival probability for each decade of life is plotted against the year of conception. The green vertical lines represent major legal changes in abortion policy. Cumulative Survival Probabilities are calculated using data from the NVSS-CDC death certificates for 1959-2018 and birth certificate data for 1959-1980, and weighted with the population of reproductive-aged women. The sample includes cohorts conceived between 1958 and 1980.
Source: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

Figure 4: Impact of Legal Abortion on Cohort Survival

(a) Cumulative Survival Probability for Decades, All



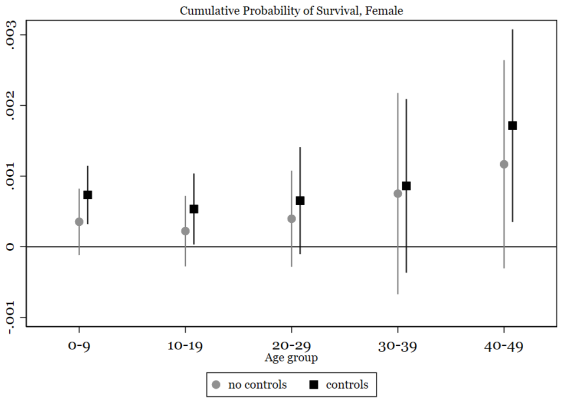
(b) Cumulative Survival Probability for Five-year age-group, All



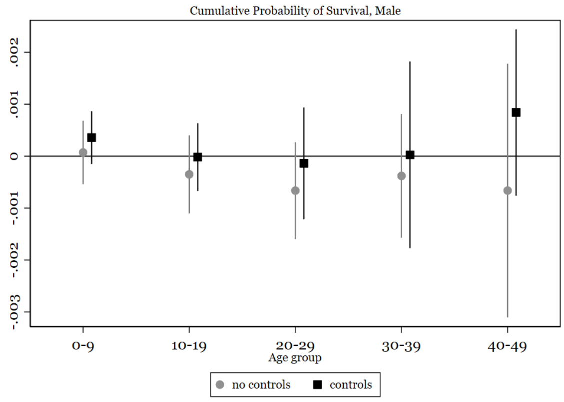
NOTES: Each dot represents the OLS coefficient of separate OLS regressions for each decade of a cohort's lifespan (circles represent regression without control, squares represent regressions with controls). The dependent variable is ln(cumulative survival probability) for each decade, conditional on surviving through the respective previous decade. The main set of state-level demographic controls includes the share of white reproductive-age females, the share of nonwhite reproductive-age females, the log of per capita income, the log of per-pupil education spending, and the state-level share with a high school degree. Additionally, policy controls included here are for state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Baseline fixed effects include state of birth fixed effects and year of conception fixed effects. Regressions are weighted with the size of the cohort at the beginning of each decade. Robust standard errors clustered at the birth state level. The sample includes cohorts conceived between 1958 and 1980.
SOURCE: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

Figure 5: Legal Abortion and Cohort Survival, by race and gender

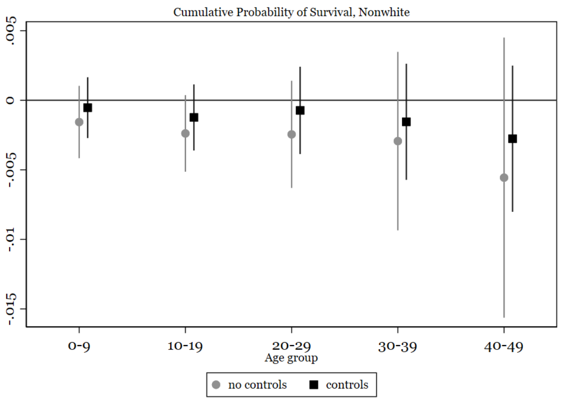
(a) Female



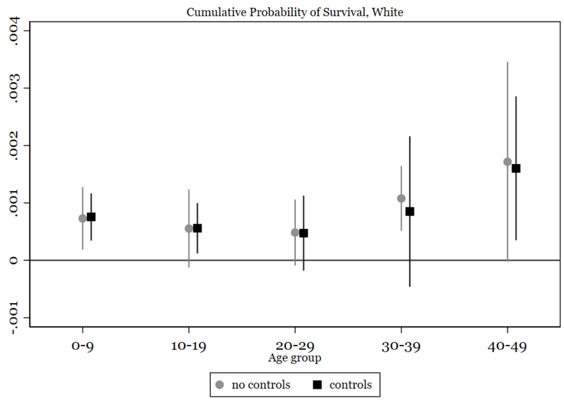
(b) Male



(c) Nonwhite



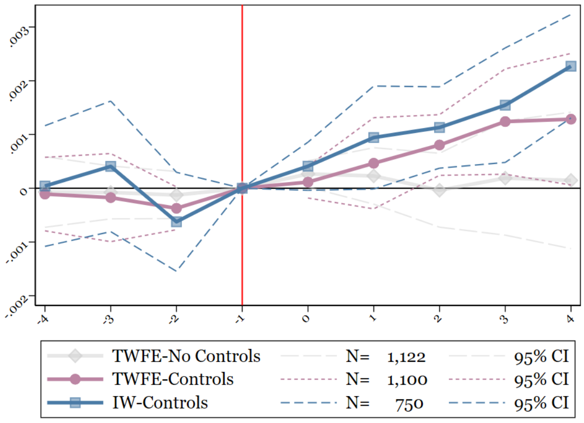
(d) White



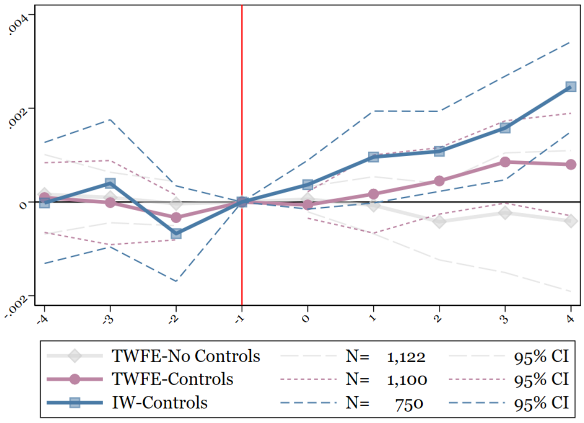
Notes: Each dot represents the OLS coefficient of separate OLS regressions for each decade of a cohort's lifespan (circles represent regression without control, squares represent regressions with controls). The dependent variable is ln(cumulative survival probability) for each decade, conditional on surviving through the respective previous decade. The main set of state-level demographic controls includes the share of white reproductive-age females, the share of nonwhite reproductive-age females, the log of per capita income, the log of per-pupil education spending, and the state-level share with a high school degree. Additionally, policy controls included here are for state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Baseline fixed effects include state of birth fixed effects and year of conception fixed effects. Robust standard errors clustered at the birth state level. Regressions are weighted with the size of the cohort at the beginning of each decade. The sample includes cohorts conceived between 1958 and 1980 who are (a) female, (b) male, (c) nonwhite, and (d) white, respectively.
Source: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

Figure 6: Legal Abortion and Cohort Survival, Event Study Plots, 1959-1980

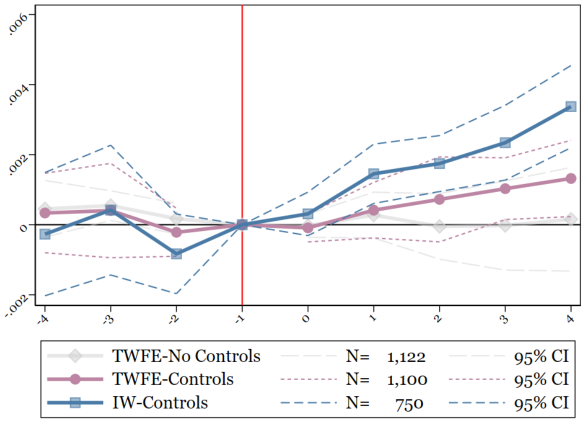
(a) Decade 1, All



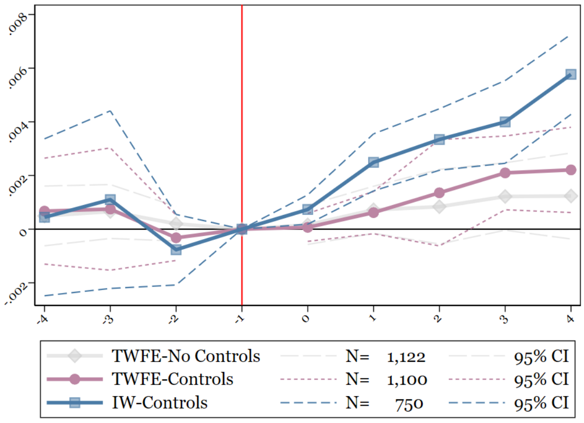
(b) Decade 2, All



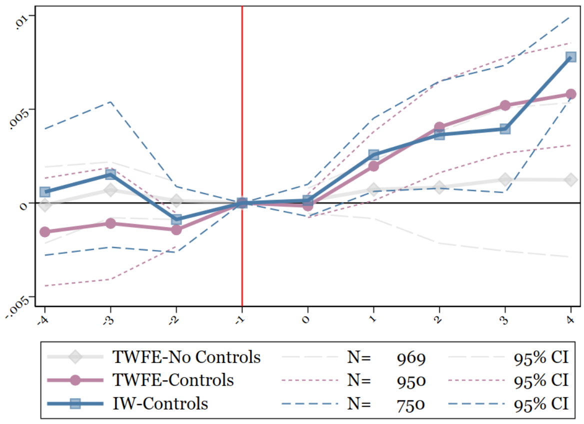
(c) Decade 4, All



(d) Decade 4, All



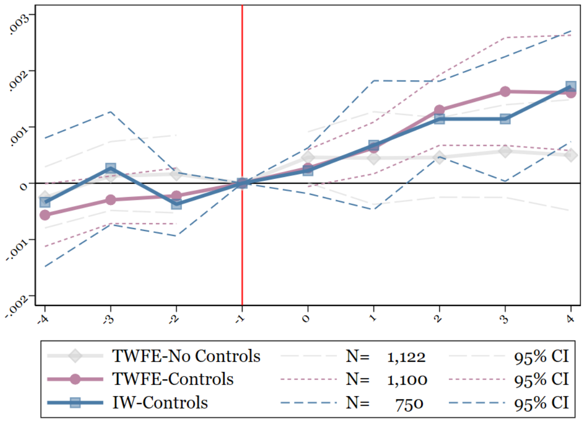
(e) Decade 5, All



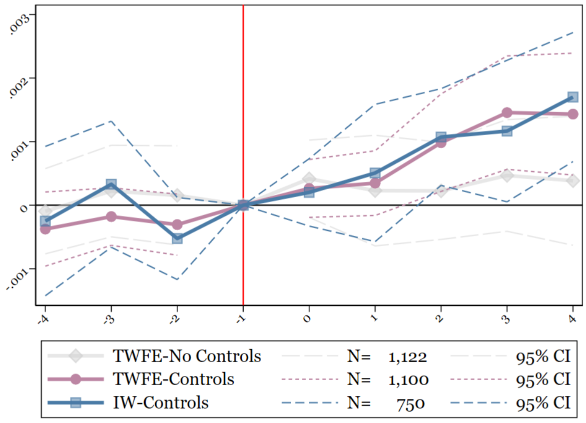
Notes: The analysis focuses on the log of cohort-specific decade-wise cumulative survival probability as the dependent variable. Each plotted point represents event-study dummy variables, β_m, for periods before and after abortion legalization (Eq. 2). The period immediately before legalization ($m = -1$) is excluded and shown with a solid red line. Only point estimates in the main event window are displayed. For TWFE, binning is done at $m = -6$ and $m = 5$. For IW specification (Sun and Abraham, 2020), *Roe v. Wade* states serve as the last-treated comparison group, and the event study is fully saturated. Each estimate point (excluding the excluded base period) is presented with 95% confidence intervals. The model includes state-level demographic controls (share of white and nonwhite reproductive-age females, log of per capita income, per-pupil education spending, share with a high school degree) and policy controls (abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, state equal pay legislation). Data is collapsed to the birth state and year of conception, with weights based on the size of the gestational-cohort at the beginning of each decade of life. Robust standard errors are clustered at the birth state level. Baseline fixed effects include state and year-of-conception fixed effects. The sample includes cohorts conceived between 1959 and 1980.
Source: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

Figure 7: Legal Abortion and Cohort Survival, Female, Event Study, 1959-1980

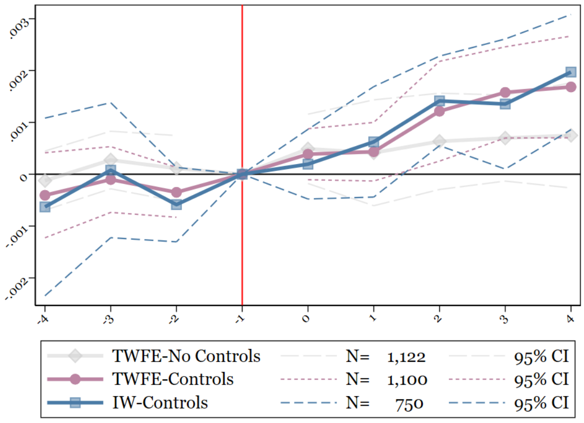
(a) Decade 1, Female



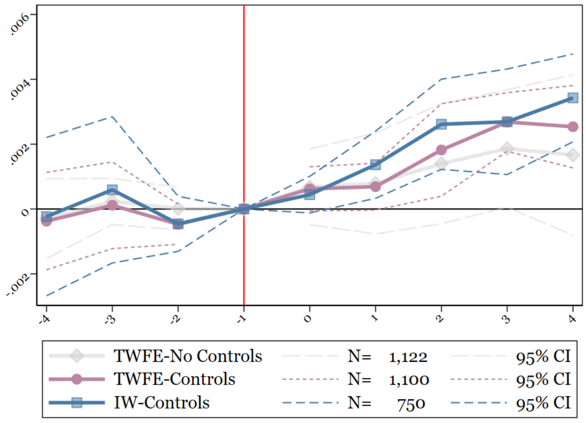
(b) Decade 2, Female



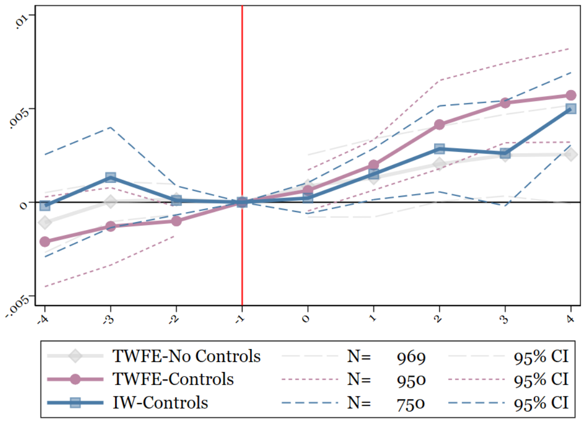
(c) Decade 4, Female



(d) Decade 4, Female



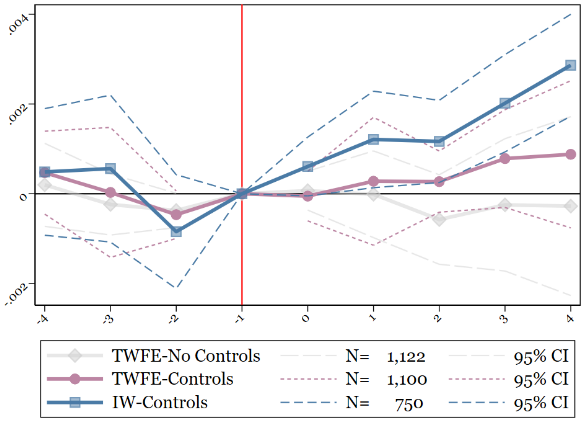
(e) Decade 5, Female



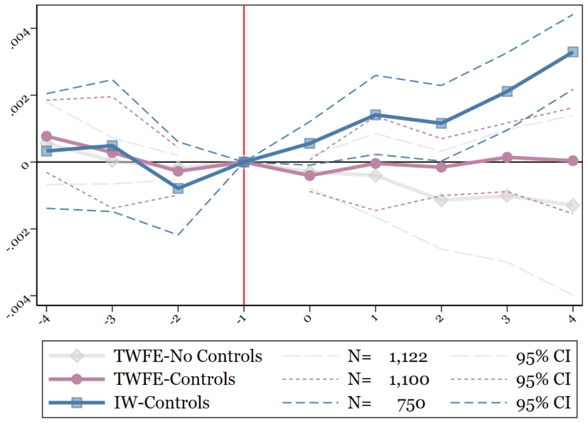
NOTES: Here, the log of cohort-specific gender-specific decade-wise cumulative survival probability is considered as the dependent variable. Each plotted point represents event-study dummy variables, β_m, for periods before and after abortion legalization (Eq. 2). The period immediately before legalization ($m = -1$) is excluded and shown with a solid red line. Only point estimates in the main event window are displayed. For TWFE, binning is done at $m = -6$ and $m = 5$. For IW specification (Sun and Abraham, 2020), *Roe v. Wade* states serve as the last-treated comparison group, and the event study is fully saturated. Each estimate point (excluding the excluded base period) is presented with 95% confidence intervals. The model includes state-level demographic controls (share of white and nonwhite reproductive-age females, log of per capita income, per-pupil education spending, share with a high school degree) and policy controls (abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, state equal pay legislation). Data is collapsed to the birth state and year of conception, with weights based on the gender-specific size of the gestational-cohort at the beginning of each decade of life. Robust standard errors are clustered at the birth state level. Baseline fixed effects include state and year-of-conception fixed effects. The sample includes cohorts conceived between 1959 and 1980.
SOURCE: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

Figure 8: Legal Abortion and Cohort Survival, Male, Event Study, 1959-1980

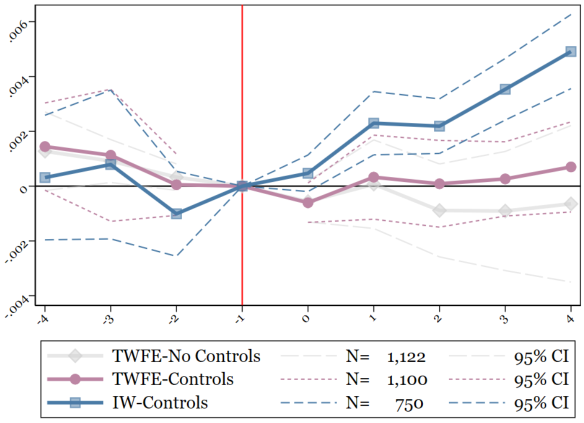
(a) Decade 1, Male



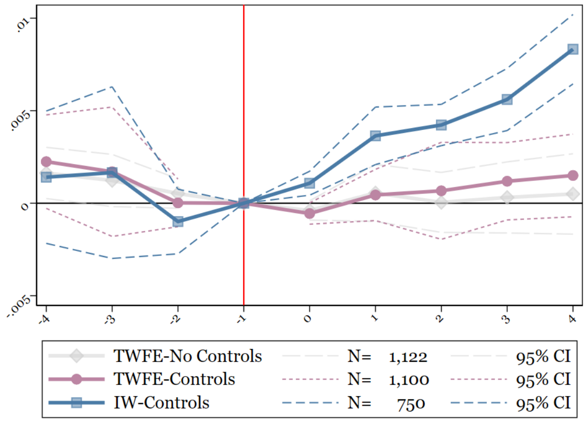
(b) Decade 2, Male



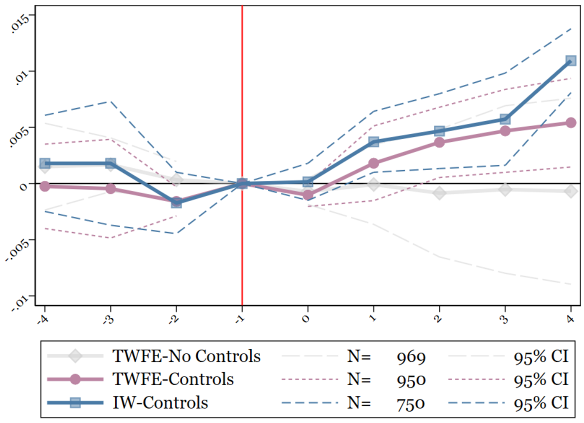
(c) Decade 4, Male



(d) Decade 4, Male



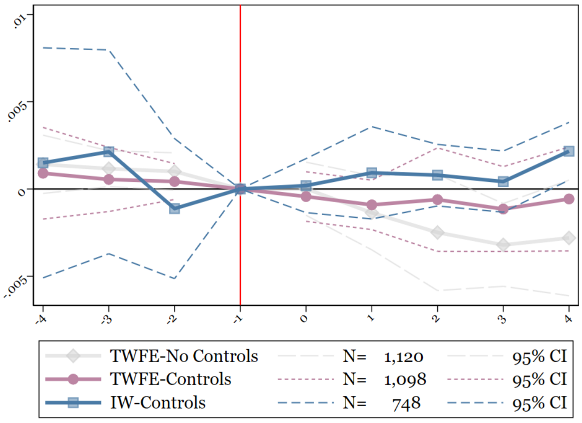
(e) Decade 5, Male



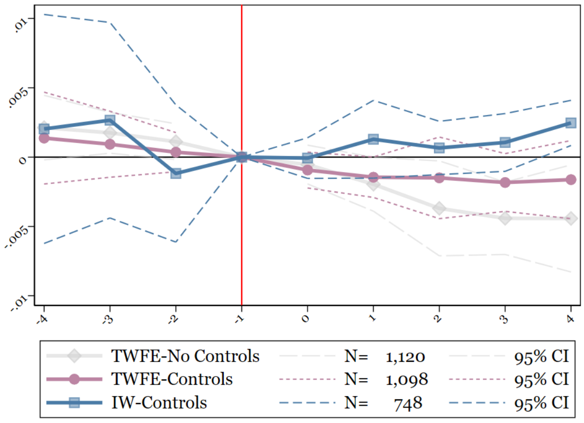
Notes: Here, the log of cohort-specific gender-specific decade-wise cumulative survival probability is considered as the dependent variable. Each plotted point represents event-study dummy variables, β_m, for periods before and after abortion legalization (Eq. 2). The period immediately before legalization ($m = -1$) is excluded and shown with a solid red line. Only point estimates in the main event window are displayed. For TWFE, binning is done at $m = -6$ and $m = 5$. For IW specification (Sun and Abraham, 2020), *Roe v. Wade* states serve as the last-treated comparison group, and the event study is fully saturated. Each estimate point (excluding the excluded base period) is presented with 95% confidence intervals. The model includes state-level demographic controls (share of white and nonwhite reproductive-age females, log of per capita income, per-pupil education spending, share with a high school degree) and policy controls (abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, state equal pay legislation). Data is collapsed to the birth state and year of conception, with weights based on the gender-specific size of the gestational-cohort at the beginning of each decade of life. Robust standard errors are clustered at the birth state level. Baseline fixed effects include state and year-of-conception fixed effects. The sample includes cohorts conceived between 1959 and 1980.
Source: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

Figure 9: Legal Abortion and Cohort Survival, Nonwhite, Event Study, 1959-1980

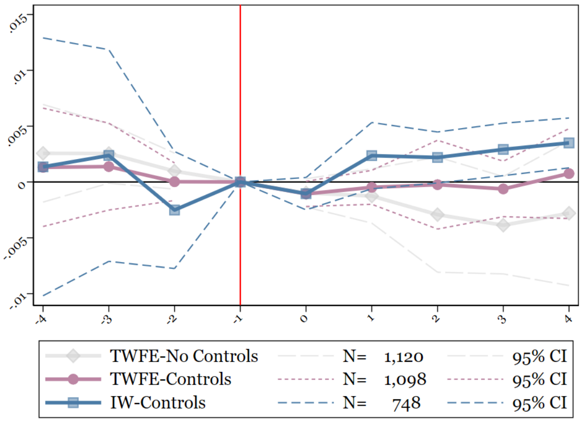
(a) Decade 1, Nonwhite



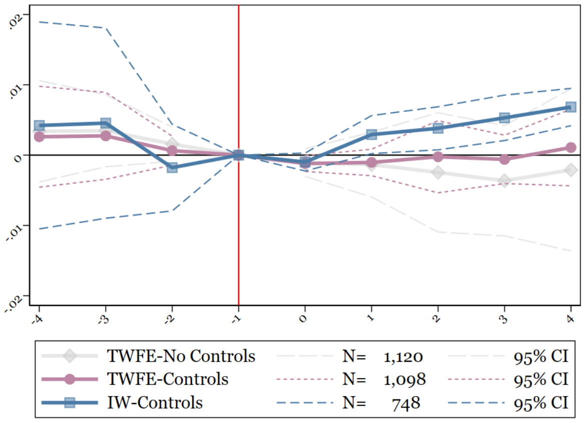
(b) Decade 2, Nonwhite



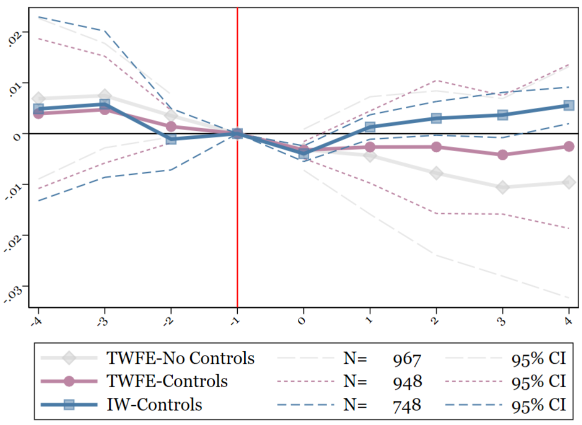
(c) Decade 4, Nonwhite



(d) Decade 4, Nonwhite



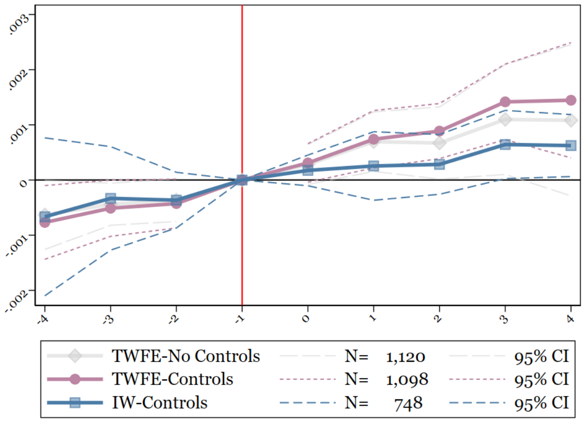
(e) Decade 5, Nonwhite



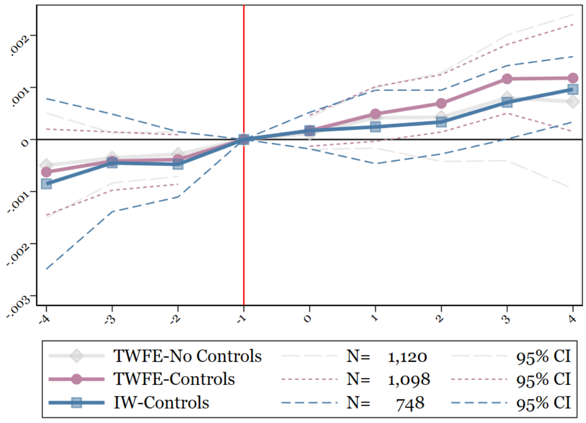
NOTES: Here, the log of race-specific decade-wise cumulative survival probability is considered as the dependent variable. Each plotted point represents event-study dummy variables, β_m, for periods before and after abortion legalization (Eq. 2). The period immediately before legalization ($m = -1$) is excluded and shown with a solid red line. Only point estimates in the main event window are displayed. For TWFE, binning is done at $m = -6$ and $m = 5$. For IW specification (Sun and Abraham, 2020), *Roe v. Wade* states serve as the last-treated comparison group, and the event study is fully saturated. Each estimate point (excluding the excluded base period) is presented with 95% confidence intervals. The model includes state-level demographic controls (share of white and nonwhite reproductive-age females, log of per capita income, per-pupil education spending, share with a high school degree) and policy controls (abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, state equal pay legislation). Data is collapsed to the birth state and year of conception, with weights based on the race-specific size of the gestational-cohort at the beginning of each decade of life. Robust standard errors are clustered at the birth state level. Baseline fixed effects include state and year-of-conception fixed effects. The sample includes cohorts conceived between 1959 and 1980.
SOURCE: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

Figure 10: Legal Abortion and Cohort Survival, White, Event Study, 1959-1980

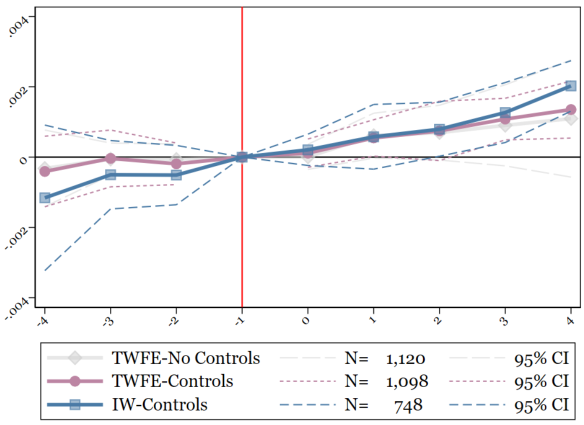
(a) Decade 1, White



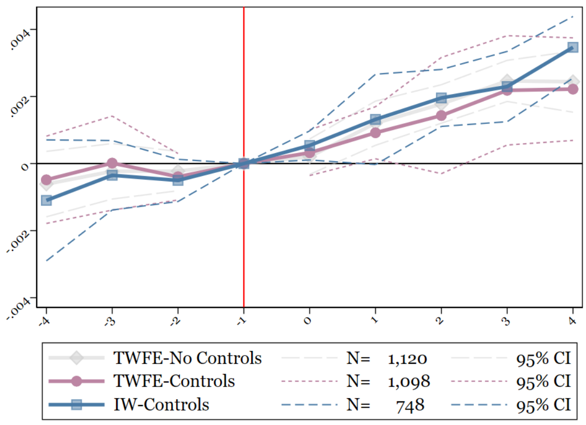
(b) Decade 2, White



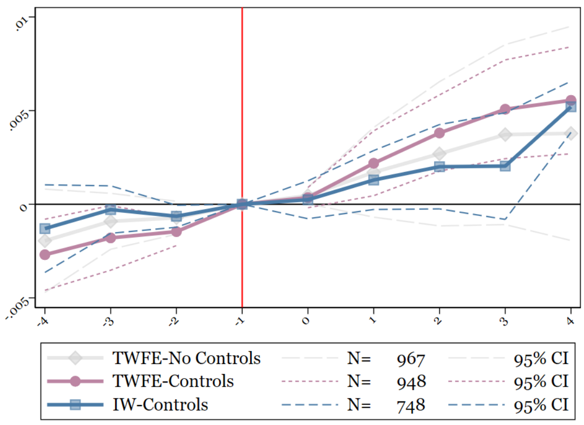
(c) Decade 4, White



(d) Decade 4, White



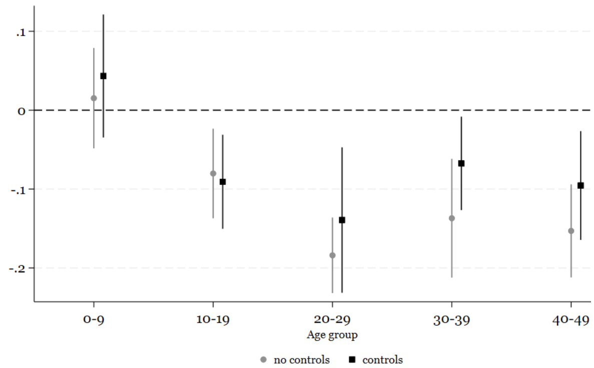
(e) Decade 5, White



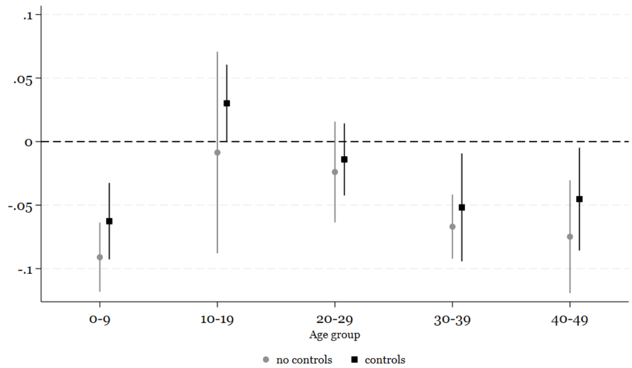
Notes: Here, the log of race-specific decade-wise cumulative survival probability is considered as the dependent variable. Each plotted point represents event-study dummy variables, β_m, for periods before and after abortion legalization (Eq. 2). The period immediately before legalization ($m = -1$) is excluded and shown with a solid red line. Only point estimates in the main event window are displayed. For TWFE, binning is done at $m = -6$ and $m = 5$. For IW specification (Sun and Abraham, 2020), *Roe v. Wade* states serve as the last-treated comparison group, and the event study is fully saturated. Each estimate point (excluding the excluded base period) is presented with 95% confidence intervals. The model includes state-level demographic controls (share of white and nonwhite reproductive-age females, log of per capita income, per-pupil education spending, share with a high school degree) and policy controls (abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, state equal pay legislation). Data is collapsed to the birth state and year of conception, with weights based on the race-specific size of the gestational-cohort at the beginning of each decade of life. Robust standard errors are clustered at the birth state level. Baseline fixed effects include state and year-of-conception fixed effects. The sample includes cohorts conceived between 1959 and 1980.
Source: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

Figure 11: Legal Abortion and Cause-specific Cohort Mortality Rate per 100,000 Reproductive-aged Women, All Population

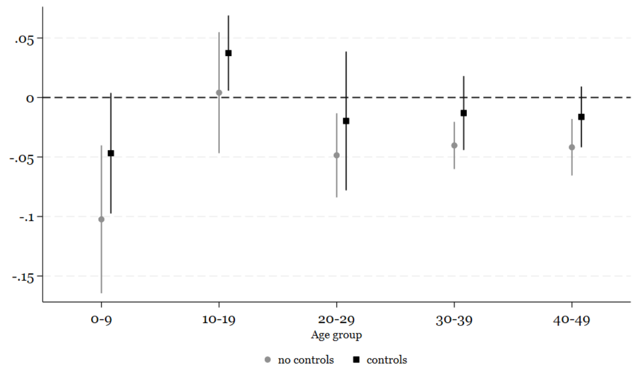
(a) Infectious Diseases



(b) Acute

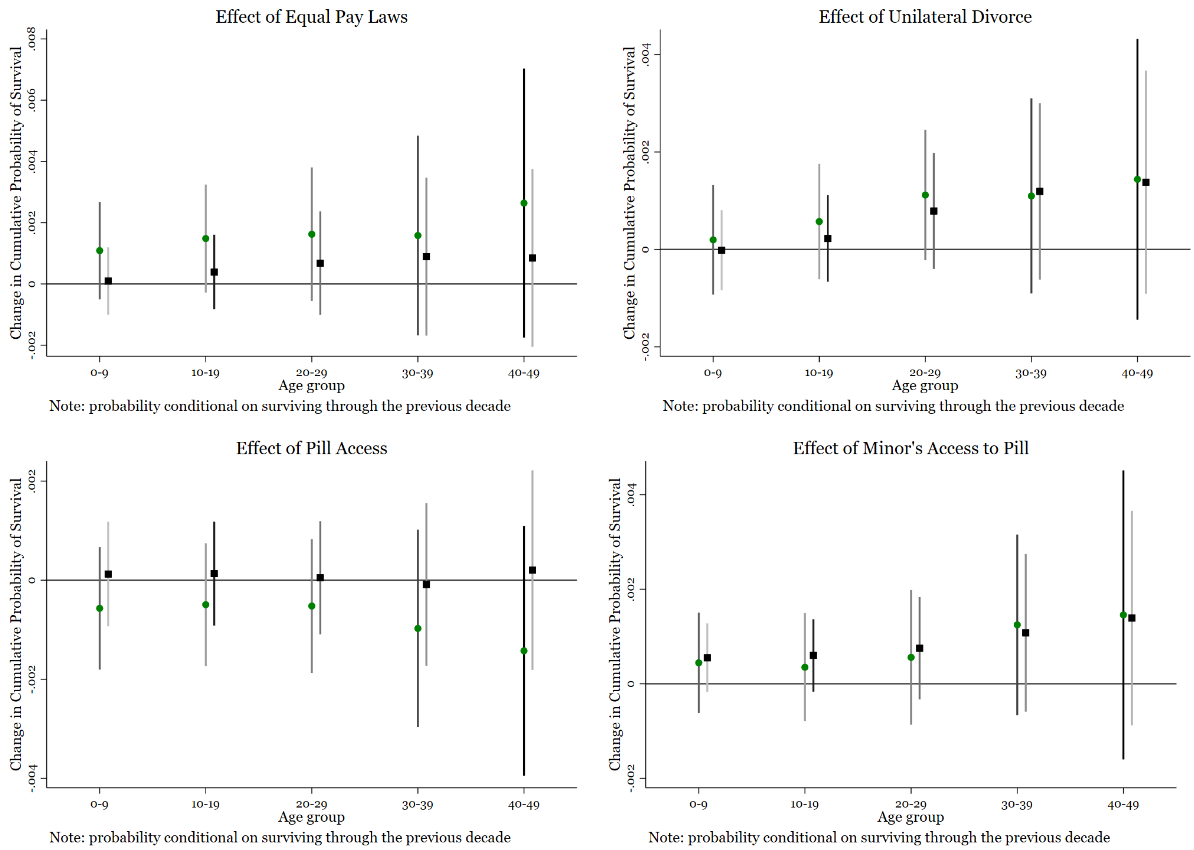


(c) Chronic



Notes: Each dot represents the OLS coefficient of separate regressions for each decade of a cohort's lifespan. The dependent variables are the inverse hyperbolic sine of the mortality rates per 100,000 reproductive-aged women, specific to causes of death (see Appendix Table B.5 for ICD codes included) and decades of life. The set of state-level demographic controls includes the share of white reproductive-age females, the share of nonwhite reproductive-age females, the log of per capita income, the log of per-pupil education spending, and the state-level share with a high school degree. Additionally, policy controls included here are for state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Baseline fixed effects include state of birth fixed effects and year of conception fixed effects. Robust standard errors clustered at the birth state level. Regressions are weighted with the population of reproductive-aged women. The sample includes cohorts conceived between 1958 and 1980.
Source: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

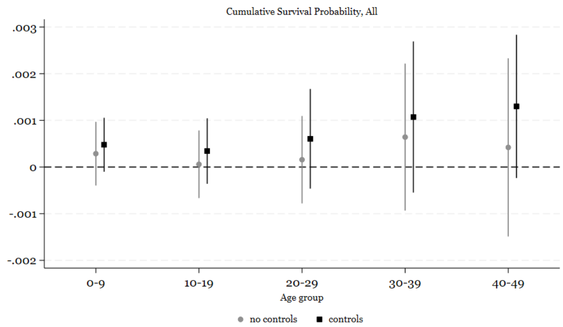
Figure 12: Robustness Check on Policies



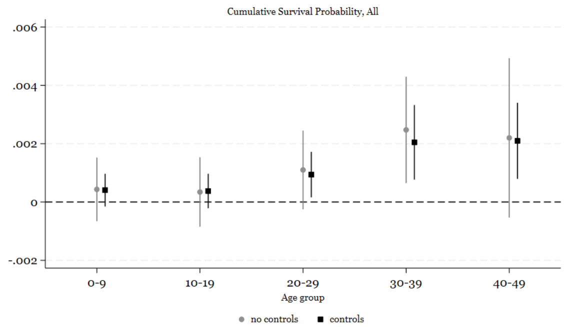
Notes: Each dot represents the OLS coefficient of separate OLS regressions for each decade of a cohort's lifespan (circles represent regression without control, squares represent regressions with controls). The dependent variable is ln(cumulative survival probability) for each decade, conditional on surviving through the respective previous decade. The main set of state-level demographic controls includes the share of white reproductive-age females, the share of nonwhite reproductive-age females, the log of per capita income, the log of per-pupil education spending, and the state-level share with a high school degree. Baseline fixed effects include state of birth fixed effects and year of conception fixed effects. Robust standard errors clustered at the birth state level. Regressions are weighted with the size of the cohort at the beginning of each decade. The sample includes cohorts conceived between 1958 and 1980.
SOURCE: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

Figure 13: Robustness Checks, Different Specifications

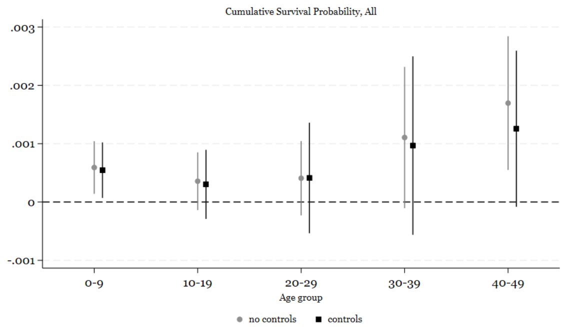
(a) Travel to Early Legal State



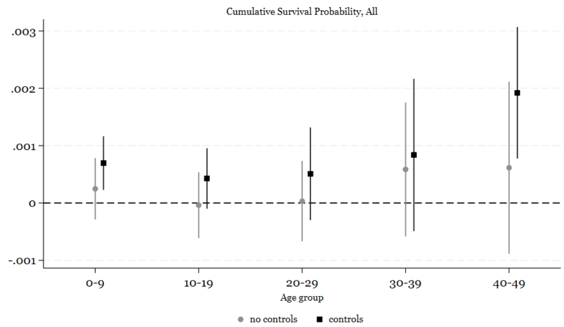
(b) Excluding Spillover



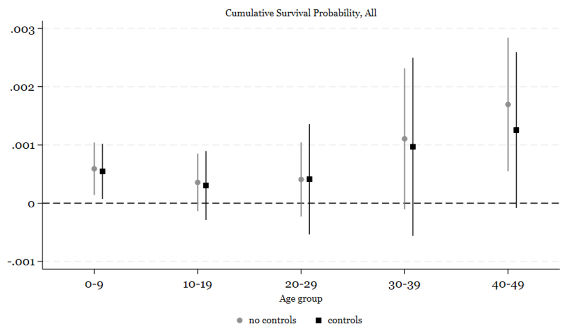
(c) Excluding States with Abortion Reforms



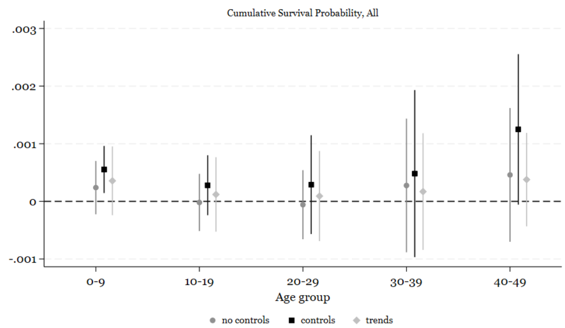
(d) Considering CA legalized abortion in 1970



(e) Excluding New Jersey and Vermont



(f) Including State-specific Linear Time Trend



Notes: Each dot represents the OLS coefficient of separate OLS regressions for each decade of a cohort's lifespan (circles represent regression without control, squares represent regressions with controls). The dependent variable is ln(cumulative survival probability) for each decade, conditional on surviving through the respective previous decade. The main set of state-level demographic controls includes the share of white reproductive-age females, the share of nonwhite reproductive-age females, the log of per capita income, the log of per-pupil education spending, and the state-level share with a high school degree. Additionally, policy controls included here are for state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Baseline fixed effects include state of birth fixed effects and year of conception fixed effects. Regressions are weighted with the size of the cohort at the beginning of each decade. Robust standard errors clustered at the birth state level. The sample includes cohorts conceived between 1958 and 1980.
Source: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

10 Tables

Table 1: Summary Statistics, by Legal Status

	Early Legal Pre Mean	Early Legal Post Mean	Refo -rm Pre Mean	Refo -rm Post Mean	Roe v. Wade Pre Mean	Roe v. Wade Post Mean
Decade 1						
Cumulative Survival Probability	0.970	0.979	0.969	0.979	0.973	0.983
Cumulative Survival Probability, White	0.974	0.980	0.974	0.983	0.975	0.984
Cumulative Survival Probability, Non-white	0.959	0.973	0.956	0.970	0.957	0.973
Cumulative Survival Probability, Male	0.970	0.977	0.971	0.977	0.973	0.981
Cumulative Survival Probability, Female	0.977	0.982	0.978	0.982	0.979	0.985
Decade 2						
Cumulative Survival Probability	0.963	0.972	0.963	0.974	0.967	0.977
Cumulative Survival Probability, White	0.966	0.973	0.968	0.977	0.969	0.979
Cumulative Survival Probability, Non-white	0.951	0.964	0.949	0.963	0.949	0.964
Cumulative Survival Probability, Male	0.962	0.967	0.964	0.969	0.965	0.973
Cumulative Survival Probability, Female	0.974	0.978	0.975	0.979	0.976	0.982
Decade 3						
Cumulative Survival Probability	0.950	0.961	0.952	0.963	0.957	0.968
Cumulative Survival Probability, White	0.952	0.960	0.958	0.968	0.960	0.971
Cumulative Survival Probability, Non-white	0.932	0.948	0.932	0.949	0.931	0.948
Cumulative Survival Probability, Male	0.941	0.955	0.950	0.959	0.951	0.966
Cumulative Survival Probability, Female	0.967	0.974	0.969	0.975	0.971	0.979
Decade 4						
Cumulative Survival Probability	0.933	0.947	0.936	0.949	0.943	0.954
Cumulative Survival Probability, White	0.934	0.943	0.945	0.955	0.948	0.958
Cumulative Survival Probability, Non-white	0.910	0.930	0.907	0.930	0.906	0.925
Cumulative Survival Probability, Male	0.935	0.954	0.945	0.959	0.948	0.966
Cumulative Survival Probability, Female	0.963	0.974	0.966	0.974	0.969	0.979
Decade 5						
Cumulative Survival Probability	0.907	0.936	0.909	0.935	0.919	0.946
Cumulative Survival Probability, White	0.900	0.931	0.920	0.942	0.925	0.951
Cumulative Survival Probability, Non-white	0.878	0.914	0.868	0.910	0.867	0.910
Cumulative Survival Probability, Male	0.935	0.951	0.945	0.954	0.948	0.963
Cumulative Survival Probability, Female	0.963	0.973	0.966	0.972	0.969	0.977

Continued on next page

Table 1 Summary Statistics, by Legal Status (continued)

	Early Legal Pre	Early Legal Post	Refo -rm Pre	Refo -rm Post	Roe v. Wade Pre	Roe v. Wade Post
	Mean	Mean	Mean	Mean	Mean	Mean
Demographic Controls						
Share High School Educated	0.371	0.477	0.303	0.406	0.332	0.447
Log(Income Per Capita)	8.121	8.921	7.810	8.603	7.960	8.815
Log(Per Pupil Education Expenditure)	8.346	8.639	8.181	8.436	8.206	8.437
Policy Controls						
1(Abortion Reform)	0.033	0.182	0.000	1.000	0.000	0.000
1(Minor's Access to Pill)	0.000	0.485	0.008	0.695	0.047	0.363
1(Pill Access)	0.950	1.000	0.869	1.000	0.876	0.996
1(Unilateral Divorce)	0.167	0.591	0.023	0.360	0.122	0.653
1(Equal Pay Laws)	0.817	0.848	0.385	0.561	0.543	0.710
1(Medicaid)	0.333	0.970	0.177	0.939	0.474	0.968
Population						
State Population (Millions)	6.333	7.850	3.143	3.508	3.521	3.884
State Share Females 15-44	0.213	0.232	0.204	0.221	0.202	0.221
State Share White Females 15-44	0.145	0.158	0.172	0.182	0.186	0.201
State Share Non-white Females 15-44	0.068	0.074	0.032	0.040	0.016	0.020
N	60	66	130	164	403	248

NOTES: Unweighted means reported. California is the only state that passed a reform and also repealed its anti-abortion legislation. California is included with the early-legal states. Pre and post indicate before and after abortion legalization (pre-*Roe*), abortion reform (pre-*Roe*), or passage of *Roe v. Wade* (dates vary by state).

SOURCE: NCHS/NVSS/CDC Multiple Cause of Death Files, 1959-1980. State population characteristics are from Ruggles et al. (2021) (shares and means). Population totals are used to construct denominators from Wolfers (2006) (also the source of the unilateral divorce laws). Income per capita from Jordan and Grossmann (2020). Per pupil spending from NCES (1959-1980). Reproductive policy laws and equal pay laws from Myers (2017, 2021).

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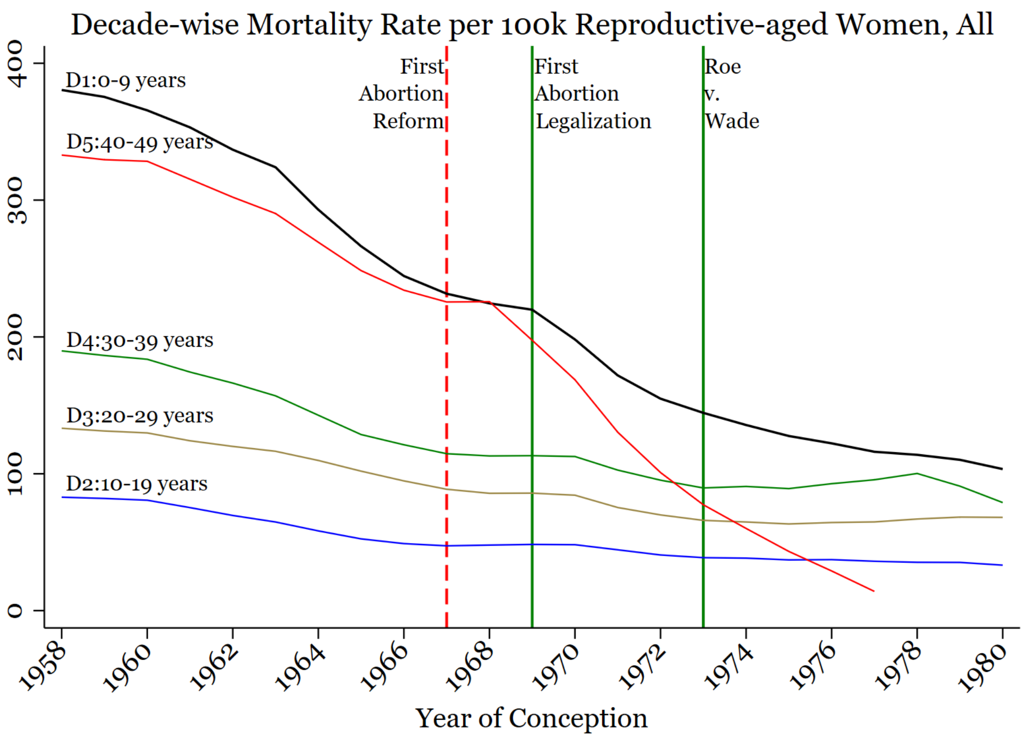
Appendices

A Additional Figures

Figure A.1: Decade-wise Mortality Rate, All



NOTES: The mortality rate per 100,000 women of reproductive age is shown for each decade of life and plotted against the year of conception. The green vertical lines represent major legal changes in abortion policy. Mortality rates are calculated using data from the NVSS-CDC death certificates for 1959-2018 and birth certificate data for 1959-1980, and weighted with the population of reproductive-aged women calculated from Ruggles et al. (2021). The sample includes cohorts conceived between 1958 and 1980.
SOURCE: NBER (1959-2004); NCHS (2005-2019, 1968-1980); NVSS (1959-1968); Ruggles et al. (2021)

B Additional Tables

B.1 Additional Background on Abortion Legislation

Table B.1: Legislative Changes in Abortion Laws, pre-1973 (*Roe v. Wade*)

	Year	State	Legal changes before *Roe v. Wade* was enacted in 1973
Panel A: Abortion Legalizations - States that repealed their anti-abortion Statutes			
1	1969	California	Legalized abortion
2	1970	New York	Legalized abortion
3	1970	Alaska	Legalized abortion
4	1970	Hawaii	Legalized abortion
5	1970	Washington	Legalized abortion
6	1971	District of Columbia	Legalized abortion
Panel B: Abortion Reforms - States that authorized abortion under specific circumstances			
1	1966	Mississippi	Legalized abortion in cases of rape
2	1967	Colorado	MPC reform
3	1967	North Carolina	MPC reform
4	1967	California	MPC reform
5	1968	Maryland	MPC reform
6	1969	Arkansas	MPC reform
7	1969	Delaware	MPC reform
8	1969	New Mexico	MPC reform
9	1969	Georgia	MPC reform
10	1969	Oregon	MPC reform
11	1970	South Carolina	MPC reform
12	1970	Kansas	MPC reform
13	1970	Virginia	MPC reform
14	1972	Florida	MPC reform
15	1972	Vermont	Court case on abortion
16	1972	New Jersey	Court case on abortion

NOTES: MPC stands for the Model Penal Code on abortion, which declares abortions to be legal only under specific circumstances: (i) if performed by a licensed physician, (ii) if the continuation of the pregnancy would severely diminish the physical or mental health of the pregnant woman, (iii) if the fetus has a grave physical or mental defect, or (iv) if the pregnancy resulted from rape or incest.
SOURCE: CDC (1969-1980); Rubin (1994); Merz et al. (1996); Myers (2017, 2021); Farin et al. (2022)

B.2 Cause of Death Analysis

Table B.2: Impact of legal abortion on Infectious Mortality Rate, 1959-2018

	Decade 1		**Decade 2**		**Decade 3**		**Decade 4**		**Decade 5**	
Panel A: Infectious Disease, All										
1(Legal Abortion)	0.015	0.043	-0.080***	-0.091***	-0.184***	-0.139***	-0.137***	-0.067**	-0.153***	-0.096***
	(0.032)	(0.039)	(0.028)	(0.030)	(0.024)	(0.046)	(0.037)	(0.029)	(0.029)	(0.034)
Pre-legalization Mean	2.798	2.792	0.749	0.742	1.220	1.184	1.747	1.726	1.105	1.093
Panel B: Infectious Disease, White										
1(Legal Abortion)	-0.032	-0.022	-0.056*	-0.075**	-0.182***	-0.174**	-0.077***	-0.052	-0.179***	-0.145***
	(0.039)	(0.058)	(0.031)	(0.033)	(0.051)	(0.067)	(0.026)	(0.048)	(0.029)	(0.043)
Pre-legalization Mean	2.541	2.545	0.654	0.650	0.832	0.818	1.363	1.358	0.897	0.890
Panel C: Infectious Disease, Nonwhite										
1(Legal Abortion)	0.052	0.027	-0.220**	-0.215**	-0.196***	-0.214***	-0.280***	-0.255***	-0.164***	-0.133*
	(0.060)	(0.068)	(0.091)	(0.101)	(0.038)	(0.062)	(0.073)	(0.079)	(0.055)	(0.067)
Pre-legalization Mean	3.354	3.358	0.872	0.869	1.861	1.835	2.489	2.482	1.589	1.588
Panel D: Infectious Disease, Male										
1(Legal Abortion)	-0.007	0.025	-0.029	-0.040	-0.214***	-0.190***	-0.108**	-0.047	-0.069*	-0.026
	(0.025)	(0.033)	(0.022)	(0.025)	(0.032)	(0.025)	(0.044)	(0.033)	(0.036)	(0.045)
Pre-legalization Mean	2.218	2.211	0.427	0.425	0.809	0.779	1.248	1.231	0.736	0.730
Panel E: Infectious Disease, Female										
1(Legal Abortion)	0.042	0.055	-0.067***	-0.076***	-0.141*	-0.105	-0.215***	-0.164***	-0.289***	-0.248***
	(0.046)	(0.047)	(0.024)	(0.025)	(0.073)	(0.083)	(0.040)	(0.039)	(0.027)	(0.032)
Pre-legalization Mean	1.981	1.975	0.387	0.379	0.674	0.640	1.038	1.019	0.612	0.599
N	1,172	1,149	1,172	1,149	1,172	1,149	1,172	1,149	1,019	999
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
State FE and Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

NOTES: OLS coefficients reported for separate regressions for each decade of a cohort's lifespan. The dependent variables are the inverse hyperbolic sine of the mortality rates per 100,000 reproductive-aged women, specific to causes of death (see Appendix Table B.5 for ICD codes included) and decades of life. The set of state-level demographic controls includes the share of white reproductive-age females, the share of nonwhite reproductive-age females, the log of per capita income, the log of per-pupil education spending, and the state-level share with a high school degree. Additionally, policy controls included here are for state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Baseline fixed effects include state of birth fixed effects and year of conception fixed effects. Robust standard errors clustered at the birth state level. Regressions in Panels A, D, and E are weighted with the population of reproductive-aged women. For the regressions in Panels B and C populations of white and non-white reproductive-aged women are considered respectively. The sample includes cohorts conceived between 1958 and 1980.

SOURCE: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

Table B.3: Impact of legal abortion on Acute Mortality Rate, 1959-2018

	Decade 1		**Decade 2**		**Decade 3**		**Decade 4**		**Decade 5**	
Panel A: Acute Disease, All										
1(Legal Abortion)	-0.091***	-0.063***	-0.009	0.030*	-0.024	-0.014	-0.067***	-0.052**	-0.075***	-0.045**
	(0.014)	(0.015)	(0.039)	(0.015)	(0.020)	(0.014)	(0.013)	(0.021)	(0.022)	(0.020)
Pre-legalization Mean	5.422	5.410	4.051	4.027	4.564	4.545	4.597	4.597	3.575	3.573
Panel B: Acute Disease, White										
1(Legal Abortion)	-0.124***	-0.139**	-0.051	-0.039	-0.029	-0.050	-0.102***	-0.116**	-0.101***	-0.106*
	(0.031)	(0.059)	(0.034)	(0.035)	(0.021)	(0.047)	(0.018)	(0.048)	(0.032)	(0.058)
Pre-legalization Mean	5.245	5.245	3.903	3.890	4.409	4.395	4.526	4.516	3.518	3.499
Panel C: Acute Disease, Nonwhite										
1(Legal Abortion)	-0.100**	-0.125*	0.074*	0.039	-0.057**	-0.120***	-0.018	-0.040	-0.064**	-0.080*
	(0.041)	(0.066)	(0.039)	(0.044)	(0.027)	(0.044)	(0.044)	(0.052)	(0.031)	(0.047)
Pre-legalization Mean	5.985	5.984	4.500	4.484	5.034	5.024	4.958	4.972	3.909	3.927
Panel D: Acute Disease, Male										
1(Legal Abortion)	-0.091***	-0.060***	-0.012	0.024	-0.011	-0.004	-0.064***	-0.049*	-0.070**	-0.045***
	(0.013)	(0.016)	(0.040)	(0.016)	(0.023)	(0.015)	(0.015)	(0.027)	(0.031)	(0.015)
Pre-legalization Mean	4.868	4.857	3.748	3.721	4.328	4.307	4.278	4.277	3.218	3.214
Panel E: Acute Disease, Female										
1(Legal Abortion)	-0.092***	-0.067***	0.000	0.049***	-0.078***	-0.055***	-0.075***	-0.058***	-0.092***	-0.056
	(0.016)	(0.015)	(0.038)	(0.018)	(0.013)	(0.020)	(0.013)	(0.018)	(0.014)	(0.043)
Pre-legalization Mean	4.563	4.551	2.690	2.680	2.989	2.980	3.285	3.290	2.369	2.369
N	1,172	1,149	1,172	1,149	1,172	1,149	1,172	1,149	1,019	999
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
State FE and Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: OLS coefficients reported for separate regressions for each decade of a cohort's lifespan. The dependent variables are the inverse hyperbolic sine of the mortality rates per 100,000 reproductive-aged women, specific to Acute causes of death (see Appendix Table B.5 for ICD codes included) and decades of life. The set of state-level demographic controls includes the share of white reproductive-age females, the share of nonwhite reproductive-age females, the log of per capita income, the log of per-pupil education spending, and the state-level share with a high school degree. Additionally, policy controls included here are for state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Baseline fixed effects include state of birth fixed effects and year of conception fixed effects. Robust standard errors clustered at the birth state level. Regressions in Panels A, D, and E are weighted with the population of reproductive-aged women. For the regressions in Panels B and C populations of white and non-white reproductive-aged women are considered respectively. The sample includes cohorts conceived between 1958 and 1980.

Source: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

Table B.4: Impact of legal abortion on Chronic Mortality Rate, 1959-2018

	Decade 1		**Decade 2**		**Decade 3**		**Decade 4**		**Decade 5**	
Panel A: Chronic Disease, All										
1(Legal Abortion)	-0.102***	-0.047*	0.004	0.037**	-0.049***	-0.020	-0.040***	-0.013	-0.042***	-0.016
	(0.031)	(0.025)	(0.025)	(0.016)	(0.018)	(0.029)	(0.010)	(0.015)	(0.012)	(0.013)
Pre-legalization Mean	3.461	3.458	2.631	2.618	3.278	3.267	4.184	4.178	3.657	3.648
Panel B: Chronic Disease, White										
1(Legal Abortion)	-0.110***	-0.091**	0.013	0.027	-0.075***	-0.064	-0.062***	-0.065	-0.072**	-0.084
	(0.030)	(0.040)	(0.030)	(0.035)	(0.023)	(0.040)	(0.019)	(0.041)	(0.029)	(0.056)
Pre-legalization Mean	3.330	3.322	2.505	2.490	3.107	3.094	4.023	4.008	3.506	3.483
Panel C: Chronic Disease, Nonwhite										
1(Legal Abortion)	-0.154***	-0.121*	-0.084*	-0.113**	-0.012	-0.046	-0.056	-0.077	-0.071*	-0.092
	(0.057)	(0.067)	(0.045)	(0.052)	(0.047)	(0.064)	(0.035)	(0.050)	(0.039)	(0.062)
Pre-legalization Mean	3.738	3.741	2.833	2.827	3.707	3.705	4.775	4.785	4.204	4.214
Panel D: Chronic Disease, Male										
1(Legal Abortion)	-0.109***	-0.054	0.005	0.037*	-0.039*	-0.008	-0.037***	-0.009	-0.018	0.004
	(0.030)	(0.033)	(0.026)	(0.020)	(0.021)	(0.034)	(0.012)	(0.018)	(0.014)	(0.012)
Pre-legalization Mean	2.877	2.874	2.100	2.087	2.727	2.714	3.598	3.590	3.083	3.074
Panel E: Chronic Disease, Female										
1(Legal Abortion)	-0.092**	-0.036	0.004	0.037	-0.057***	-0.032	-0.045***	-0.018	-0.074***	-0.045**
	(0.036)	(0.022)	(0.033)	(0.023)	(0.016)	(0.025)	(0.011)	(0.015)	(0.010)	(0.017)
Pre-legalization Mean	2.632	2.627	1.740	1.729	2.406	2.395	3.364	3.360	2.828	2.820
N	1,172	1,149	1,172	1,149	1,172	1,149	1,172	1,149	1,019	999
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
State FE and Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

NOTES: OLS coefficients reported for separate regressions for each decade of a cohort's lifespan. The dependent variables are the inverse hyperbolic sine of the mortality rates per 100,000 reproductive-aged women, specific to chronic causes of death (see Appendix Table B.5 for ICD codes included) and decades of life. The set of state-level demographic controls includes the share of white reproductive-age females, the share of nonwhite reproductive-age females, the log of per capita income, the log of per-pupil education spending, and the state-level share with a high school degree. Additionally, policy controls included here are for state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Baseline fixed effects include state of birth fixed effects and year of conception fixed effects. Robust standard errors clustered at the birth state level. Regressions in Panels A, D, and E are weighted with the population of reproductive-aged women. For the regressions in Panels B and C populations of white and non-white reproductive-aged women are considered respectively. The sample includes cohorts conceived between 1958 and 1980.

SOURCE: NVSS/CDC Multiple Cause of Death Files, 1959-2018. (NBER, 1959-2004; NCHS, 2005-2019)

B.3 Cause of death classification by ICD codes

Table B.5: Cause of Death Classification with ICD codes, 1959-2018

Infectious Diseases
Influenza, Pneumonia, Flu, Tuberculosis, Waterborne and food-borne diseases, and other infectious diseases including sexually transmitted diseases and diseases attributable to bacteria, viruses, and other parasites
ICD7: 470-475, 480-483, 490-493
ICD8: 460-466, 470-474, 480-486, 010-019, 540-543, 000-009, 090-099, 020-136
ICD9: 460-466, 480-487, 010-018, 540-543, 001-009, 090-099, 020-139
ICD10: J00-J18, A15-A19, K35-K38, A00-A09, A20-B99
Chronic Diseases
Cardiovascular diseases, Cancer, Diabetes, Nervous system, Respiratory illness, Other chronic incl. all other organs
*Chronic diseases (narrow definition) include Cardiovascular diseases, Cancer, Diabetes, Nervous system, Respiratory illness and excludes other chronic diseases
ICD7: 401, 402, 410-416, 420-422, 430-434, 440-447, 450-456, 460-468, 290-299, 140-148, 150-159, 160-165, 170-181, 190-199, 200-207, 210-229, 230-239, 260, 250-254, 270-277, 280-289, 322-323, 530-539, 560, 580-587, 590-594, 600-617, 620-626, 630-637, 700-709, 715, 720-727, 730-738, 740-749, 780-783, 786-789, 332-334, 340-345, 350-357, 360-379, 390-398, 500-502, 510-527
ICD8: 391-398, 420-422, 400-404, 410-414, 420-429,432-438, 440-448, 450-458, 280-289, 140-163, 170-174, 180-228, 230-239,250,240-246, 251-258, 260-279, 303-304, 520-529, 530-534, 544,550,551, 560-577, 580-584, 590-607, 610-616, 620-629, 690-698, 700,707,708, 710-718, 720-738, 780-783, 786-789, 320-324, 330-333, 340-358, 360-379, 380-389, 490-493, 500-508, 510-519
ICD9: 391-398, 401-405, 410-417, 420-429, 432-438, 440-448, 451-459, 280-289, 140-149, 150-159, 160-165, 170-176, 179-189, 190-199, 200-208, 210-239, 239, 250, 240-246, 251-279, 291-292, 520-534, 553, 570-608, 610-616, 620-629, 690-698, 700-707, 710-739, 780-786, 320-326, 330-337, 340-389,490-496, 500-508, 510-519
ICD10: I01-I52, I67-I99,D70-D77, C00-D44, E10-E14, G00-H95, J20-J99, E00-E07, E15-E89, K00-K28, K70-K87, L20-N99, R00-R69
Accident
Motor vehicle accidents, all other accidents, and adverse effects caused by exposure to smoke, fire, flames, accidental poisoning, etc.
*Accidental deaths (narrow definition) includes all accidental deaths but excludes motor vehicle accidents
ICD7: 800-802, 810-825, 830-835, 840-845, 850-858, 860-866, 870-888, 890-895, 900-904, 910-936, 940-946, 950-959, 960-965,970-979, 980-985, 990-999
Continued on next page

Table B.5 Cause of Death Classification with ICD codes, 1959-2018 (continued)

ICD8: 800-807, 810-823, 825-827, 830-838, 840-845, 850-869, 870-877, 880-887, 890-899, 900-936, 940-978, 990-999
ICD9: 800-807, 810-838, 840-845, 849-869, 870-888, 890-936, 940-978, 990-999, 430-431, 535-537, 550-552, 555-569, 680-686, 701-706, 708-709, 787-789
ICD10: V02-V04, V09.0, V12-V14, V19.0-V19.2, V19.4-V19.6, V20-V79, V80.3 -V80.5, V81.0-V81.1, V82.0-V82.1, V83-V86, V87.0-V87.8, V88.0-V88.8, V89.0, V89.2, V01, V05-V06, V09.1, V09.3-V09.9, V10-V11, V15-V18, V19.3, V19.8-V19.9, V80.0-V80.2, V80.6-V80.9, V81.2-V81.9, V82.2-V82.9, V87.9, V88.9, V89.1, V89.3, V89.9, V90-X59, Y40-Y86, Y88, U03, X60-X84, Y87.0, U01-U02, X85-Y09, Y87.1, I60-I66, K29-K31, K40-K67, K90-K93, L00-L14
Maternal (pregnancy-related)
Maternal death is defined as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes" (Hoyert, 2023)
ICD7: 640-652, 670-678, 680-689
ICD8: 630-645,650-662,670-678
ICD9: 630-648, 650-677
ICD10: O00-O99
Acute
Acute deaths include accidental deaths, infant deaths, and maternal deaths, the codes are in the preceding rows. Additionally, sudden deaths caused by other causes are also included, specific codes are shared below.
ICD7: 330, 331, 540-545, 561, 570-578, 690-698, 710-714, 716, 785
ICD8: 430-431, 535-537, 552-553, 560-569, 680-686, 701-706, 709, 784-785
ICD9: 430-431, 535-537, 550-552, 555-569, 680-686, 701-706, 708-709, 787-789
ICD10: I60-I66, K29-K31, K40-K67, K90-K93, L00-L14
Child Maltreatment (narrow definition)
Includes deaths caused by malnutrition, caused by falls, accidental threats to breathing, poisoning (drugs, medicaments, and biological substances; and accidental poisoning by and exposure to noxious substances), accidental drowning and submersion, neglect, abandonment, maltreatment, exposure to excessive temperature or pressure. Additionally, age at the time of death as reported on the death certificates is used to compute child maltreatment deaths.
ICD7: 280-286, 852-855, 870-888, 890-895, 900-904, 921-922, 923-926, 929-933
ICD8: 260-269, 804, 833, 834, 835, 843, 850-869, 870-877, 880-887, 911-913, 832, 910, 954, 964, 984, 900, 901, 902, 904
ICD9: 260-269, 804, 833, 834, 835, 843, 987, 849-869, 870-877, 880-888, 911-913, 832, 910, 954, 964, 984, 900, 901, 902, 904, 961, 962, 980, 981, 982, 983

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Table B.5 Cause of Death Classification with ICD codes, 1959-2018 (continued)

ICD10: E40-E46, W00-W19, W75-W84, T36-T50, X40-X49, W65-W74, Y06-Y07, W92-W94
Child Maltreatment (broad definition)
Includes all the causes included in the narrow definition and homicide; the codes used are mentioned in respective rows for these causes. Additionally includes any mentions of falls, poisoning, or injury in the cause of death description, these particular codes are given below. Additionally, age at the time of death reported on the death certificates is used to compute the child maltreatment deaths.
ICD7: 760-761, 911-920
ICD8: 910-929, 940-949, 960-978, 980-989, 990-999
ICD9: 922-925, 960-969, 970-978, 980-989, 990-999
ICD10: Y30,Y31 X85-Y05, Y08-Y09, X00-X09, R95-T14, T20-T32, Y10-Y34, W20-W49
Homicide
Assault by any means
ICD7: E964, E980-E985
ICD8: E965, E966, E960-E964, E967-E969
ICD9: E967, E960-E966, E968-E969
ICD10: X85-X92, X93-X99, Y00-Y09, Y87.1
Suicide
Intentional harm by any means
ICD7: 970-979
ICD8: 950-959
ICD9: 950-959
ICD10: U03, X60-X84, Y87.0
Infant and Neonatal Mortality
Age at the time of death reported on the death certificates used to compute the infant and neonatal rates. Infant mortality is measured as any death occurring to infants under one year of age. Neonatal mortality is defined as the death of an infant in the first month of life.
Source: NCHS (1959-1967, 1968-1978, 1992); NVSS (1999)