IZA Institute of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 17910

The Effect of Abortion Policies on Fertility and Human Capital in Sub-Saharan Africa

Arcangelo Dimico

MAY 2025

DISCUSSION PAPER SERIES

IZA DP No. 17910

The Effect of Abortion Policies on Fertility and Human Capital in Sub-Saharan Africa

Arcangelo Dimico
Queen's University Belfast, GLO, IZA, CEPH, QUCEH and HHDI

MAY 2025

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany
Phone: +49-228-3894-0
Email: publications@iza.org
www.iza.org

ABSTRACT

The Effect of Abortion Policies on Fertility and Human Capital in Sub-Saharan Africa*

I evaluate the impact of abortion policies in sub-Saharan Africa to understand the potential consequences of a reduced international support for women's rights following the overturn of Roe v. Wade. I find that decriminalizing abortion reduces fertility through two complementary channels. For households at the top of the wealth distribution, the effect manifests as a reduction in excess fertility, which is more pronounced among lower-educated women due to their lower likelihood of using contraception. For households at the bottom of the wealth distribution, the impact runs through a decline in the number of children with a low survival probability. This latter effect is more pronounced among highly educated women, who are more likely to control their own health-related decisions and view abortion as a viable option. I also find that while women's education levels rise after decriminalization, this does not lead to better labor market opportunities. Children born afterwards tend to achieve higher levels of education.

JEL Classification: O15, L18, J13, J16, K38
Keywords: abortion, gender, fertility, child mortality, human capital

Corresponding author:
Arcangelo Dimico
Queen's University Belfast
University Road
Belfast
Northern Ireland
BT7 1NN
United Kingdom
E-mail: a.dimico@qub.ac.uk

* I thank Graziella Bertocchi, Michael Bleaney, David Canning, Omer Moav, Helmut Rainer, Oliver Morrisey, and participants at the Belfast Workshop on Fertility, Health, and Human Capital (2023), the NICEP annual conference (2024), the CSAE annual Conference (2025) for helpful comments and suggestions. No financial support to be acknowledged.

1 Introduction

The recent overturning of *Roe vs. Wade* by the U.S. Supreme Court has revived global debates about reproductive rights, prompting concerns about potential implications for African nations, where fertility rates remain significantly higher than global averages. While fertility rates worldwide have been on decline since the 1960s, reaching an average of 2.3 children per woman in 2020, sub-Saharan Africa stands as an exception, maintaining fertility rates nearly double those of any other region. Following a modest drop in the late 20th century, the region experienced a level ling off in fertility decline in the early 2000s, leading to an upward revision in the projected population growth for the area.

To explain this "*African exceptionalism*", particular attention has been directed to the distinctive characteristics of the African society that make the nature of the fertility transition different from other countries (Bongaarts & Casterline 2013). Factors such as premarital sexual norms and a gradual erosion of traditional birth spacing methods have been identified as contributors to the slower pace of the fertility transition in the region (Caldwell et al. 1992). Consequently, policies aimed at enhancing access to modern family planning and safe abortion have been considered necessary to mitigate early childbearing and establish appropriate birth intervals between children. As pointed out by Becker (1960), such measures can increase the scope of decision-making and potentially boost the income effect.

In this paper, rather than speculating about the spillover effects of the 2022 US court decision, I take a step back to examine whether abortion policies in Africa have exerted a significant influence on fertility and human capital in the first place. While several African nations decriminalized abortion under certain conditions, policy adoption timing varies significantly across countries. For instance, many former British colonies expanded access to safe abortion soon after the 1967 English Abortion Act, whereas other countries only began to reform their laws after ratifying the 2003 Maputo Protocol on the Rights of Women in Africa. These legal changes were often driven by international pressure, rather than domestic demand, generating exogenous variation in timing and scope of the policy across countries which could have been exploited to identify the effect of abortion decriminalization. However, differences in ancestral fertility preferences and reproductive traditions across ethnic groups may influence compliance with these laws, potentially biasing the estimated effects of the policy. To address this issue, I follow Michalopoulos & Papaioannou (2014, 2016) and Lee & Schultz (2012) and focus on DHS clusters across adjacent regions (in different countries) within the historical homeland of the same ethnic group. Focusing on DHS clusters within the same ethnic group in different countries allows for a quasi-experiment similar to a difference-in-discontinuities approach which combines features of a regression discontinuity design with a difference-in-differences approach (Grembi et al. 2016, Eggers et al. 2018, Galindo-Silva et al. 2018). The difference-in-differences element, arising from the time and cross-country variations, controls for differences between treated and untreated countries before and after the decriminalization of abortion. At the same time, the regression discontinuity design takes into account specific ethnic characteristics influencing differences in sexual norms and traditional family planning methods, which together with other spatially correlated factors might influence the demand for children and human capital.

Using this difference-in-discontinuities approach and retrospective information about fertility from DHS surveys for 32 sub-Saharan countries, I find that decriminalizing abortion significantly reduces fertility. Women in countries that have decriminalized abortion have an 8 percentage point lower probability of having more children than the sample mean. This effect is primarily driven by decriminalization on grounds related to fetal abnormality/impairment, and rape/incest.

To understand the mechanism driving this impact on fertility I look at possible channels. I find that the impact of decriminalizing abortion on fertility manifests through two complementary channels. Legal access to abortion reduces the likelihood of childbirth with a low survival rate. This decline is particularly prominent among women with higher education levels from households at the lower end of the wealth distribution. Poverty is a key factor influencing the probability of having children with a higher mortality rate, thereby explaining the pronounced effect among less affluent households. At the same time, educated women in less affluent households are more likely to exert control over decisions related to their health and consider abortion as a viable option if needed.

Decriminalization of abortion has also an impact on excess fertility (i.e., unwanted children). This latter effect is more pronounced among less educated women in households at the top of the distribution of wealth. The reduction of excess fertility for households at the top of the wealth distribution is consistent with abortion boosting the income effect, as outlined by Becker (1960), given that affluent households tend to have the lowest demand for children (measured by the number of ideal children). Abortion in this case is considered as a potential substitute for family planning, explaining the observed larger impact among less educated women; those who are less inclined to use contraception methods.

Finally I extend the analysis to consider the effects of abortion decriminalization on women's human capital and labor market outcomes, as well as the potential long-term impact on the educational attainment of children. Women in countries decriminalizing abortion tend to have a higher level of education (approximately 0.1 standard deviations), however, the impact on labor participation and job quality is relatively modest and barely significant.

To consider the long-term effect of abortion on the quality of children I turn to the DHS household survey and focus on sons and daughters who are no longer enrolled in school. I find a large effect of decriminalization on children's educational levels. This effect increases over time and is more pronounced among households in the upper third and fourth quintile of the wealth distribution - those most likely to benefit from a reduction in excess fertility. Overall, the impact of abortion decriminalization on children's education ranges from 0.2 standard deviations for cohorts born shortly after the decriminalization of abortion to nearly 0.5 standard deviations for later cohorts.

To test the robustness of results I perform several sensitivity checks. I replace the dependent variable with different measures of fertility and excess fertility to evaluate the stability of the results across different indicators. I include a larger set of control variables to account for the influence of historical and geographical characteristics. I use dummies for self-reported ethnicity to control for the coexistence of individuals from different ethnicity within the historical homeland of the group. I also re-estimate models using DiD estimators robust to heterogeneous treatment and estimate variations of the baseline model to account for modern contraception. All these tests have no significant impact on estimated effects, confirming the robustness of results.

There are some issues, however, which are still source of concerns in terms of causality. Different from a conventional border regression discontinuity, the difference-in-discontinuities design mitigates the risk of confounding policies that might change at the border. Nevertheless, the porous nature of Africa's borders poses a potential threat to identification, as border populations might cross national boundaries to seek abortion services. Consequently, it is plausible that women in a country with restrictive abortion policies could cross into neighboring countries where clinics offer the service. This sort of "*abortion tourism*", however, should level off differences between adjacent groups and result in a downward bias of the effect on fertility and human capital. I also find no evidence of sorting along the border when I look at the continuity of the distribution function at the border, which should exclude one of the most common issues associated with geographic regression discontinuity designs (Keele & Titiunik 2015).

The paper contributes to the existing literature on the impact of family planning and abortion on fertility and human capital. A substantial portion of this literature look at family programs and abortion in the United States, with earlier research focusing on the economic consequences of contraception (Goldin & Katz 2002, Goldin 2006, Bailey 2010, 2013). These studies, particularly those examining the effects of the birth control pills, show that increased access by young unmarried women has an effect on fertility, marital, educational, and labor market outcomes later in life. Bailey (2006), Miller (2009) and Guldi (2008) find an effect of birth control pills on age at birth, which then affects education and labour force participation. Christensen (2012) and Rotz (2016) focus on the quality of the matching between husband and wife, and the incidence of premarital cohabitation. Ananat & Hungerman (2012) evaluate the impact on maternal outcomes, showing that contraception at younger ages contributes to a higher proportion of children born to mothers who are married, college-educated, and employed in professional occupations. Kearney & Levine (2009) and Lindo & Packham (2017) look at different national and state level programs to facilitate access to family planning. The former focuses on Medicaid eligibility for family planning. Using a difference-in-differences approach they find evidence that family planning funding reduces birth rates. The latter analyzes the impact of the Colorado's Family Planning Initiative and finds that access to long-acting reversible contraceptives (LARCs) has a substantial effect on teen birth rates.

Nevertheless, Myers (2017) cautioned that some of the existing evidence on family planning in the US may confound the effects of abortion. Myers (2021*a*), Myers (2021*b*), and Lindo & Pineda-Torres (2021) look at access to abortion and find that the waiting period and the distance from an abortion centre have a significant effects on the likelihood of abortion and number of births. Miller et al. (2023) show that being denied an abortion might cause future financial distress. The legalization of abortion has an effect on fertility Bitler & Zavodny (2002) in the short- (Levine et al. 1999, Angrist & Evans 2000) and in the long-term (Ananat et al. 2007) and decrease the probability of single parenting (Gruber et al. 1999). Crime is also likely to be affected (Donohue & Levitt 2001) and the probability of college graduation among women too (Ananat et al. 2009).

Similar effects have been observed when evaluating the impact of abortion in other countries. Pop-Eleches (2006) evaluates the impact of abortion on education and employment in Romania. Kalsi (2015) focuses on abortion in Taiwan and shows possible positive effects on university enrollment rates of higher birth order girls. Brooks et al. (2019) exploit exogenous variation coming from the global gag rule to estimate the impact of prohibiting abortion on the incidence of unsafe abortion in Africa. A few other studies have looked at the potential unintended negative consequences of abortion. Abortion in Taiwan has had an effect on sex-selection at birth (Lin et al. 2014), a finding which is confirmed by Valente (2014) who finds evidence of sex-selective abortion in Nepal.

Studies focusing on local randomized interventions in developing countries, however, have produced conflicting evidence about the impact of family programs on long term usage of contraception and fertility. Ashraf et al. (2013) find no significant effect of contraception programs in Zambia on fertility, though they document an increase in the uptake. Desai & Tarozzi (2011), Lutalo et al. (2010), Tran et al. (2020) find a marginal or non-significant long term impact of family programs on the probability to use contraception and pregnancy rates in Ethiopia, Uganda and Democratic Republic of Congo. The existing evidence from the Novrongo project in Ghana and the Matlab project in Bangladesh, on the other hand, seems to provide more encouraging results with significant effects of family planning programs on fertility, education and employment (Shareen & Schultz 2013, Sinha 2005, Canning & Schultz 2012). Miller & Babiarz (2016) provide a review of the micro-evidence on the effectiveness of family planning highlighting the heterogeneity in the existing evidence of family planning programs on fertility, women's health and socioeconomic outcomes. These differences across different randomized control trials are generally related to differences in terms of statistical power of projects and a time-horizon which might be too short for the effect to manifest which then result in heterogenous conclusions, even though these studies tend to be internally valid.

The literature on family planning in sub-Saharan Africa, primarily among anthropologists, ethnographers, and demographers, has concentrated on the impact of traditional family planning methods (e.g., post-partum abstinence and lactation amenorrhea), considering modernity and the erosion of traditional norms over time as potential explanatory factors for the lack of a fertility transition. Coale (1986), Knodel & van de Walle (1979) and Watkins (1987) argue that socioeconomic conditions weakly associate with fertility decline, and regions sharing the same language and culture tend to follow similar patterns. Bahrami-Rad et al. (2021) find a correlation between the intensity of usage of traditional methods in ethnographic surveys and current intensity. Rossier & Corker (2017) investigated usage of modern, traditional, and neo-traditional contraceptive methods among women in 23 countries. They identify substantial unmet needs across regions, arguing that some women might prefer traditional methods due to perceiving modern and neo-traditional methods as being associated with promiscuity. Caldwell & Caldwell (1977) and Van de Walle & Van de Walle (1989) raised questions about the value of traditional methods for birth control, considering them akin to purification rituals. Singh et al. (2017) use data from DHS to explore the impact of abortion and traditional vs. modern family planning methods. They find that modern family planning methods are more prevalent in Southern regions, while traditional methods are more common in Middle Africa and that modern methods, especially in Southern regions, are more effective in avoiding unintended pregnancies. Murdock (1967) considers a lack of protein-based diet as one of the factors which explain the regional variation in traditional family planning methods. This analysis is then extended by Saucier (1972) and Brown (2007), among others. Caldwell & Caldwell (2002), Caldwell et al. (1992) and Bongaarts (2020) considered the absence of consistent national family planning programs as a significant factor explaining the lack of a fertility transition in Africa.

The paper is also related to the literature on demographic economics and the trade-off between quality and quantity of children pioneered by Becker (1960). Becker (1981) and Becker et al. (1990) extend the idea of a substitution effect to consider fertility reduction in the demographic transition which is driven by the quality–quantity trade-off[1]. The effect of income (and the cost of children) on the demand of children has had considerable appeal in the empirical literature, often with contrasting results. Brueckner & Schwandt (2015), Lovenheim & Mumford (2013), Kearney & Wilson (2018), Gallego & Lafortune (2023) find a positive impact of income on fertility while Jones & Tertilt (2008) and Herzer et al. (2012) suggest a negative relation between income and fertility. Becker et al. (2010) and Bleakley & Lange (2009), on the other hand, focus on the price of the quality of children suggesting that a reduction in the cost of quality has a significant negative effect on fertility. Cervellati & Sunde (2011) and Hailemariam (2022) suggest that the effect of income on fertility may not be monotonic and that depends on whether countries have already initiated the fertility transition.

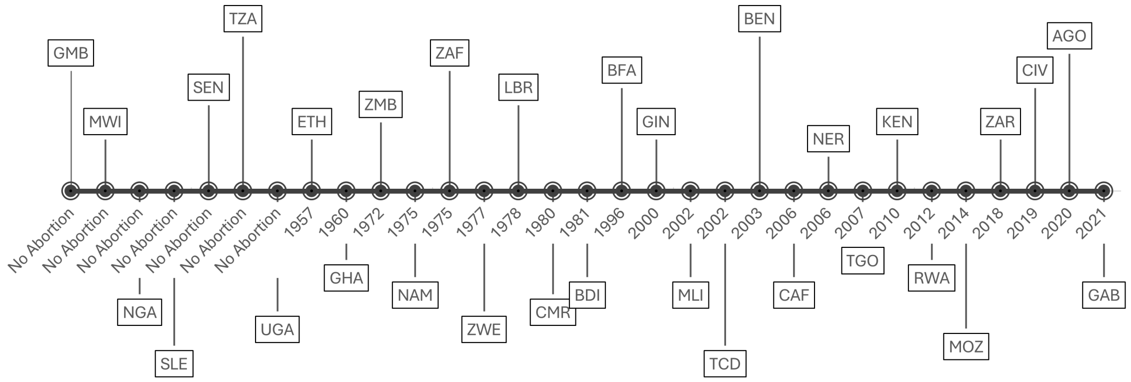
The paper is structured as follows: Section 2 offers a brief background on abortion policies in Africa. In Section 3, I present the data and discuss the empirical approach used to estimate the impact of abortion policies. Section 4 reports the estimated effects of abortion policies on fertility. The channels through which abortion policies affect fertility are investigated in Section 5, while in Section 6, I show the impact of abortion policies on human capital among women and children. The paper ends with some short conclusions (Section 7).

2 Background

Legalization of abortion remains a contentious issue in many countries, and Africa is no exception in this regard. Access to safe abortion is still severely restricted or regulated in many countries, pushing many women towards unsafe alternatives when they find themselves in need of terminating a pregnancy. It is estimated that nearly three-quarters of abortions in sub-Saharan Africa are unsafe (Bankole et al. 2020). Unintended pregnancy stemming from gender-based violence, non-consensual early sexual debut, and child marriage is one of the most common reasons for resorting to unsafe forms of abortion (UNFPA 2022). According to Bankole et al. (2020), only four countries (South Africa, Guinea Bissau, Cape Verde, and Sao Tome and Principe) currently allow abortion without

[1]Other contributions in this area include Barro & Becker (1989), Galor (2005), Galor & Weil (2000), Galor & Moav (2002, 2004) and Moav (2005). Guinnane (2011), Doepke (2015), Doepke et al. (2023) and Jones et al. (2010) provide an exhaustive review of the empirical and theoretical literature discussing changes occurred across countries in the last decades.

Figure 1: Timeline of Abortion Legislation.



Note: "No Abortion" denotes countries where the termination of a pregnancy is either strictly prohibited or allowed only in cases when the life of the pregnant woman is at risk.

restrictions[2] (liberalized), with Zambia being the sole country decriminalizing abortion on grounds of survival, health, rape, and socioeconomic factors[3]. The absence of clear national guidelines limits access and provision of services even in cases where abortion has been decriminalized, forcing women to resort to unsafe or traditional methods with all the potential associated health risks.

The distribution of abortion policies across African countries largely reflects the colonial legacy, with former British colonies having more permissive policies compared to former French colonies. However, this distinction is not always clear-cut. Religion also plays a crucial role, with most Muslim-majority countries imposing more restrictive rules. For instance, abortion in Sierra Leone is still regulated by the 1861 Victorian penal code, stipulating that attempting to terminate a pregnancy can result in life imprisonment.

Figure 1 shows the timeline of legislation in our sample of countries. Abortion in Malawi, Nigeria, Gambia, Sierra Leone, Senegal, and Tanzania is either strictly prohibited altogether or decriminalized solely in cases where the life of the pregnant woman is threatened. From a chronological point of view, we can identify two potential waves of regulations among countries that have decriminalized. The first wave occurred in the 1970s following the English Abortion Act of 1967, while the second phase started at the turn of the millennium with several countries ratifying the Maputo Protocol which guarantees extensive rights to African women and girls. Ethiopia and Ghana included mitigating circumstances in the penal code even before the English Abortion Act. The 1957 Ethiopian Penal Code (Proclamation No. 158) permits free mitigation when *"the*

[2]South Africa is the only country liberalizing abortion in the sample (the 1996 Choice on Termination of Pregnancy Act).

[3]Benin in 2021 passed one of the Africa's most liberal abortion laws allowing it when a pregnancy is likely to cause a woman material, educational, professional or moral distress.

pregnancy has been terminated on account of exceptionally grave state of physical or mental distress, especially following rape, or incest, or because of extreme poverty". Ghana's 1960 Criminal Offence Act 29 also considers rape, fetal abnormality, and risks to the mother's physical and mental health as circumstances under which abortion is not a criminal offense[4]. Rwanda, Mozambique, Gabon, Angola, Ivory Coast, and the Democratic Republic of Congo have only recently adopted more progressive policies. However, some of the countries which have only recently regulated abortion will be untreated in our sample because occurring after the DHS survey takes places.

3 Data

3.1 Abortion Policies

I use information from the UN/WHO Global Abortion Policies Database, alongside data from the Center for Reproductive Rights and the Guttmacher Institute, to code abortion laws across sub-Saharan Africa. These sources provide details about the legal grounds under which an abortion can be carried out, the year of decriminalization, and the conditions under which decriminalization occurred. However, they sometimes offer inconsistent information. To ensure coding consistency, I cross-reference this data with original Penal/Criminal codes and address any discrepancies across the sources. Countries where pregnancy termination is only allowed when the woman's life is threatened (without consideration for physical or mental health) are considered as the most restrictive, and no abortion is coded in such instances. A country will be treated if pregnancy termination on grounds related to physical and/or mental health, rape/incest, or fetal abnormality represents mitigating circumstances and the woman is not prosecutable by law. Table A1 in Appendix A provides a summary of the sources which I used for coding whether abortion is decriminalized. Figure B1 and Figure B2 in Appendix B show the distribution by country of the legal grounds on which abortion is not considered a criminal offense and the year of decriminalization.

3.2 DHS

The Demographic Health Surveys (DHS) is a nationally representative survey that provides rich information on marriage, fertility, mortality, family planning and reproductive health for almost 90 countries since 1984. Individuals are normally sampled using a stratified two-stage cluster design. Countries are first divided into small regions (clus-

[4]Act 29, Criminal Offenses Act, 1960, Sections 58 & 67.

ters) from which households are randomly selected. Each eligible household receives a household, a biomarker, and an individual questionnaire. The latter provides the full history of the mother and some basic information about children (i.e., sex, survival, spacing, birth-weight). The individual questionnaire, however, does not cover information about the education of children. This information is only available from the household survey and only for children still residing in the household, causing a sample selection issue. Despite this selection in the sample, the analysis can still provide valuable information. For instance, the selection in the sample is likely to result in a downward bias (bias toward zero) of the estimated impact of abortion if children born after the policy are more likely to accumulate human, as those with higher education levels are more likely to leave the household, affecting the variance in education among the treated sample more severely.

For the sample selection, I include only countries with available Global Positioning System (GPS) data. In several cases (e.g., Angola, Gambia, Central African Republic, and South Africa), GPS-linked data from the Standard DHS is available for only one survey wave — typically the most recent. Hence, to avoid over-representing countries with multiple survey rounds and keep consistency across countries, I select only the most recent DHS survey with available GPS data for each country. The final sample comprises 32 countries,[5] offering broad representation across sub-Saharan Africa. Figure B3 in Appendix B shows the geographical distribution of DHS clusters included in the sample.

Exposure to Christian missions and colonial policies has been found to be significant predictor of current levels of education, which in turn can influence abortion and fertility decisions. To proxy for this exposure, I use geocoded data from Christian missions, explorer routes, and colonial railways from Nunn (2010) and Nunn & Wantchekon (2011) and compute the distance from DHS clusters. Data from Natural Earth and Maina et al. (2019) are used to measure the distance from the closest city and health facility, which can provide insights into the cost of abortion. Access to the sea is also an important determinant of development which I proxy with a measure of the centroid distance of the DHS cluster from the shore. To gather geographical information on altitude, ruggedness, temperature, and rainfall, I generate a 20km radius buffer around each cluster and compute the average value within this buffer[6].

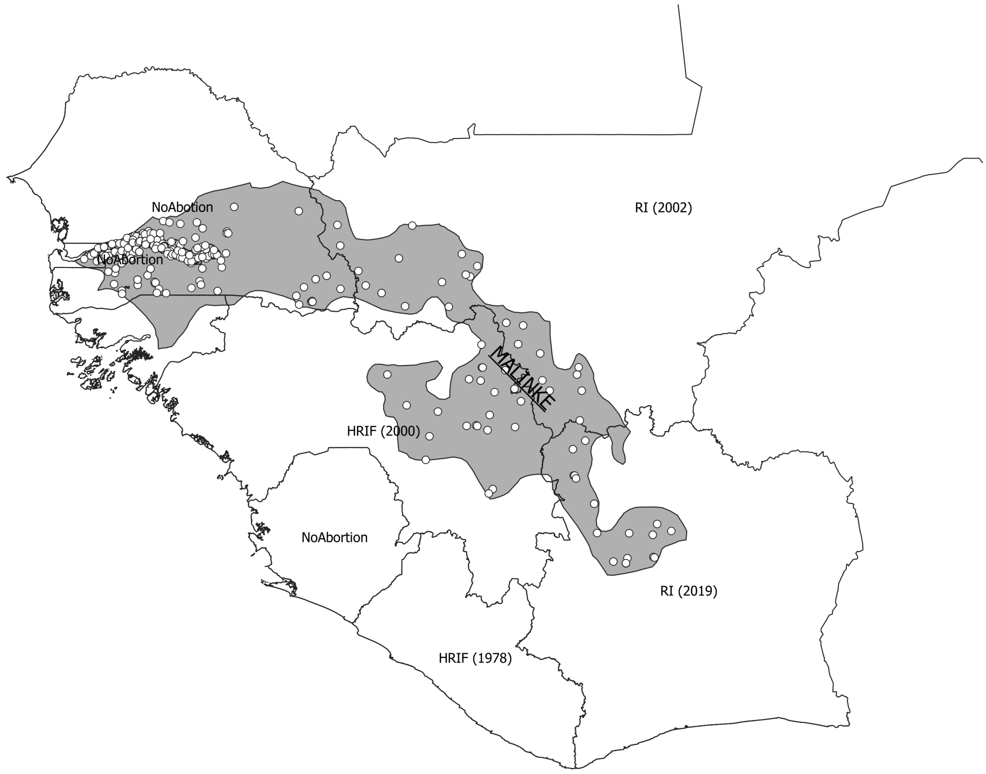
3.3 Ethnic Partitions

Murdock (1957) provides information on the spatial distribution of 826 ethnic groups

[5]The list of countries and survey waves is provided in Table A2 in Appendix A.

[6]Table A3 in Appendix A reports a short description of sources and variables

Figure 2: Ethnic Partitions and Variation in Abortion - West Africa.



Note: The historical ethnic homeland of the Malinke is shaded in grey. White dots represent DHS cluster within the ethnic homeland, and black lines mark countries' borders. RI stands for rape and incest, while HRIF stands for health, rape/incest, and fetal impairment. The year of decriminalization is reported unless abortion has not been decriminalized (denoted as NoAbortion). Guinea-Bissau is not part of the sample and left blank.

(plus 8 uninhabited regions) in Africa[7]. Following Michalopoulos & Papaioannou (2016, 2014), I overlay the distribution of ethnic homelands with level zero administrative boundaries from GADM. This intersection marks the partitioned ethnic groups resulting from the "*Scramble for Africa*", initiated by the 1884-85 Berlin Conference. Figure B4 in Appendix B shows the distribution of these partitions. The estimation method leverages the variation between the portion of the ethnic group in an untreated country and the partition in the treated country. Cohort variation across partitions will also be exploited, considering that abortion laws in different countries were adopted at different points in time.

Figure 2 provides a visual inspection of the variance to be exploited focusing on the Malinke, one of the largest ethnic groups in Africa, spanning across six countries (Ivory Coast, Guinea, Mali, Gambia, Senegal and Guinea Bissau). Abortion was decriminalized in Guinea in 2000 on grounds related to health, rape, and fetal abnormality. In Mali, the 2002 abortion law considers rape and incest as the only mitigating circumstance. Simi-

[7]The dataset is provided by Nunn & Wantchekon (2011) and available at: https://nathannunn.arts.ubc.ca/data/

larly, the 2019 penal code in Ivory Coast only decriminalizes abortion on grounds related to rape and incest. Senegal and Gambia, finally, have the most restrictive abortion laws. Hence Guinean women of childbearing age (before/after 2000) in DHS clusters (white dots) within the Malinke's historical homeland will be compared to women in Senegal and Gambia who have never been treated. Women in Guinea will also be compared to their counterparts in Mali and Ivory Coast who remain untreated till 2002 and 2019 respectively. Of course, later-treated women in Ivory Coast and Mali will also be compared with early-treated women in Guinea (besides untreated women in Gambia and Senegal) which might cause issues in terms of heterogeneity of the treatment effect. This possibility will be considered, even though the number of untreated countries in the sample remains substantial. For instance, Ivory Coast in the sample will be considered as an untreated group because the DHS survey is conducted before 2019 and only the information on women born before such a date will be used.

3.4 Empirical Strategy

I use retrospective data on women's characteristics from the DHS to exploit variations in fertility across countries and birth cohorts. To estimate the effect of abortion decriminalization, I focus on women likely to have been exposed to the policy change (the decriminalization of abortion) throughout their entire reproductive lifespans. These are women who are either not yet of reproductive age or not yet born when abortion is decriminalized. This group is more likely to be influenced by changes in abortion laws, given that, according to the Guttmacher Institute, nearly half of all pregnancies among adolescents in sub-Saharan Africa are unintended, with significant implications for education, employment, family formation, and fertility. Although older women may have access to abortion after decriminalization, the policy's effect on their fertility is likely limited, as adjusting fertility behaviors later in life is more difficult. The difficulty to change fertility choices is consistent with existing evidence on the relationship between fertility timing, educational attainment, and subsequent family decisions.

The lowest age at birth in the sample is 12[8]. Consequently, women who are 12 years old (or younger) when abortion is decriminalized are considered part of the treated group. The model to be estimated can be written as follows:

[8] I look at the distribution of age at first birth in the sample to understand when women may potentially begin giving birth. The distribution of age at first birth is provided in Table B5 in Appendix B.

$$Y_{i,g,c,t} = \gamma_g + \lambda_c + \theta_t + \sum_{\tau=t}^{T} \beta_\tau \cdot \chi_c \cdot \mathbf{1}(t_{12} - T_c = \tau) + \epsilon_{i,g,c,t}$$

The estimator leverages variations between women in countries where legal access to safe abortion is available, and compare them to women in countries where such a choice is not present. It will also consider the variation between cohorts exposed to the treatment (abortion) for their entire reproductive lifespan and those who had already reached reproductive age when abortion laws were passed. These two sources of variation, however, will be confined to women across adjacent regions belonging to the historical homeland of the same ethnic group to mitigate the effect of ethnic and cultural differences in terms of sexual norms and fertility[9]. The estimated model therefore is comparable to a standard difference-in-discontinuities approach. The difference-in-differences will reduce the possibility of confounding policies which change at the border, a possible threat to identification common to geographic regression discontinuity designs (Keele & Titiunik 2015). The RD approach will exploit the variation between individuals who are likely to share similar underlying characteristics.

In the model above, $Y_{i,g,c,t}$ represents the outcome for a mother i, in the partition g, country c and birth cohort t. Country (λ_c) and cohort (θ_t) fixed effects capture the overall differences across countries and over cohorts. Ethnic fixed effects (γ_g) will force the estimator to exploit the variation between adjacent regions of the same ethnic group historical homeland. The dynamic treatment effect (β_τ) will capture the effect of abortion τ period away from the year of decriminalization. The event time is set to zero for women born more than 12 years before the law's enactment ($t_{12} - T$) to capture the effect on women who are either 12 year old or younger when the treatment kicks in (i.e., those entering childbearing age when the law is passed). The error will be clustered at an ethnic partition level (the level at which the treatment changes)[10].

Keele & Titiunik (2015) argue that border regression discontinuity designs tend to be problematic because of sorting along the border; however the density function (Figure B6 in Appendix B) does not show any discontinuity at the cutoff. Michalopoulos & Papaioannou (2016) shows that individuals in partitioned groups tend to show worse socioeconomic

[9] In Table C1 in Appendix C, I use information on ethnic characteristics associated with fertility and sexual norms from Murdock (1967) to test whether these are correlated with the treatment. This analysis aims to understand the potential influence of ancestral ethnic characteristics on the estimated effect of the treatment if these are not accounted for. I also show differences in means for geographical variables. The control group tends to exhibit a significantly larger average for ethnic features such as birth intervals longer than 2 years, genital cutting, polygyny, and boy segregation at approaching puberty. Conversely, the treated group shows a significantly larger average for the insistence on virginity. Geographical variables are also unbalanced between treated and control group. All these differences should be rule out when exploiting the variation within ethnic groups.

[10] Table C2 in Appendix C reports Summary Statistics for the most important variables.

outcomes which could also bias estimates when partitioned and non-partitioned group are compared. However, this is not a significant concern in this context because I only compare groups that have been partitioned and, therefore, affected in a similar manner.

4 Results

4.1 The Effect of Abortion Laws on Fertility

To understand the impact of abortion policies on fertility, I use a simple event-study approach to evaluate the dynamic effect. The sample includes women of reproductive age (15-49) who, by the time of the interview, have at least one child to exclude young unmarried women with no child[11]. Figure 3 shows the dynamic effect. The horizontal axis reports event periods, with zero denoting women born 12 years before the treatment kicks in (i.e., entering childbearing age when the law is passed) and positive integers representing younger cohorts. Hence, the event period will be one for women entering childbearing age one year after decriminalization, two for women entering childbearing age two years after the policy, and so on. The dependent variable is a binary indicator for whether the number of children is above the sample mean (i.e., more than 3 children). The vertical axis reports changes in the probability of having more than 3 children[12]. The standard error is clustered at an ethnic partition level (top left Panel), double clustered at an ethnic group and country levels (top right Panel), and Conley (1999) HAC robust (bottom right Panel) using a 300km distance threshold.

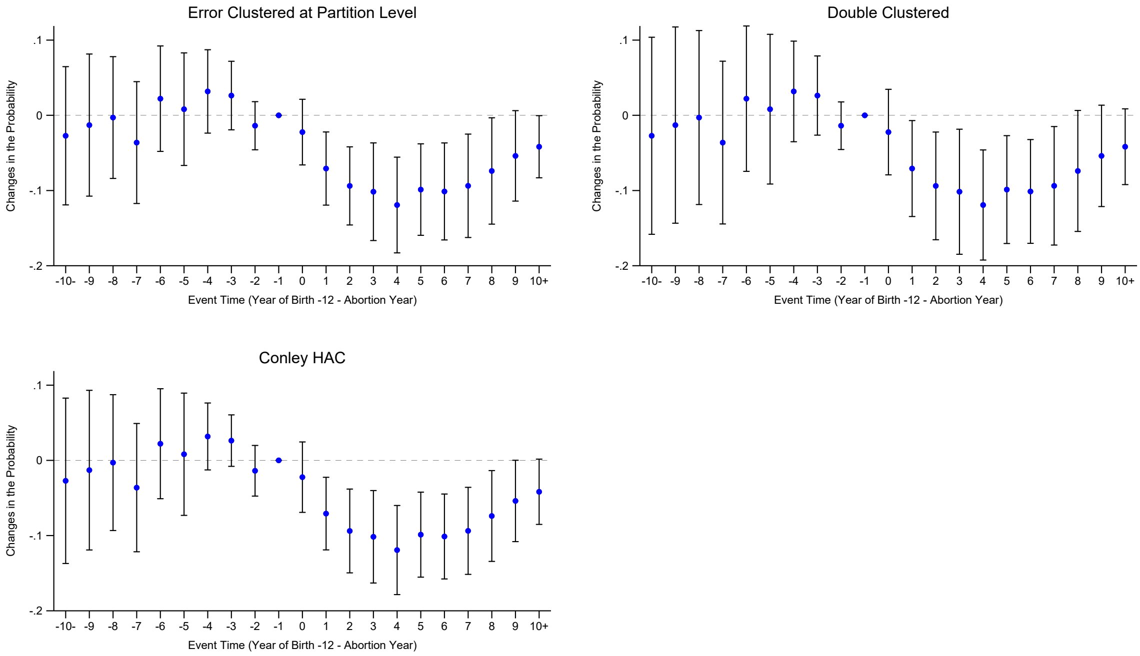
Decriminalization of abortion exerts a negative effect on fertility. The impact becomes statistically significant for women who enter childbearing age one year after the policy (i.e., born 11 years before the treatment kicks in) and peaks for women entering childbearing age four years after. For this latter age cohort, the probability of having more than three children decreases by nearly 11.9 percentage points[13]. The lack of a significant

[11] I report in Figure B7 in Appendix B results using the entire sample of women (i.e., with and without children) of reproductive age. Including women with no children leads to a small reduction of the estimated effect and a marginal loss of significance. This is something expected because if the treatment does not affect the probability of no children then including these women would dilute the effect.

[12] In Figure B8 in Appendix B I show that results are robust to alternative transformations of the dependent variable which include either the standardized total number of children or the log of the total number of children. I prefer focusing on results using the dummy because of potential issues with the standardized total number of children (i.e., large outliers) and the log of the number of children (i.e., using logs for a count variable)

[13] Figure B9 in Appendix B shows estimates including additional controls. The additional controls include: *i)* a third order polynomial form on latitude and longitude, *ii)* geographical controls; *iii)* colonial/historical controls. Including these additional controls has no effect on estimated coefficients and standard errors lending support to the identification strategy given that these controls should be balanced between the treated and untreated group once estimates are confined within ethnic group.

Figure 3: Abortion and Fertility



Note: The dependent variable is a dummy indicating whether the number of children is greater than three. The vertical axis shows changes in probability, while the horizontal axis represents event periods, with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (e.g., 1 for those born 11 years before, 2 for those born 10 years before, etc.). Estimates are restricted to the sub-sample of women who, by the time of the survey, have at least one child. Controls include: *i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status. Point estimates and 95 percent confidence intervals are provided. The error is clustered at an ethnic partition level (top left Panel), double clustered at an ethnic group and country level (top right Panel) and Conley HAC robust (bottom right Panel).

effect for the initial post-treatment cohort likely reflects delays in drafting guidelines and probably an attitudinal shift in the perceptions towards abortion. The diminishing effect for women entering childbearing age toward the end of the post-treatment period aligns with the treatment definition, as these women are at the outset of their reproductive years, resulting in smaller variations in the number of children compared to women nearing the end of their childbearing years, hence influencing the magnitude of the estimated effect[14].

Table 1 presents average treatment effects. The probability of having more than three children for treated women decreases by nearly 7.6 percentage points (Model 1). This effect corresponds to a nearly 15.8 percent reduction in the share of women having more than three children compared to the sample mean. In Model 2, I break down the abortion

[14]Maps provided by Murdock (1957) tend to offer a static picture of the distribution of ethnic groups in Africa which does not consider the impact of modernity and the possible co-existence of different groups within an area. Figure B10 in Appendix B shows that controlling for the self-reported ethnicity leads to a larger estimated impact (the number of observations decreases though). Fixed effects for self reported ethnicity should control for individuals of different ethnicity living within the historical ethnic group homeland.

Table 1: Average Treatment Effect

	(1) Fertility	(2) Fertility
abortion	-0.076**	
	(0.030)	
Mother Health		0.171***
		(0.031)
Rape and Incest		-0.004
		(0.020)
Foetal Impairment		-0.211***
		(0.031)
Adj.R-squared	0.408	0.409
Observations	171332	171332
Sample Mean	0.484	0.484
Ethnic FE	Yes	Yes
Country FE	Yes	Yes
Year FE	Yes	Yes
Individual Controls	Yes	Yes
Geographic Controls	No	No

Notes: The dependent variable is a dummy indicating whether the number of children is greater than three. Estimates are confined to the subset of women in the sample who, by the time of the survey, have at least one child. Controls include: *i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status. Clustered standard errors at an ethnic partition level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

dummy into three distinct binary variables, each capturing circumstances under which the termination of pregnancy is not subject to criminal prosecution. The three grounds include: *i*) rape and incest; *ii*) woman's physical and/or mental health; *iii*) fetal impairment. These dummies are highly collinear due to the fact that the majority of countries have decriminalized abortion under all these circumstances (see Figure B1 in Appendix B). Mali and Ivory Coast are the only countries in which abortion has been decriminalized exclusively on ground related to rape and incest, while Burundi and Kenya are the only countries in which abortion has been decriminalized solely for health reasons. No countries have decriminalized abortion based solely on fetal abnormality/impairment grounds. The coefficient on fetal abnormality hence captures the cumulative effect, with dummies for health and rape discounting the overall impact. The coefficient on the dummy for fetal impairment corresponds to an average decrease of -21.1 percentage points in the probability of having more than three children. This effect drops by almost 17.1 percentage points (i.e., close to -4.1 pp) in countries where abortion has been decriminalized exclusively on grounds related to the mother's physical and/or mental health, while the change in the estimated effect due to rape and incest is not statistically significant.

Heterogenous Treatment: Although there are a considerable number of never-treated groups in the sample, the potential heterogeneity of treatment across countries raises concerns regarding the use of negative weighting when calculating the average effect. To address this problem, in Figure B11 in Appendix B, I re-estimate the model using estimators robust to heterogeneous treatment. The top left Panel shows the dynamic treatment effect using a stacked regression approach similar to Cengiz et al. (2019). This approach stacks separate datasets containing observations on treated and control units and matches each treated unit to a clean control using separate fixed effects for the treated and non-treated. The top right Panel, reports estimates using the Two Stage DiD by Gardner (2022), which, similarly to Borusyak et al. (2021), uses an imputation approach to generate a suitable control group. The bottom left Panel shows the heterogeneous treatment using the approach outlined in De Chaisemartin & d'Haultfoeuille (2020) which focuses on switchers.

There are slight differences between these estimators, particularly in the way they use the information from the pre-treatment time period. Estimators based on an imputation method (Gardner 2022) tend to use the entire pre-treatment history to generate the control group, while those based on switchers (De Chaisemartin & d'Haultfoeuille 2020) tend to focus on the information provided by the the last pre-treament period. Despite these differences they all tend to confirm a reduction in fertility although there is a loss of efficiency compared to the standard TWFE. The only significant difference is in the timing of the effect. Using Cengiz et al. (2019) (LHS Panel), the estimated effect closely resembles that obtained using a TWFE. The effect becomes statistically significant for women entering childbearing one year after the policy, reaches its maximum for those entering four years post-policy, and then dissipates toward the end of the period for the same reasons outlined in the TWFE results. The estimate obtained using De Chaisemartin & d'Haultfoeuille (2020) (RHS Panel) shows a similar pattern. The effect begins to emerge for women entering childbearing one year after the policy (significant at the 10 percent level), with a reduction in fertility of approximately 5.8 percentage points (compared to 7.1 pp. for the TWFE). As with the TWFE, the effect peaks for women entering childbearing four years after the policy, reaching 9.6 percentage points. Finally, using the estimator from Gardner (2022) (Bottom Panel), the effect appears somewhat delayed. For women entering childbearing one year after the policy, the estimate is not statistically significant, though its magnitude is similar to that of De Chaisemartin & d'Haultfoeuille (2020) (5.1 vs. 5.8 pp.). The effect becomes statistically significant for the cohort entering two years post-policy (at the 10 percent level) and peaks four years after the policy with a 9.8 pp. reduction—slightly higher than the 9.6 pp. estimate from De Chaisemartin &

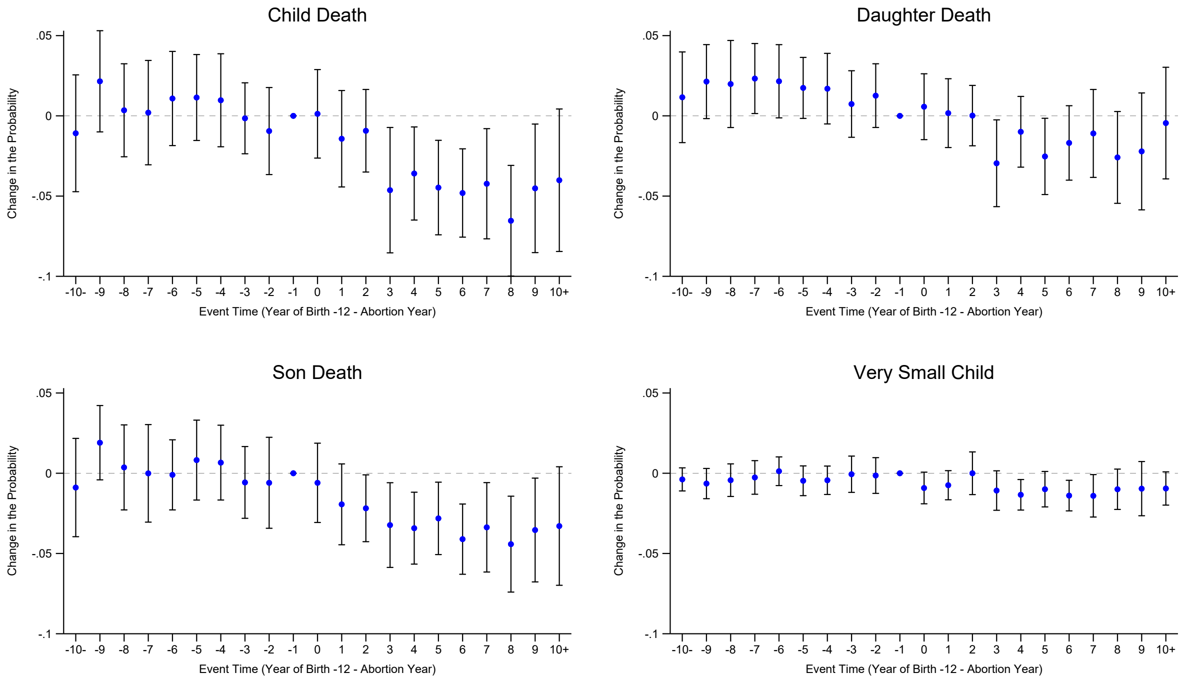
d'Haultfoeuille (2020).

Confounding Family Planning: A potential issue in identifying the estimated effects of abortion laws is that the estimates may confound the impact of family planning. Finding consistent data on family planning across countries is quite challenging because regulations have changed many times over time. However, the Population Reference Bureau (2022) released a report[15] in which they use data from the DHS to estimates the evolution of modern contraceptive prevalence across 22 sub-Saharan African countries over the past 50 years through some interpolation[16]. The report classifies countries into three stages: countries with low modern contraceptive prevalence (Stage 1), those transitioning from low to high prevalence (Stage 2), and countries with high prevalence of modern contraceptive methods (Stage 3). Using the interactive chart provided in the report, I code the year in which countries crossed the threshold for low contraceptive prevalence. Figure B12 in Appendix B compares the Abortion Timeline with data on the year countries cross the upper threshold for low prevalence for the 20 countries in the sample. The two timelines show that some countries which have not decriminalized abortion (e.g., Tanzania, Uganda, and Malawi) are among the first to reach the 15% threshold, the upper limit for low prevalence. Countries that reached this threshold early, such as Kenya, have only decriminalized abortion in recent years. This simple evidence, hence, seems to suggest little correlation between the two policies. To support this initial evidence in Figure B13 (Panel A) in Appendix B I re-estimate the effect of abortion on fertility using this restricted sample of 20 countries. The results are consistent with those obtained from the full sample of 32 countries. The effect of abortion peaks for women entering childbearing four years after abortion decriminalization and then decreases for subsequent cohorts. In Panel B, I replace dummies for abortion decriminalization with binary indicators representing women of childbearing age exposed to modern contraception. Hence the treatment in Panel B will capture the elapsed time since the upper threshold for low prevalence is crossed. As with abortion, I will focus on women in childbearing years. Modern contraceptive methods have a significant effect on fertility. The effect becomes significant for women entering childbearing three years after the low-prevalence threshold is crossed and peaks for the cohort entering childbearing 8 years after. Finally, In Panel C I re-estimate the effect of abortion controlling for modern contraception using dummies above. Controlling for modern contraception results in an even larger effect of abortion. This larger effect seems something quite sensible given that cohorts exposed to the two policies are quite different (as shown in Figure B13) and because the two policies have a self-reinforcing effect.

[15]The report is available at https://2022-family-planning-review.prb.org/.

[16]My sample only includes 20 countries out of the 22 provided by the report.

Figure 4: Abortion and Child Mortality.



Note: The dependent variables are dummies indicating whether at least one child is deceased (top left Panel), a daughter is deceased (top right Panel), a son is deceased (bottom left Panel), or the child is very small (less than 1.5 kg) (bottom right Panel). The vertical axis shows changes in the probability, while the horizontal axis represents event periods, with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (e.g., 1 for those born eleven years before, 2 for those born ten years before, etc.). Estimates are confined to the subset of women who, by the time of the survey, have at least one child. Controls include:*i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status. Point estimates and 95 percent confidence intervals are provided. The error is clustered at an ethnic partitions level.

5 Channels

5.1 Child Mortality

I showed above that abortion policies have a significant effect on fertility, and that the impact is the largest for policies allowing safe access to termination of pregnancy due to fetal impairment and rape or incest. To better understand the mechanism which drives such an effect, I use information on birth weight and child mortality to test whether the effect of abortion policies runs through a reduction in the probability of infants being born in poor health and having low survival rates. I use information on birth weight (*m19*) and child deaths (*v206* and *v207*) to code dummies for very small child (i.e., below 1.5 kg) and whether at least one daughter or son has died. The latter normally refers to children under five years old.

In Figure 4, I report the dynamic treatment effect[17]. The top left Panel shows the

[17]Table C3 in Appendix C reports the average treatment effect.

estimated dynamic effect on the probability of at least one child being deceased. This effect is then split between the probability of at least one daughter (top right) or one son being deceased (bottom left). The last Panel (bottom right) shows the estimated effect on the probability of a very small child being born.

Decriminalization exerts a significant and negative effect on the probability of child mortality (top left Panel). The effect becomes significant for women entering childbearing age three years after the decriminalization of abortion. The marginal effect for this cohort is approximately 4.6 percentage points, and the probability of child mortality further decreases to 6.5 percentage points for women who enter childbearing eight years after the legal changes to abortion. The delay in the manifested effect aligns with the observed reduction in fertility.

In the following two Panels, I distinguish the impact on child mortality between the probability of a daughter (top right) and a son being deceased (bottom right). The reduction in the probability is more pronounced for sons, with a maximal effect close to -4.1 percentage points for women entering childbearing age six years after the policy, compared to a 3 percentage points decrease in the probability for daughters[18]. A significant portion of this decline in the probability of child mortality is attributable to a lower likelihood of very small children being born, who tend to have the lowest survival rates. Hence, it is not coincidental that the effect on the probability of a very small child is also the largest for women entering childbearing age six years after legal access to abortion is allowed. For this cohort, the probability of having a child whose weight is below 1.5 kg is around 1.4 percentage points smaller.

Since the risk of child malnourishment is higher in economically disadvantaged households, in Figure B14 in Appendix B, I check for differential effects of decriminalizing abortion on child mortality depending on wealth, which I measure using the wealth score index provided by the DHS[19]. In line with the hypothesis, the effect of abortion on child mortality appears more pronounced and statistically significant among households in the bottom three quintiles of the wealth distribution. Conversely, no significant effect is observed for women in households at the top of the distribution of wealth. This difference across households in terms of child mortality seems consistent with fetal impairment and rape being the legal grounds having the largest effect on fertility, and with a reduction in the probability of children born with health issues.

I also test for a differential effects on child mortality depending on the level of education

[18]The difference in the probability of daughters and sons being dead does not seem to be imputable to selective abortion. This should result in a higher probability to have a first male born, but I do not find any significant effect.

[19]The wealth index score is a composite measure of living standard obtained using a principal component analysis for household selected assets, such as televisions, bicycles, access to water, etc.

of the mother (Figure B15 in Appendix B) and find that the effect of legal access to abortion on the probability of children being deceased is the largest for women with either secondary or higher education, while the effect is not statistically significant for women with lower levels of education. The observed effect on more educated women might seem contradictory given the impact of abortion on households at the bottom of the wealth distribution. However, this effect clearly indicates which women are likely to benefit the most from the policy. Nearly 57 percent of women with no education report that their partner or someone else is the decision-maker regarding their health. This percentage drops to 16 percent among women with either secondary or higher education. Moreover, the probability of having an antenatal check for educated women in less affluent households increases to almost 96 percent compared to 77 percent for uneducated women. Hence, the effect on more educated women in households at the bottom of the distribution of wealth[20] is likely to reflect their increased likelihood of having control over decisions regarding their health and better access to information about legal routes to terminate pregnancies. Hence, the effect concentrates on more educated women at the bottom of the distribution.

5.2 Excess Fertility

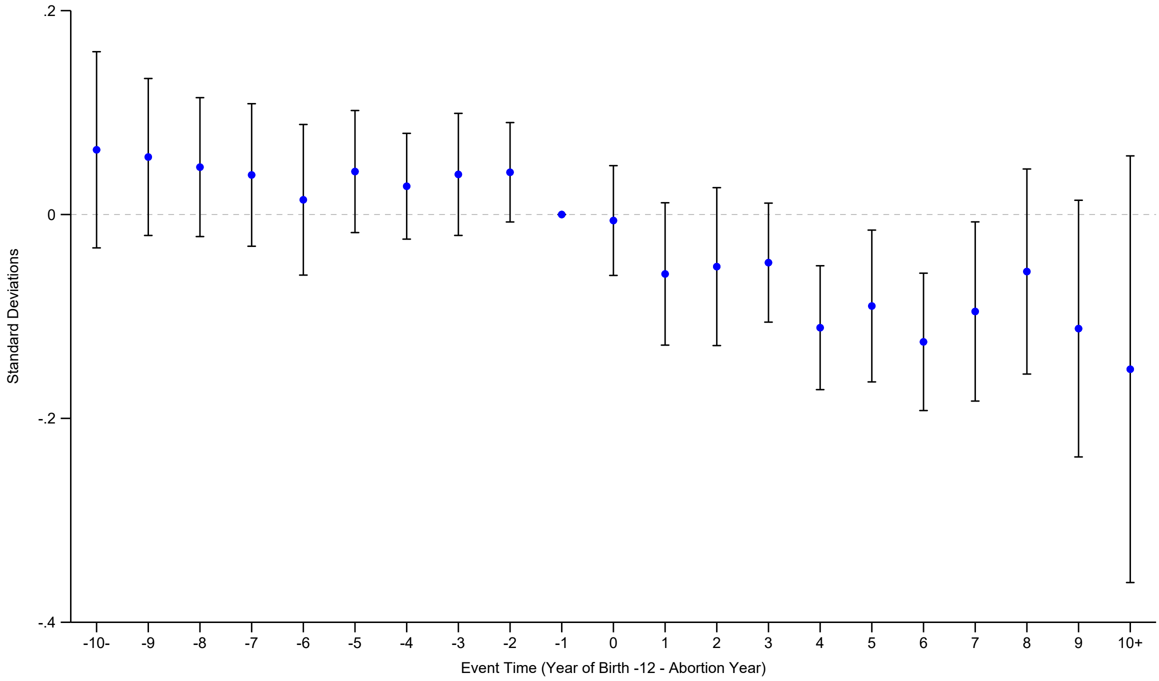
According to Becker (1960), family planning and abortion (possibly) increase the scope of decision-making, potentially enhancing the influence of income on the trade-off between the quantity and quality of children. Therefore, if abortion is used as a method of birth control alternative to contraception, one would anticipate an effect on excess fertility.

I follow the approach used by the DHS and take the difference between the total number of child alive (*v218*) and the ideal number of children (*v613*) to generate a proxy for excess fertility. I then estimate the dynamic impact of decriminalizing abortion on the number of unwanted children (Figure 5)[21]. Results are consistent with a gradual reduction in the number of unwanted children. The impact of legal access to abortion on excess fertility is statistically significant for women entering their childbearing years four years after the policy. This effect becomes more pronounced for subsequent cohorts (except for a few cohorts), and the size of the coefficient becomes even larger for the last two cohorts, despite the effect not being statistical significance due to larger confidence intervals. The average effect of decriminalizing abortion corresponds to an approximate 0.15 standard deviations change when considering women entering childbearing age six

[20]When I look at heterogeneous effect depending both on wealth and education and I find that the effect is more pronounced on women with a higher level of education at the bottom of the distribution. Results are not shown for brevity.

[21]Table C3 in Appendix C reports the average treatment effect on child mortality and excess fertility.

Figure 5: Abortion and Excess Fertility



Note: The dependent variable is the standardized number of unwanted children. The vertical axis reports changes in standard deviations, while the horizontal axis represents event periods, with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (e.g., 1 for those born eleven years before, 2 for those born ten years before, etc.). Estimates are confined to the subset of women who, by the time of the survey, have at least one child. Controls include:*i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status. Point estimates and 95 percent confidence intervals are provided. The error is clustered at an ethnic partitions level.

years after the policy[22].

To gain further insights into the underlying mechanism, I examine the heterogeneous effect of the treatment based on wealth and education (Figure B16 and B17 in Appendix B). The impact of legal access to abortion on unwanted children appears to be more pronounced among households at the top of the wealth distribution (Figure B14) and significantly larger for women with either primary or no education at all (Figure B15). The effect for households at the top of the distribution of wealth is expected given that they have a smaller demand for quantity (4.1 ideal children compared to 5.8 for households at the bottom of the distribution) and hence are more likely to consider abortion as a means to control the number of children. The effect for education, on the other hand, is much more puzzling and opposite from the one found for child mortality.

To understand the impact of abortion on excess fertility among lower educated women I look at women using family planning to consider whether abortion can be considered

[22]This effect is robust to alternative measures of unwanted children which include: *i*) a dummy for whether the number of child alive is smaller than the ideal number; *ii*) the ratio of the number of children alive to the ideal number of children. Results are not reported for brevity.

as a substitute for family planning. In Figure B18 and B19 in Appendix B, I disentangle the impact of abortion depending on education between women using family planning and those who do not use family planning methods. Consistent with the view that abortion might be used as a substitute for family planning, I find no significant differences by education among women who use contraception (Figure B16 in Appendix B) given that their probability of an unwanted pregnancy is smaller. Interestingly, the effect of decriminalization on excess fertility among women who do not use any family planning method manifests predominantly among educated women (Figure B17 in Appendix B), which seems to reinforce the wealth effect. Therefore, when family planning is taken into account, the distinct heterogeneous effect of education vanishes, and the wealth effect becomes predominant.

6 Human Capital

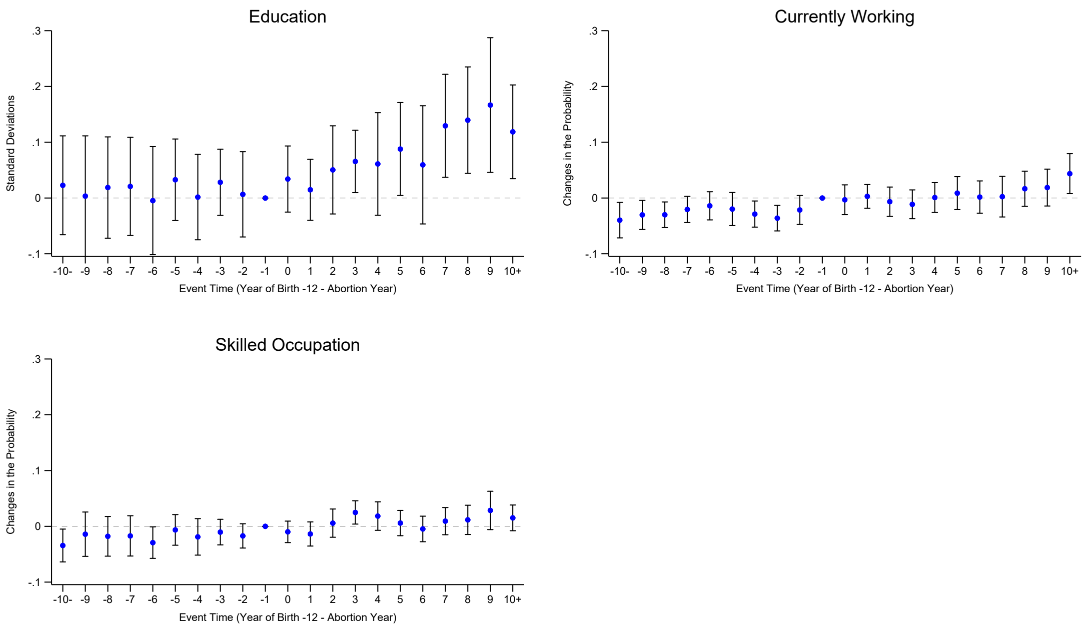
6.1 Female Education and Labour Outcomes

The Guttmacher Institute estimates that sub-Saharan Africa has the highest number of unintended pregnancies across regions, reaching 91 per 1,000 women. This figure is particularly high among young women, with nearly 46% of all pregnancies among adolescents in sub-Saharan Africa reported as unintended. Early unintended pregnancies generally tend to have consequences on future choices in terms of women's accumulation of human capital and subsequent labor market choices, leading to detrimental effects on gender equality. Therefore, by mitigating the probability of early motherhood, legal access to abortion may also influence the level of education and the likelihood of women participating in the workforce.

The DHS provides information on women's educational attainment and labour market outcomes, which I use to gain insights into this additional channel. Specifically, I focus on: *i)* a measure of the highest completed level of education (*v106*); *ii)* whether the woman is currently working (*v714*); *iii)* whether she is in a skilled occupation which I code from the reported occupation (*v717*). The latter is a dummy for whether women are employed in professional/technical/managerial or manual skilled occupations.

Figure 6 reports the estimated effect of abortion policies on education (top left Panel), labour force participation (top right Panel) and skilled occupation (bottom left Panel). Legal access to abortion exerts a statistical significant effect on women who enter childbearing age three years after the decriminalization of abortion and the magnitude of the effect increases for the following cohorts. For the cohort entering childbearing age five years after the abortion policy there is an increase in the level of education corresponding

Figure 6: Effect of Abortion on Women's Education and Labour Market Outcome



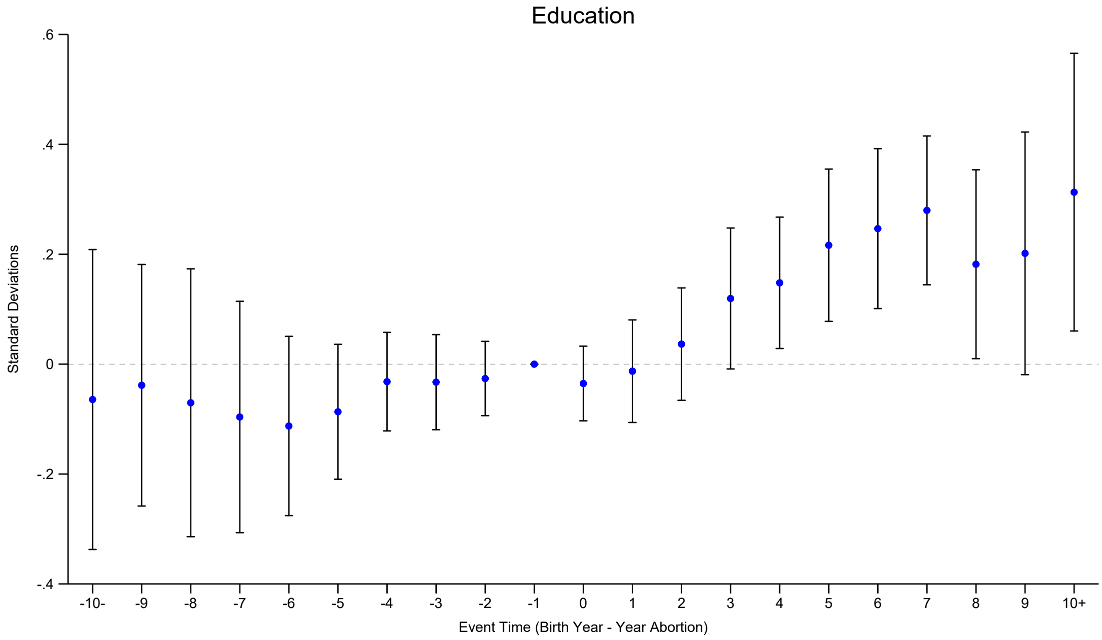
Note: The dependent variables are the standardized level of education attainment (top left Panel), a dummy for labour force participation (top right Panel), and a dummy for skilled occupation (left bottom Panel). The vertical axis reports either the standard deviations or the marginal change. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Estimates are confined to the subset of women and men in the sample who, by the time of the survey, have at least one child. Controls include:*i* Country FE; *ii* Survey Year FE; *iii* Cohort FE; *iv* Ethnic Group FE; *v* Marital Status. Point estimates and 95 percent confidence intervals are reported. The error is clustered at an ethnic partitions level.

to nearly 0.1 standard deviations. This effect increases to 0.13 and 0.16 standard deviations change for women entering childbearing years respectively seven and nine year after the policy, before slightly declining to 0.11 for the cohort 10+. However, such an effect on education does not result in a higher probability to participate in the labour market (top right Panel) or in a higher probability to get a better job (bottom left Panel). These effects suggest that while abortion may influence women's education levels by preventing unwanted early pregnancies, the impact on labor market conditions remains contingent on the dynamics within such a market, which may still exhibit discrimination against women.

6.2 Children's Education

In the last part of the paper I focus on the potential long-term effects of decriminalizing abortion on children's human capital accumulation in order to gain a better understanding of the impact on the quality of children. Information on the level of education of children from the DHS is only available from the household questionnaire. As a result, this information is limited to children who are still residing in the household at the time of

Figure 7: Effect of Abortion on Children Education.



Note: The dependent variable is the standardized level of education of children. The vertical axis reports changes in standard deviations. The horizontal axis represents event periods, with 0 denoting children born in the same year the abortion law was passed and positive integers denoting younger children. Estimates are confined to the subset of children over 6 who are not currently attending school. Controls include:*i* Country FE; *ii* Survey Year FE; *iii* Cohort FE; *iv* Ethnic Group FE; *v* Marital Status. Point estimates and 95 percent confidence intervals are reported. The error is clustered at an ethnic partitions level.

the survey. These children are likely to be a selected sample with specific characteristics potentially correlated with the treatment. For instance, children with lower educational levels may have a higher likelihood of remaining in the household, as those with better labor market opportunities are more prone to relocate. This sample bias could affect the distribution of education and ultimately result in a downward bias if safe abortion and education are positively correlated. Nevertheless, the analysis can still provide useful information on the long-term effect of abortion on human capital.

I use the same empirical specification used for mothers, with the sole distinction being that the treatment in this context hinges on whether a child is born[23] after legal access to abortion becomes available. These children will be compared with those born in the same year, in the same ethnic group, but in a country where abortion is still a criminal offense. The variation between children born after/before the provision will also be exploited. To avoid comparing children with incomplete and completed levels of education, I will confine estimates to children above 6 who are currently not enrolled in school. Therefore, I will

[23]The DHS provides information about the age of each household member which I use together with the year of the survey to generate birth cohorts. As a consequence a treated child will be someone born after the decriminalization/legalization of abortion.

consider school-age children not enrolled in any programme as those who will not receive any education at all. Children who have completed their education will not be enrolled in school by default. The proxy for human capital is a categorical measure of educational attainment (*hv106*) which ranges from no education (coded 1) to higher education (coded 4).

Figure 7 shows the dynamic treatment effect of decriminalizing abortion on children's education. The effect on education clearly mirrors the impact of abortion on fertility. There is no significant effect for the first few cohorts born soon after decriminalization since the effect on the quantity has not yet significantly manifested. The effect of decriminalizing abortion on education becomes significant for children born four years after the treatment kicks in, and keeps increasing for the following birth cohorts. The level of education for children born seven years after the treatment shows a noteworthy increase of almost 0.25 standard deviations. Figure B20 in Appendix B shows the heterogeneity of the effect by wealth. The effect on education is larger among children in households in the third and fourth quintiles of the distribution of wealth, while the impact on the education for children in the top quintile is much more noisy and barely statistically significant. The loss of significance for the top quintile can be attributed to the already higher average educational attainment within this group, where most children have attained at least a primary education. Consequently, the potential for further educational gains is limited. In contrast, children in the third and fourth quintiles, with average education levels below primary education, are expected to experience a more substantial effect from fertility reduction due to the greater room for improvement in educational outcomes.

The evidence above aligns with an increased commitment to investing in children subsequent to fertility reduction, particularly evident in households in the middle of the wealth distribution. Nevertheless, the impact of fertility on education diminishes when the children's attained level of education approaches the desired threshold, indicating that the fertility effect becomes negligible at that point.

7 Conclusions

I evaluate the impact of abortion policies in Africa to understand the potential economic repercussions in the wake of reduced international pressure to safeguard women's rights, prompted by the US court decision to overturn Roe vs. Wade. I find that legal access to safe abortion in Africa appears to have multifaceted effects, with a discernible impact on fertility, child mortality, and women's education.

The paper underlines the importance of policies to protect women's right in Africa in order to facilitate the fertility transition and improve the condition of women since policies that support legal access to safe abortion can contribute to a decrease in unwanted pregnancies and pregnancies at risk, thereby positively influencing fertility patterns. The analysis highlights variations in the impact of abortion policies across different wealth and education groups. Among educated women in households at the bottom of the distribution of wealth, the effect of decriminalization manifests through a reduction of children with a high probability to die. This is because women in poor households are more likely to experience sexual violence and have complicated pregnancies. In addition, women in poor households are more likely to give birth to severely malnourished children. Hence, decriminalization on grounds related to rape and fetal abnormality can significantly affects those births. On the other hand, among uneducated women in households at the top of wealth, the effect of decriminalization of abortion manifests predominately through a reduction in the prevalence of excess fertility.

These findings underscore the importance of policies that protect women's reproductive rights in Africa. By facilitating access to safe abortion, such policies can significantly influence fertility patterns, improve women's health and educational outcomes, and contribute to the overall socioeconomic development of the region. Furthermore, given the significance of the heterogeneous effects, the evidence supports, from a policy point of view, the idea of a holistic approach to women's empowerment which integrates family planning, prenatal care, and safe abortion services together with education policies.

The analysis also shows that there is a substantial response of African countries to international pressure to protect women's right which supports concerns about the possible implications of overturning Roe vs Wade.

References

Ananat, E. O., Gruber, J. & Levine, P. (2007), 'Abortion legalization and life-cycle fertility', *The Journal of Human Resources* **42**(2), 375–397.

Ananat, E. O., Gruber, J., Levine, P. B. & Staiger, D. (2009), 'Abortion and selection', *The Review of Economics and Statistics* **91**(1), 124–136.

Ananat, E. O. & Hungerman, D. M. (2012), 'The power of the pill for the next generation: Oral contraception's effects on fertility, abortion, and maternal and child characteristics', *The Review of Economics and Statistics* **94**(1), 37–51.

Angrist, J. & Evans, W. (2000), 'Schooling and labor market consequences of the 1970 state abortion reforms', *Research in Labor Economics* **18**, 75–113.

Ashraf, N., Field, E. & Leight, J. (2013), Contraceptive access and fertility: The impact of supply-side interventions.

Bahrami-Rad, D., Becker, A. & Henrich, J. (2021), 'Tabulated nonsense? Testing the validity of the Ethnographic Atlas', *Economics Letters* **204**, 109880.

Bailey, M. J. (2006), 'More power to the pill: The impact of contraceptive freedom on women's life cycle labor supply', *The Quarterly Journal of Economics* **121**(1), 289–320.

Bailey, M. J. (2010), 'Momma's got the pill: How Anthony Comstock and Griswold v. Connecticut shaped US childbearing', *American Economic Review* **100**(1), 98–129.

Bailey, M. J. (2013), Fifty years of family planning: New evidence on the long-run effects of increasing access to contraception, Technical report, National Bureau of Economic Research.

Bankole, A., Remez, L., Owolabi, O., Philbin, J. & Williams, P. (2020), 'From unsafe to safe abortion in Sub-Saharan Africa: Slow but steady progress', *Guttmacher Institute* .

Barro, R. J. & Becker, G. S. (1989), 'Fertility choice in a model of economic growth', *Econometrica* pp. 481–501.

Becker, G. (1960), An Economic Analysis of Fertility, *in* 'Demographic and economic change in Developed countries', National Bureau of Economic Research, Inc, pp. 209–240.

Becker, G. (1981), *A Treatise on the Family*, National Bureau of Economic Research, Inc.

Becker, G. S., Murphy, K. M. & Tamura, R. (1990), 'Human capital, fertility, and economic growth', *Journal of Political Economy* **98**(5), S12–S37.

Becker, S. O., Cinnirella, F. & Woessmann, L. (2010), 'The trade-off between fertility and education: Evidence from before the demographic transition', *Journal of Economic Growth* **15**, 177–204.

Bitler, M. & Zavodny, M. (2002), 'Did abortion legalization reduce the number of unwanted children? Evidence from adoptions', *Perspectives on Sexual and Reproductive Health* pp. 25–33.

Bleakley, H. & Lange, F. (2009), 'Chronic disease burden and the interaction of education, fertility, and growth', *The Review of Economics and Statistics* **91**(1), 52–65.

Bongaarts, J. (2020), 'Trends in fertility and fertility preferences in sub-Saharan Africa: The roles of education and family planning programs', *Genus* **76**(1), 1–15.

Bongaarts, J. & Casterline, J. (2013), 'Fertility transition: Is sub-Saharan Africa different?', *Population and Development Review* **38**, 153–168.

Borusyak, K., Jaravel, X. & Spiess, J. (2021), 'Revisiting event study designs: Robust and efficient estimation', *arXiv preprint arXiv:2108.12419* .

Brooks, N., Bendavid, E. & Miller, G. (2019), 'USA aid policy and induced abortion in sub-Saharan Africa: An analysis of the Mexico City Policy', *The Lancet Global Health* **7**(8), e1046–e1053.

Brown, M. (2007), 'When ancient meets modern: The relationship between postpartum non-susceptibility and contraception in Sub-Saharan Africa', *Journal of Biosocial Science* **39**(4), 493–515.

Brueckner, M. & Schwandt, H. (2015), 'Income and population growth', *The Economic Journal* **125**(589), 1653–1676.

Caldwell, J. C. & Caldwell, P. (1977), 'The role of marital sexual abstinence in determining fertility: A study of the Yoruba in Nigeria', *Population Studies* **31**(2), 193–217.

Caldwell, J. C. & Caldwell, P. (2002), 'Africa: The new family planning frontier', *Studies in family planning* **33**(1), 76–86.

Caldwell, J. C., Orubuloye, I. O. & Caldwell, P. (1992), 'Fertility decline in Africa: A new type of transition?', *Population and Development Review* pp. 211–242.

Canning, D. & Schultz, T. P. (2012), 'The economic consequences of reproductive health and family planning', *Lancet* **380**(9837), 165–171.

Cengiz, D., Dube, A., Lindner, A. & Zipperer, B. (2019), 'The effect of minimum wages on low-wage jobs', *The Quarterly Journal of Economics* **134**(3), 1405–1454.

Cervellati, M. & Sunde, U. (2011), 'Life expectancy and economic growth: The role of the demographic transition', *Journal of Economic Growth* **16**, 99–133.

Christensen, F. (2012), 'The pill and partnerships: The impact of the birth control pill on cohabitation', *Journal of Population Economics* **25**(1), 29–52.

Coale, A. J. (1986), *The Decline of Fertility in Europe*, Princeton University Press, Princeton.

Conley, T. G. (1999), 'Gmm estimation with cross sectional dependence', *Journal of econometrics* **92**(1), 1–45.

De Chaisemartin, C. & d'Haultfoeuille, X. (2020), 'Two-way fixed effects estimators with heterogeneous treatment effects', *American Economic Review* **110**(9), 2964–2996.

Desai, J. & Tarozzi, A. (2011), 'Microcredit, family planning programs, and Ccntraceptive behavior: Evidence from a field experiment in Ethiopia', *Demography* **48**(2), 749–782.

Doepke, M. (2015), 'Gary Becker on the Quantity and Quality of Children', *Journal of Demographic Economics* **81**(1), 59–66.

Doepke, M., Hannusch, A., Kindermann, F. & Tertilt, M. (2023), The economics of fertility: A new era, *in* 'Handbook of the Economics of the Family', Vol. 1, Elsevier, pp. 151–254.

Donohue, J. & Levitt, S. (2001), 'The impact of legalized abortion on crime', *The Quarterly Journal of Economics* **116**(2), 379–420.

Eggers, A. C., Freier, R., Grembi, V. & Nannicini, T. (2018), 'Regression discontinuity designs based on population thresholds: Pitfalls and solutions', *American Journal of Political Science* **62**(1), 210–229.

Galindo-Silva, H., Some, N. H. & Tchuente, G. (2018), Fuzzy difference-in-discontinuities: Identification theory and application to the Affordable Care Act, Papers 1812.06537, arXiv.org.

Gallego, F. & Lafortune, J. (2023), 'Baby commodity booms? The impact of commodity shocks on fertility decisions and outcomes', *Journal of Population Economics* **36**(1), 295–320.

Galor, O. (2005), From stagnation to growth: Unified growth theory, *in* P. Aghion & S. Durlauf, eds, 'Handbook of Economic Growth', 1 edn, Vol. 1, Part A, Elsevier, chapter 04, pp. 171–293.

Galor, O. & Moav, O. (2002), 'Natural selection and the origin of economic growth', *The Quarterly Journal of Economics* **117**(4), 1133–1191.

Galor, O. & Moav, O. (2004), 'From physical to human capital accumulation: Inequality and the process of development', *The Review of Economic Studies* **71**(4), 1001–1026.

Galor, O. & Weil, D. N. (2000), 'Population, technology, and growth: From Malthusian stagnation to the demographic transition and beyond', *American Economic Review* **90**(4), 806–828.

Gardner, J. (2022), 'Two-stage differences in differences', *arXiv preprint arXiv:2207.05943* .

Goldin, C. (2006), 'The quiet revolution that transformed women's employment, education, and family', *American Economic Review* **96**(2), 1–21.

Goldin, C. & Katz, L. F. (2002), 'The power of the pill: Oral contraceptives and women's career and marriage decisions', *Journal of Political Economy* **110**(4), 730–770.

Grembi, V., Nannicini, T. & Troiano, U. (2016), 'Do fiscal rules matter?', *American Economic Journal: Applied Economics* **8**(3), 1–30.

Gruber, J., Levine, P. & Staiger, D. (1999), 'Abortion legalization and child living circumstances: Who is the "marginal child"?', *The Quarterly Journal of Economics* **114**(1), 263–291.

Guinnane, T. W. (2011), 'The historical fertility transition: A guide for economists', *Journal of Economic Literature* **49**(3), 589–614.

Guldi, M. (2008), 'Fertility effects of abortion and birth control pill access for minors', *Demography* **45**(4), 817–827.

Hailemariam, A. (2022), 'Income and differential fertility: Evidence from oil price shocks', *Journal of Demographic Economics* pp. 1–24.

Herzer, D., Strulik, H. & Vollmer, S. (2012), 'The long-run determinants of fertility: One century of demographic change 1900–1999', *Journal of Economic Growth* **17**, 357–385.

Jones, L. E., Schoonbroodt, A. & Tertilt, M. (2010), *2. Fertility Theories: Can They Explain the Negative Fertility- Income Relationship?*, University of Chicago Press, Chicago, pp. 43–106.

Jones, L. E. & Tertilt, M. (2008), Chapter 5 An Economic History of Fertility in the U.S.: 1826-1960, Technical report, Emerald Group Publishing Limited, Bingley.

Kalsi, P. (2015), 'Abortion legalization, sex selection, and female university enrollment in Taiwan', *Economic Development and Cultural Change* **64**(1), 163–185.

Kearney, M. S. & Levine, P. B. (2009), 'Subsidized contraception, fertility, and sexual behavior', *The Review of Economics and Statistics* **91**(1), 137–151.

Kearney, M. S. & Wilson, R. (2018), 'Male earnings, marriageable men, and nonmarital fertility: Evidence from the fracking boom', *Review of Economics and Statistics* **100**(4), 678–690.

Keele, L. J. & Titiunik, R. (2015), 'Geographic boundaries as regression discontinuities', *Political Analysis* **23**(1), 127–155.

Knodel, J. & van de Walle, E. (1979), 'Lessons from the past: Policy implications of historical fertility studies', *Population and Development Review* **5**(2), 217–245.

Lee, A. & Schultz, K. A. (2012), 'Comparing british and french colonial legacies: A discontinuity analysis of Cameroon', *Quarterly Journal of Political Science* **7**(4), 365–410.

Levine, P. B., Staiger, D., Kane, T. J. & Zimmerman, D. J. (1999), 'Roe v Wade and American fertility', *American Journal of Public Health* **89**(2), 199–203.

Lin, M.-J., Liu, J.-T. & Qian, N. (2014), 'More women missing, fewer girls dying: The impact of abortion on sex ratios at birth and excess female mortality in Taiwan', *Journal of the European Economic Association* **12**(4), 899–926.

Lindo, J. M. & Packham, A. (2017), 'How much can expanding access to long-acting reversible contraceptives reduce teen birth rates?', *American Economic Journal: Economic Policy* **9**(3), 348–76.

Lindo, J. M. & Pineda-Torres, M. (2021), 'New evidence on the effects of mandatory waiting periods for abortion', *Journal of Health Economics* **80**, 102533.

Lovenheim, M. F. & Mumford, K. J. (2013), 'Do family wealth shocks affect fertility choices? Evidence from the housing market', *Review of Economics and Statistics* **95**(2), 464–475.

Lutalo, T., Kigozi, G., Kimera, E., Serwadda, D., Wawer, M. J., Zabin, L. S. & Gray, R. H. (2010), 'A randomized community trial of enhanced family planning outreach in Rakai, Uganda', *Studies in Family Planning* **41**(1), 55–60.

Maina, J., Ouma, P. O., Macharia, P. M., Alegana, V. A., Mitto, B., Fall, I. S., Noor, A. M., Snow, R. W. & Okiro, E. A. (2019), 'A spatial database of health facilities managed by the public health sector in sub-Saharan Africa', *Scientific Data* **6**(1), 134.

Michalopoulos, S. & Papaioannou, E. (2014), 'National institution and subnational development in Africa', *The Quarterly Journal of Economics* **129**(1), 151–214.

Michalopoulos, S. & Papaioannou, E. (2016), 'The long-run effects of the scramble for Africa', *American Economic Review* **106**(7), 1802–48.

Miller, G. (2009), 'Contraception as development? New evidence from family planning in Colombia', *The Economic Journal* **120**(545), 709–736.

Miller, G. & Babiarz, K. S. (2016), 'Family planning program effects: Evidence from microdata', *Population and Development Review* **42**(1), 7–26.

Miller, S., Wherry, L. R. & Foster, D. G. (2023), 'The Economic consequences of being denied an abortion', *American Economic Journal: Economic Policy* **15**(1), 394–437.

Moav, O. (2005), 'Cheap children and the persistence of poverty', *The Economic Journal* **115**(500), 88–110.

Murdock, G. P. (1957), 'World Ethnographic Sample', *American Anthropologist* **59**(4), 664–687.

Murdock, G. P. (1967), 'Ethnographic Atlas: A summary', *Ethnology* **6**(2), 109–236.

Myers, C. K. (2017), 'The power of abortion policy: Reexamining the effects of young women's access to reproductive control', *Journal of Political Economy* **125**(6), 2178–2224.

Myers, C. K. (2021*a*), 'Cooling off or burdened? The effects of mandatory waiting periods on abortions and births'.

Myers, C. K. (2021*b*), 'Measuring the burden: The effect of travel distance on abortions and births'.

Nunn, N. (2010), 'Religious conversion in colonial Africa', *American Economic Review* **100**(2), 147–52.

Nunn, N. & Wantchekon, L. (2011), 'The slave trade and the origins of mistrust in Africa', *American Economic Review* **101**(7), 3221–52.

Pop-Eleches, C. (2006), 'The Impact of an abortion ban on socioeconomic outcomes of children: Evidence from Romania', *Journal of Political Economy* **114**(4), 744–773.

Population Reference Bureau (2022), The Future of Family Planning in Africa: Toward Equitable, Data-Driven, Client-Centered Programs, Report.

Rossier, C. & Corker, J. (2017), 'Contemporary use of traditional contraception in sub-Saharan Africa', *Population and Development Review* **43**, 192–215.

Rotz, D. (2016), 'Why have divorce rates fallen?: The role of women's age at marriage', *Journal of Human Resources* **51**(4), 961–1002.

Saucier, J.-F. (1972), 'Correlates of the long postpartum taboo: a cross-cultural study', *Current Anthropology* **13**(2), 238–249.

Shareen, J. & Schultz, T. P. (2013), 'Family planning and women's and children's health: Long-term consequences of an outreach program in Matlab, Bangladesh', *Demography* **50**(1), 149–180.

Singh, S., Bankole, A. & Darroch, J. E. (2017), 'The impact of contraceptive use and abortion on fertility in sub-Saharan Africa: estimates for 2003–2014', *Population and Development Review* **43**(Suppl 1), 141.

Sinha, N. (2005), 'Fertility, child work, and schooling consequences of family planning programs: Evidence from an experiment in rural Bangladesh', *Economic Development and Cultural Change* **54**(1), 97–128.

Tran, N. T., Seuc, A., Tshikaya, B., Mutuale, M., Landoulsi, S., Kini, B., Nkolomonyi, B. M., Kyloka, J. N., Langwana, F., Cuzin-Kihl, A. et al. (2020), 'Effectiveness of post-partum family planning interventions on contraceptive use and method mix at 1 year after childbirth in Kinshasa, DR Congo (Yam Daabo): a single-blind, cluster-randomised controlled trial', *The Lancet Global Health* **8**(3), e399–e410.

UNFPA (2022), 'Seeing the unseen: The case for action in the neglected crisis of unintended pregnancy', *United Nations Population Fund* .

Valente, C. (2014), 'Access to abortion, investments in neonatal health, and sex-selection: Evidence from Nepal', *Journal of Development Economics* **107**, 225–243.

Van de Walle, E. & Van de Walle, F. (1989), 'Postpartum sexual abstinence in tropical Africa', *African Demography Working Paper Series* p. 17.

Watkins, S. C. (1987), 'The Fertility transition: Europe and the Third World compared', *Sociological Forum* **2**(4), 645–673.

Appendix A

Table A1: Sources

Countries Decriminalizing Abortion		
Country	**Source**	**Hyperlinks**
Angola	Penal Code art 156 - 2019	Penal Code
Benin	Law on Sexual and Reproductive Rights 2003-03, art 17	Loi N 2003-03
Burkina Faso	Penal Law 1996	Guttmacher Institute: Global Review of Laws on Induced Abortion, 1985-1997
Burundi	Décret-loi n° 16 du 4 Avril 1981, art 357	Décret-loi n° 16 du 4
Cameroon	Penal Law 80/10 of July 14,1980	Center for Reproductive Rights
Central Africa Republic	Reproductive Health Law art 25 - 2006	Journal Officiel de la Republique Centrafriciane
Chad	Abortion Act 2002	Loi n°006/PR/2002
Democratic Republic of Congo	Ratification Maputo Protocol in 2018	Journal Officiel
Ethiopia	Penal Code, Proclamation No. 158 of 1957	Penal Code, Proclamation No. 158 of 1957
Gabon	Penal Code 2021 Amendment Article 245	Journal Officiel
Ghana	Criminal Offence Act 1960	Center for Reproductive Rights
Guinea	Reproductive Health Law 2000	Reproductive Health Law
Ivory Coast	Penal Code-574-2019	Journal Officiel, Chapter 3, Section3, Art. 427
Kenya	Constitution 2010 - Article 26	Center for Reproductive Rights
Liberia	Liberian Code of Laws Chapter 16 -1978	Liberian Code of Laws Revised
Mali	Reproductive Health, Law No. 02-044 - 2002	Center for Reproductive Rights
Mozambique	Penal Code 2014	Boletim Da Republica

Continued on next page...

Country	Source	Hyperlinks
Namibia	Reproductive and Sterilization Act 1975	Abortion and Sterilization Act 2 of 1975
Niger	Reproductive Health Law 2006	Sur la santé de la reproduction au Niger
Rwanda	Ratification of the Maputo Protocol 2012	Center for Reproductive Rights
South Africa	Abortion and Sterilization Act 1975	Abortion and Sterilization Act NO. 2 of 1975
Togo	Reproductive Health Law 2007	Journal Officiel
Zambia	Termination of Abortion Act 1972	The Termination of Pregnancy Act
Zimbabwe	Abortion Law 1977	The Termination of Pregnancy Act
Countries in Which Abortion is Heavily Restricted		
Gambia	Section 30(1) of the Women's Act 2010	Women's Act 2010
Malawi	Penal Code 149-150	Laws of Malawi
Nigeria	Criminal Code - Section 228-30	Center for Reproductive Rights
Senegal	Loi de base n 65-60	Center for Reproductive Rights
Sierra Leone	Offences against the Person 1861	An Act to consolidate and amend the Statute Law of England and Ireland
Uganda	The Penal Code Act (Cap. 120)	Centre for Reproductive Rights
Tanzania	Penal Code, Chapter 16	Center for Reproductive Rights

Continued from next page...

Table A2: Countries and Waves

Country	DHS Sample	Wave	Year
Angola	Standard DHS	Wave 7	2015
Benin	Standard DHS	Wave 7	2017
Burkina Faso	Standard DHS	Wave 6	2010
Burundi	Standard DHS	Wave 7	2016
Cameroon	Standard DHS	Wave 7	2018
Central African Republic	Standard DHS	Wave 3	1994
Chad	Standard DHS	Wave 7	
Democratic Republic of Congo	Standard DHS	Wave 6	2013
Ethiopia	Standard DHS	Wave 8	2011
Gabon	Standard DHS	Wave 6	2012
Ghana	Standard DHS	Wave 7	2014
Gambia	Standard DHS	Wave 8	2019
Guinea	Standard DHS	Wave 7	2018
Ivory Coast	Standard DHS	Wave 6	2012
Kenya	Standard DHS	Wave 7	2014
Liberia	Standard DHS	Wave 7	2018
Malawi	Standard DHS	Wave 7	2016
Mali	Standard DHS	Wave 7	2018
Mozambique	Standard DHS	Wave 6	2011
Namibia	Standard DHS	Wave 6	2013
Nigeria	Standard DHS	Wave 7	2018
Niger	Standard DHS	Wave 6	2012
Rwanda	Standard DHS	Wave 8	2018
Sierra Leone	Standard DHS	Wave 7	2018
Senegal	Standard DHS	Wave 8	2018
South Africa	Standard DHS	Wave 7	2016
Togo	Standard DHS	Wave 6	2013
Tanzania	Standard DHS	Wave 7	2015
Uganda	Standard DHS	Wave 7	2016
Zambia	Standard DHS	Wave 6	2013
Zimbabwe	Standard DHS	Wave 7	2015

Table A3: Variables Description

Variable Name	Source	Description
DHS Variables		
Fertility	v201	Total number of children
Unwanted Children	v218 & v613	Difference between total child alive and ideal number of child
Child Mortality	v206 & v207	Dummy for sons dead + daughters dead > 0
Sons Dead	v206	Dummy for sons dead > 0
Daughters Dead	v207	Dummy for daughters dead> 0
Very Small Child	m19_1 to m19_6	Lowest birth weight among all children < 1500
Mother's Education	v106	Highest education level
Currently Working	v714	Dummy for whether currently working
Skilled Occupation	v716	Dummy for professional/technical/managerial/manual skilled occupation.
Wealth Score	v190	Wealth index combined
Children's Education	hv106	Highest education level
Other Variables		
Distance from railway	Nunn (2010)	Euclidean distance between a cluster and the closest colonial railway
Distance from explorer routes	Nunn & Wantchekon (2011)	Euclidean distance between a cluster and the closest colonial route
Distance from mission	Nunn (2010)	Euclidean distance between a cluster and the closest Christian mission
Distance from coast	Level 0 Shapefile from GADM	Euclidean distance between a cluster and the coast
Distance from city	Natural Earth	Eclidean distance between a cluster and the closest major city
Distance from Water Bodies	Natural Earth	Distance between a cluster and the closest internal water body
Elevation	ETOPO	Altitude in cm

Continued on next page...

Variable Name	Source	Description
Ruggedness	QGIS & ETOPO	Computed using the raster terrain analysis plugin
Temperature	Worldclim	Mean annual temperature
Precipitation	Worldclim	Mean annual rain precipitation
Distance from Health	Maina et al. (2019)	Euclidean distance from the closest health centre
Birth Intervals	Murdock (1967)	Dummy for birth intervals > 2 years
Genital Cutting	Murdock (1967)	Dummy for genital cutting is practiced
Boy Segregation	Murdock (1967)	Dummy for boy segregation
Insistence on Virginity	Murdock (1967)	Dummy for whether premarital sex is prohibited
Polygyny	Murdock (1967)	Dummy for polygyny

Continued from next page...

Appendix B

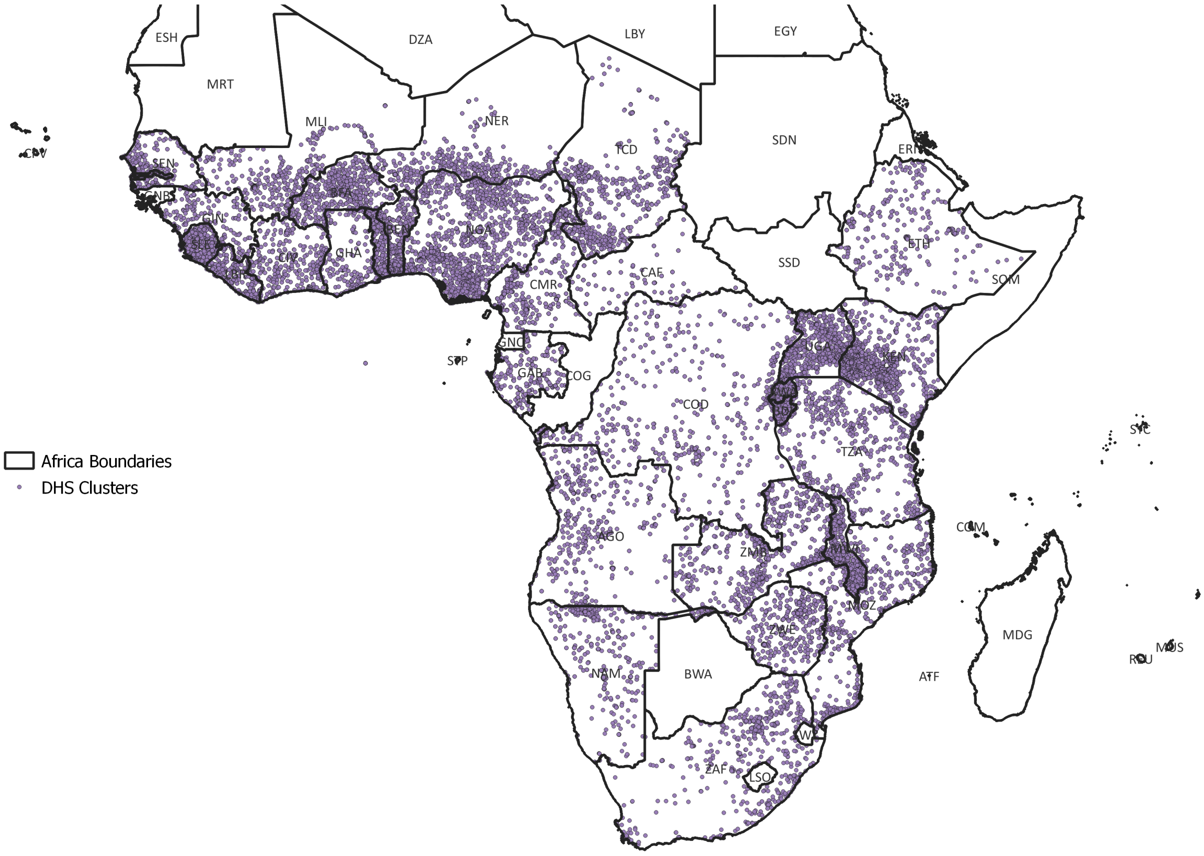
Figure B1: Distribution of Legal Grounds on which Abortion Has Been Decriminalized.

Note: No Abortion indicates countries where abortion is a criminal offense or only permitted to save a woman's life. *H* represents physical and/or mental health as a mitigating circumstance, *RI* stands for rape and incest, and *F* denotes fetal abnormality. *HRIF+* is used for countries that consider health, rape/incest, fetal impairment, and socioeconomic conditions as mitigating circumstances. Information is provided only for countries in the sample.

Figure B2: Year of Decriminalization.

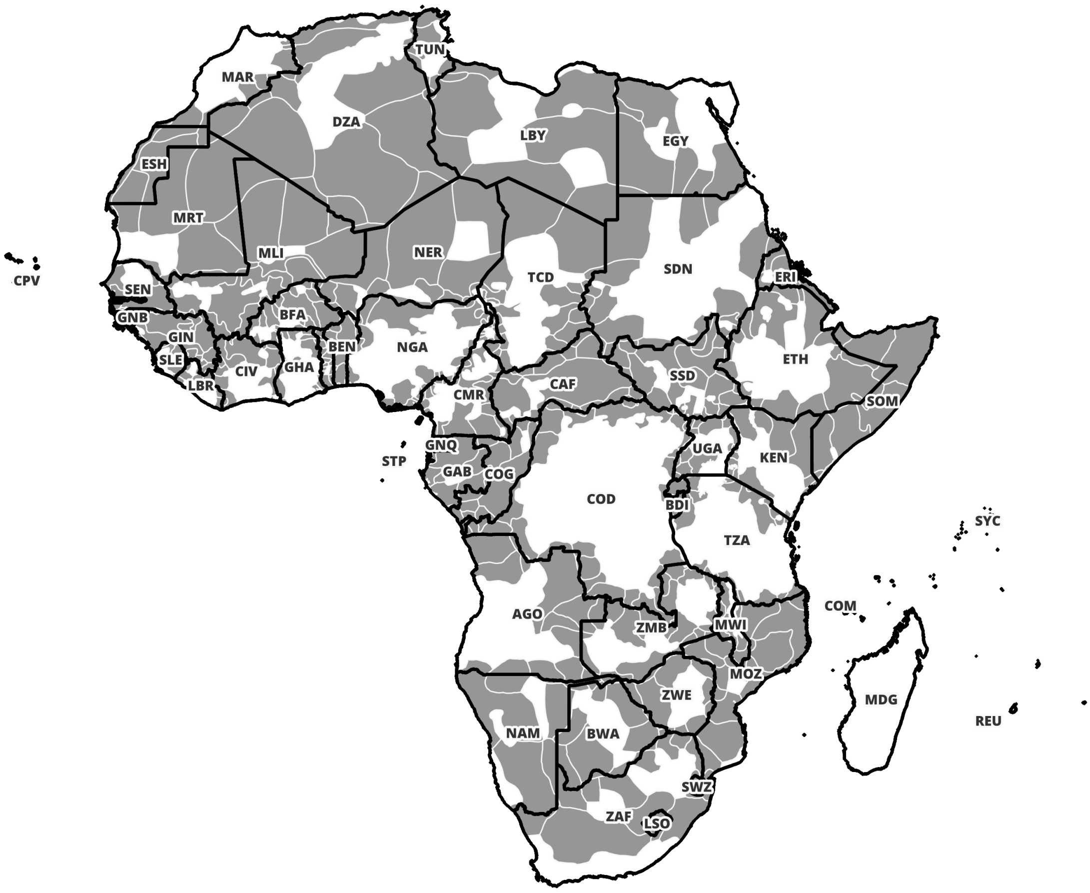
Note: The year of decriminalization is only reported for countries in the sample decriminalizing abortion.

Figure B3: Distribution of DHS Clusters in the Sample.



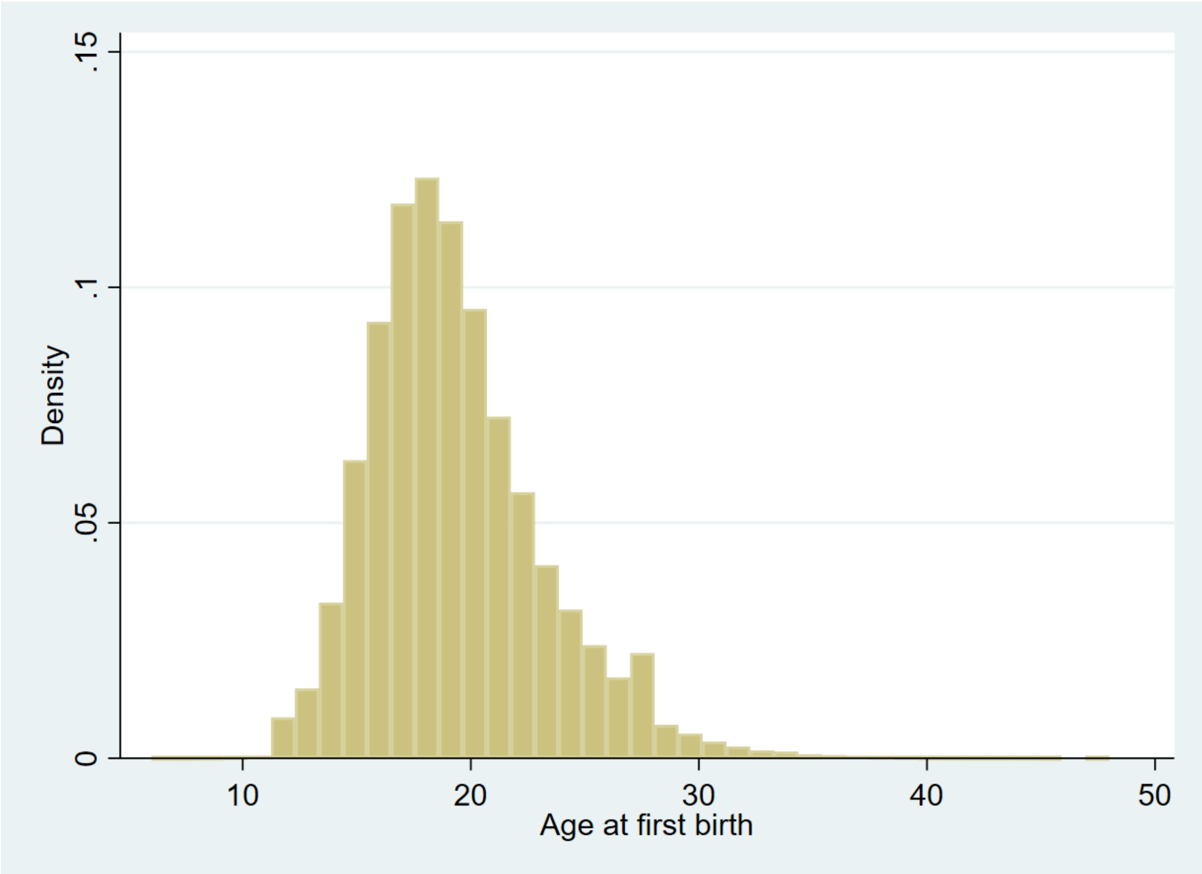
Note: .Countries covered in the sample with dots representing DHS clusters.

Figure B4: Ethnic Partitions.



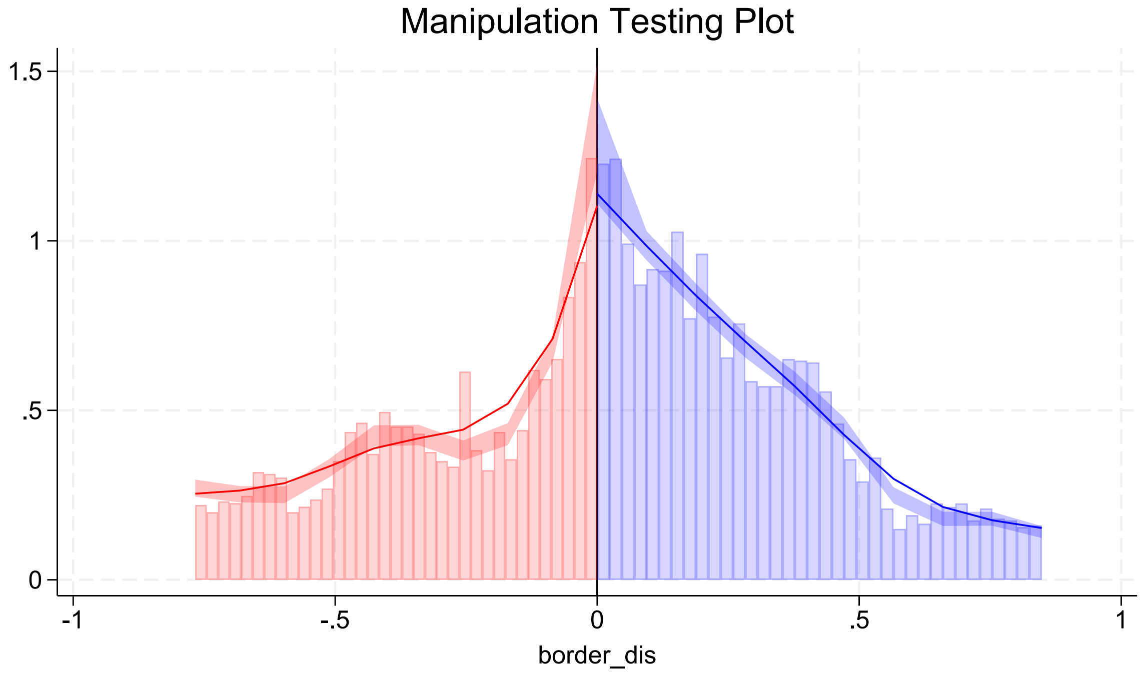
Note: Ethnic partitions are shown in grey. Country borders in black and ethnic borders in white.

Figure B5: Distribution of Age at First Birth



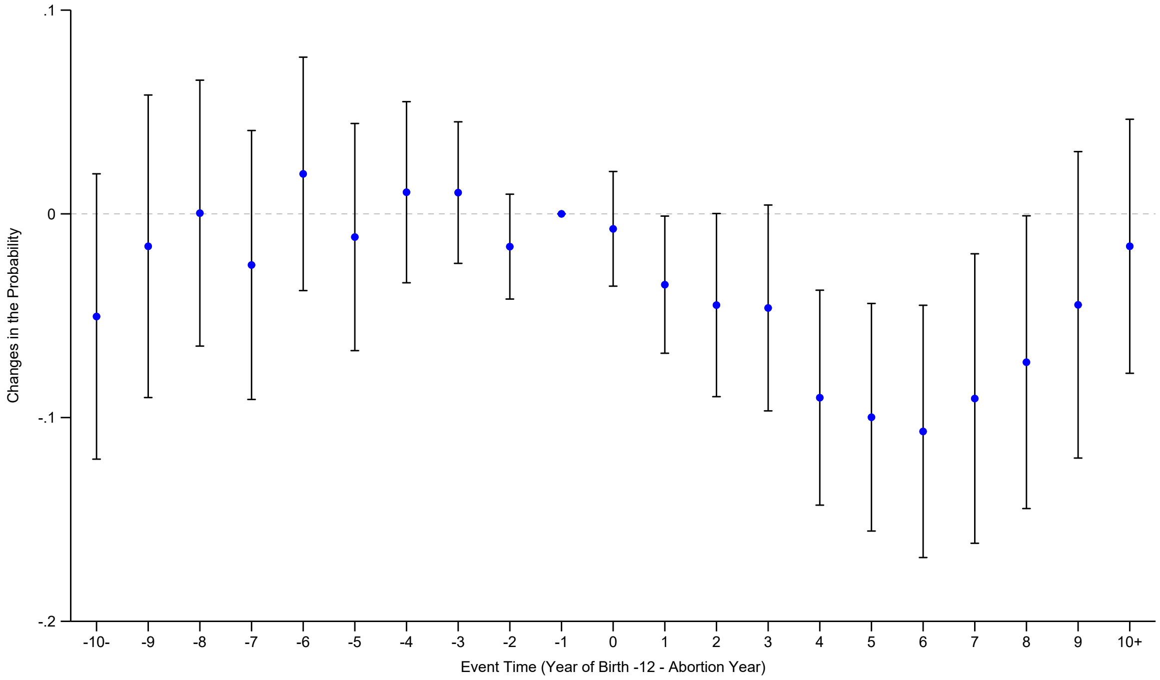
Note: The graph shows the distribution of age at first birth in the sample.

Figure B6: Sorting at the Border



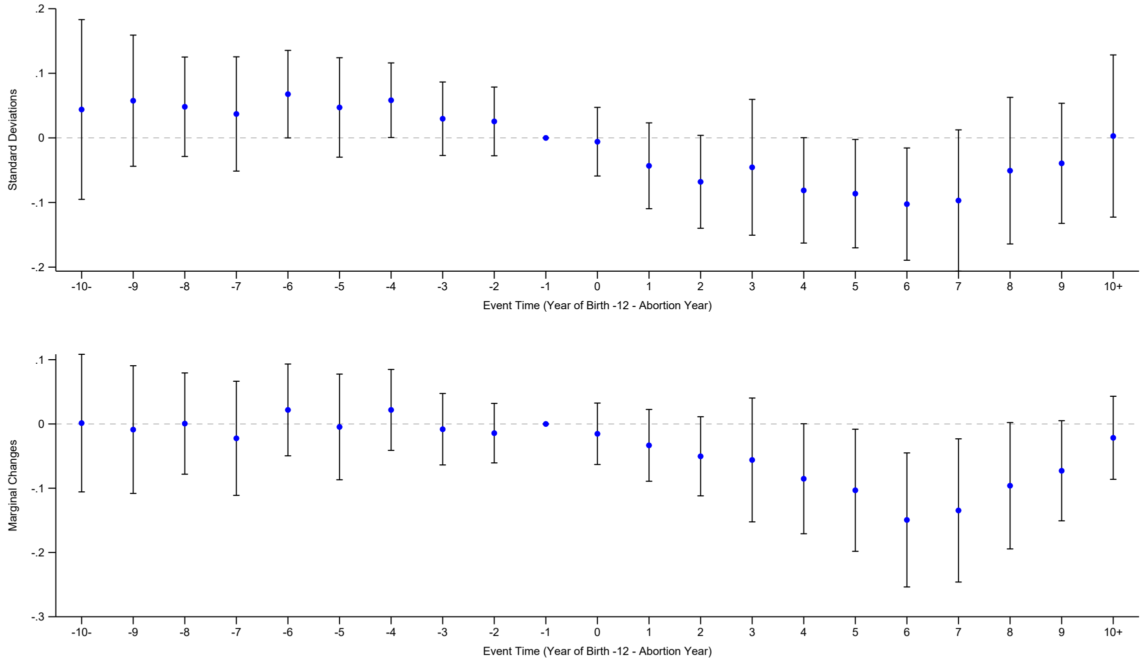
Note: The graph shows the continuity of the density function at the cutoff, with lighter shades representing the confidence intervals.

Figure B7: Abortion and Fertility Including Women with no Children



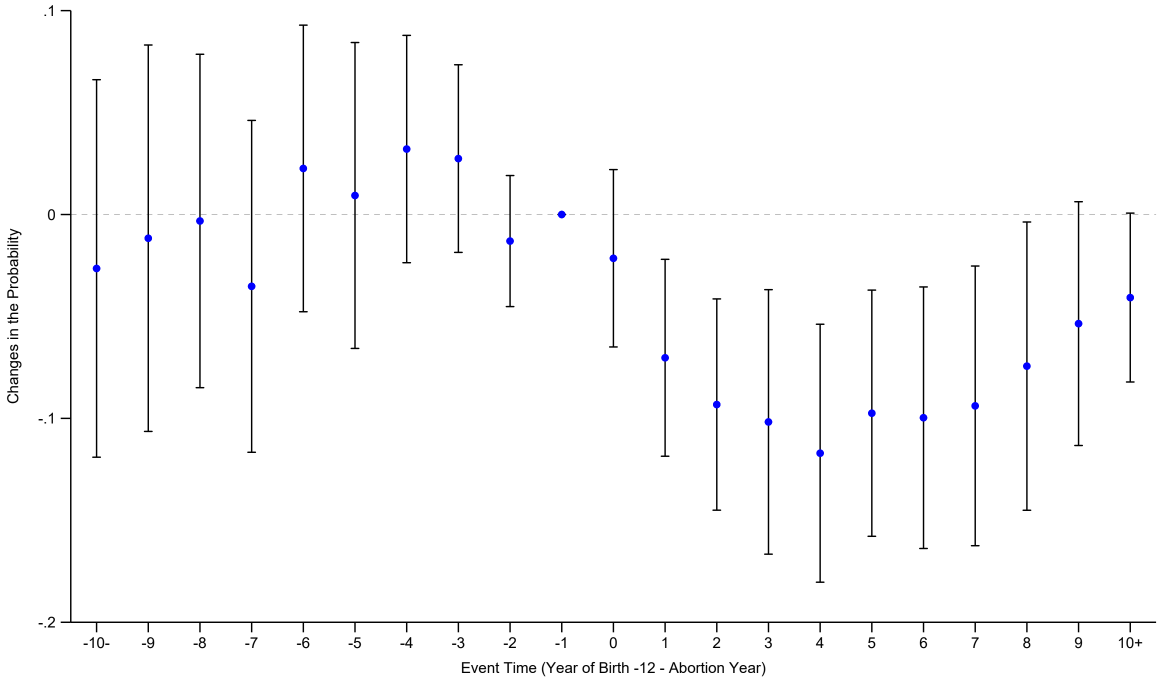
Note: The dependent variables is a dummy for whether the number of children is larger than three. The vertical axis reports changes in the probability. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Controls include:*i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status. Point estimates and 95 percent confidence intervals are provided. The error is clustered at an ethnic partitions level.

Figure B8: Abortion and Fertility Using Alternative Transformation of the Dependent



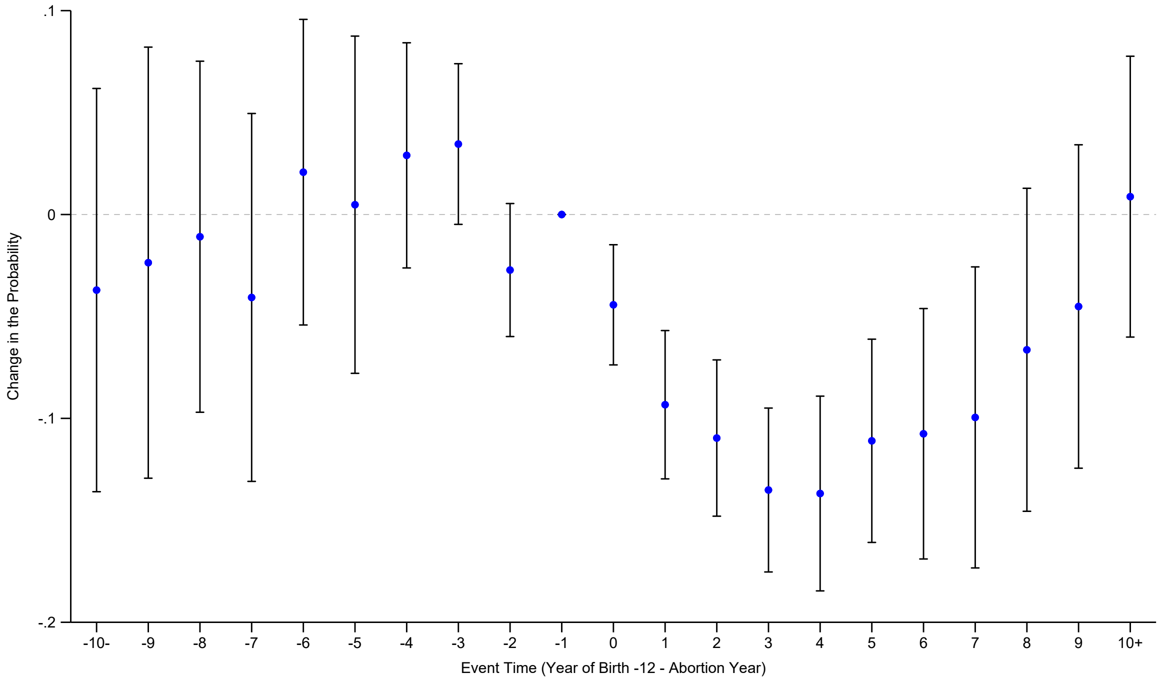
Note: The dependent variables are the standardized total number of children on the top Panel and the log of the total number of children on the bottom Panel. The vertical axis reports either the standard deviation or the marginal changes. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Estimates are confined to the subset of women in the sample who, by the time of the survey, have at least one child. Controls include:*i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status. Point estimates and 95 percent confidence intervals are provided. The error is clustered at an ethnic partitions level.

Figure B9: Abortion and Fertility Including Additional Controls



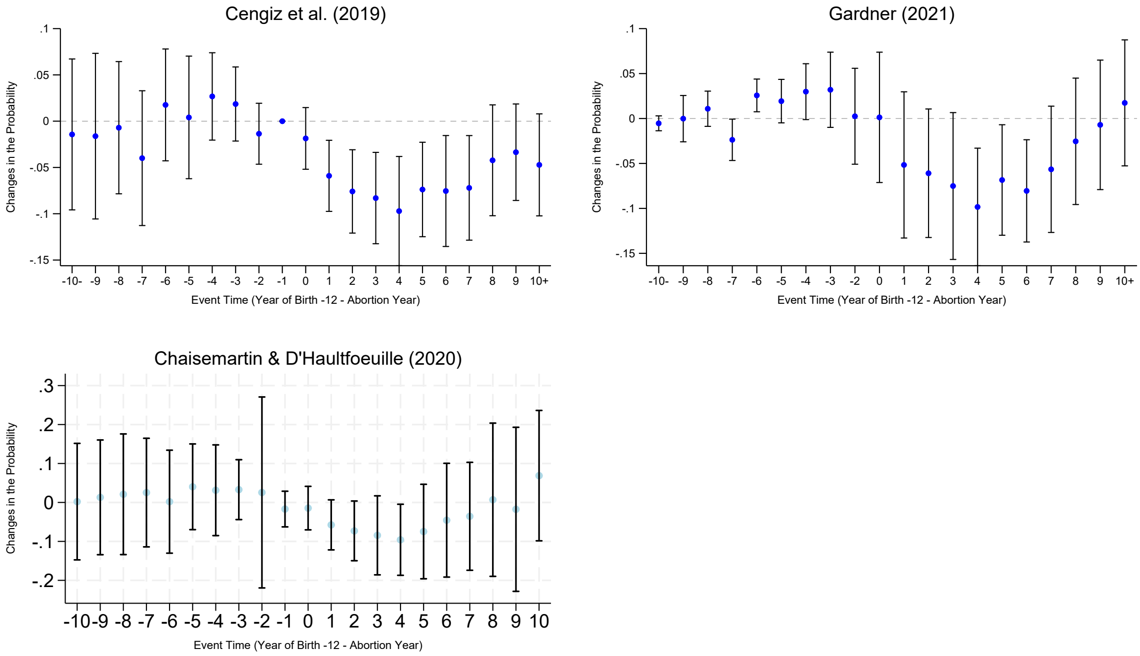
Note: The dependent variables is a dummy for whether the number of children is larger than three. The vertical axis reports changes in the probability. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Estimates are confined to the subset of women in the sample who, by the time of the survey, have at least one child. Additional controls include: a third form polynomial on latitude and longitude, distance from colonial railways, distance from explorer routes, distance from Christian missions, distance from a major city, distance from health facility, distance from water bodies, distance from the coast, elevation, ruggedness, temperature and precipitation. Point estimates and 95 percent confidence intervals are reported. The error is clustered at an ethnic partitions level.

Figure B10: Abortion and Fertility Controlling for Self-Reported Ethnicity



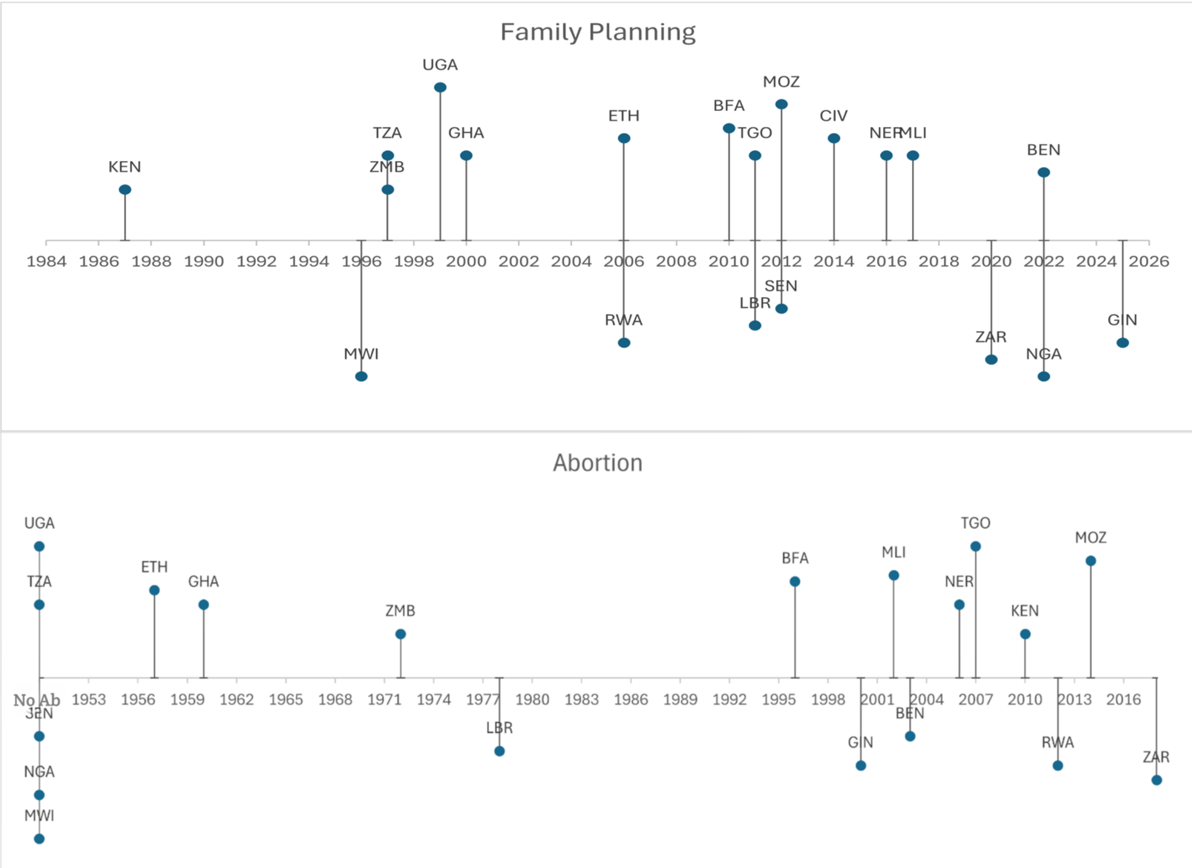
Note: The dependent variables is a dummy for whether the number of children is larger than three. The vertical axis reports changes in the probability. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Controls include:*i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status. Point estimates and 95 percent confidence intervals are provided. The error is clustered at an ethnic partitions level.

Figure B11: DiD Robust to Heterogeneous Treatment.



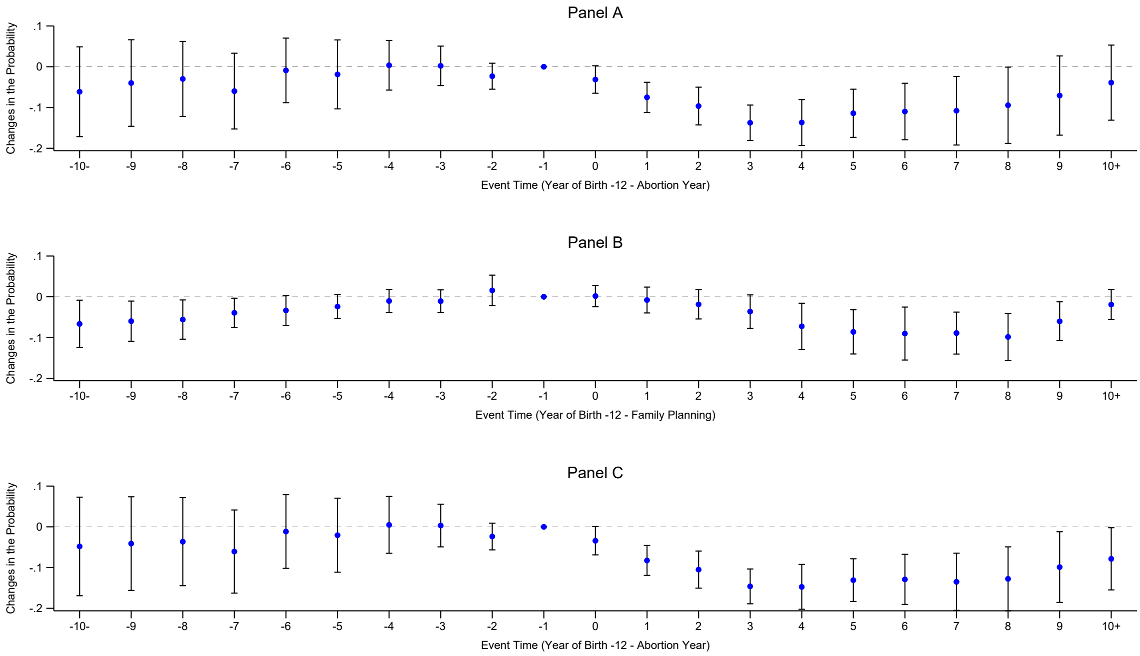
Note: The dependent variables is a dummy for whether the number of children is larger than three. The vertical axis reports changes in the probability. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Estimates are confined to the subset of women in the sample who, by the time of the survey, have at least one child. Controls include:*i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status. Point estimates and 95 percent confidence intervals are provided. The error is clustered at ethnic an partitions level.

Figure B12: Abortion vs Modern Contraception - Timeline.



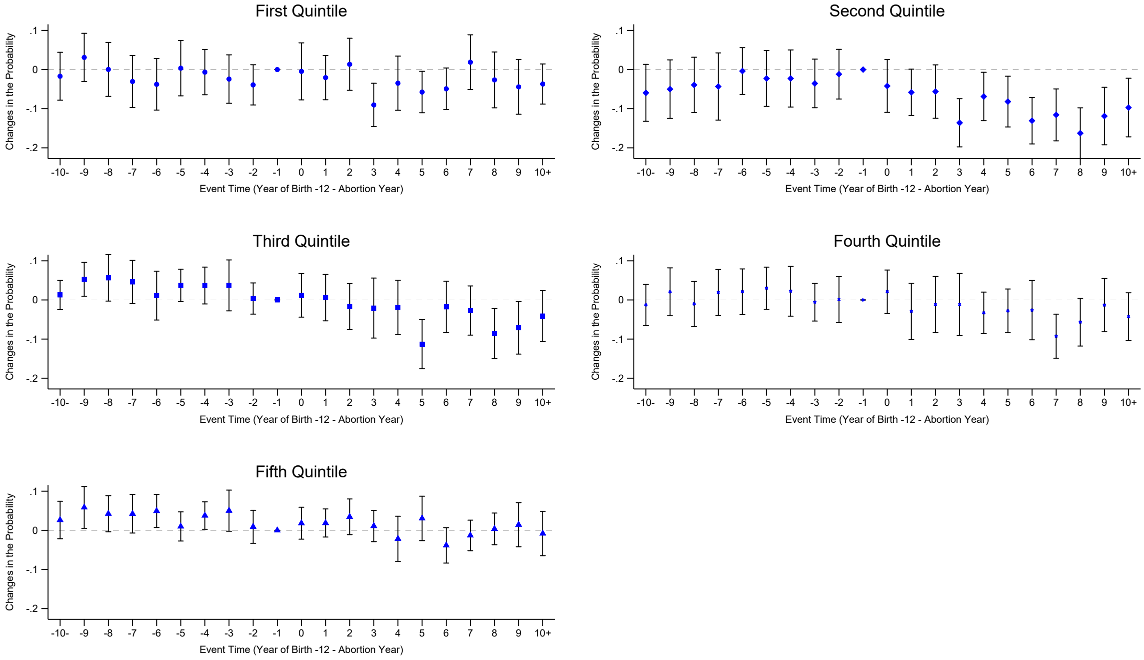
Note: The Figure shows the Timeline for Modern Contraception (Top Panel) and abortion (Bottom Panel) for the 20 countries in the sample for which data on modern contraception is available. The Top Panel reports the year in which the upper threshold for low prevalence is crossed. The Bottom Panel shows the year of abortion decriminalization.

Figure B13: Effect of Abortion and Modern Contraception on Fertility.



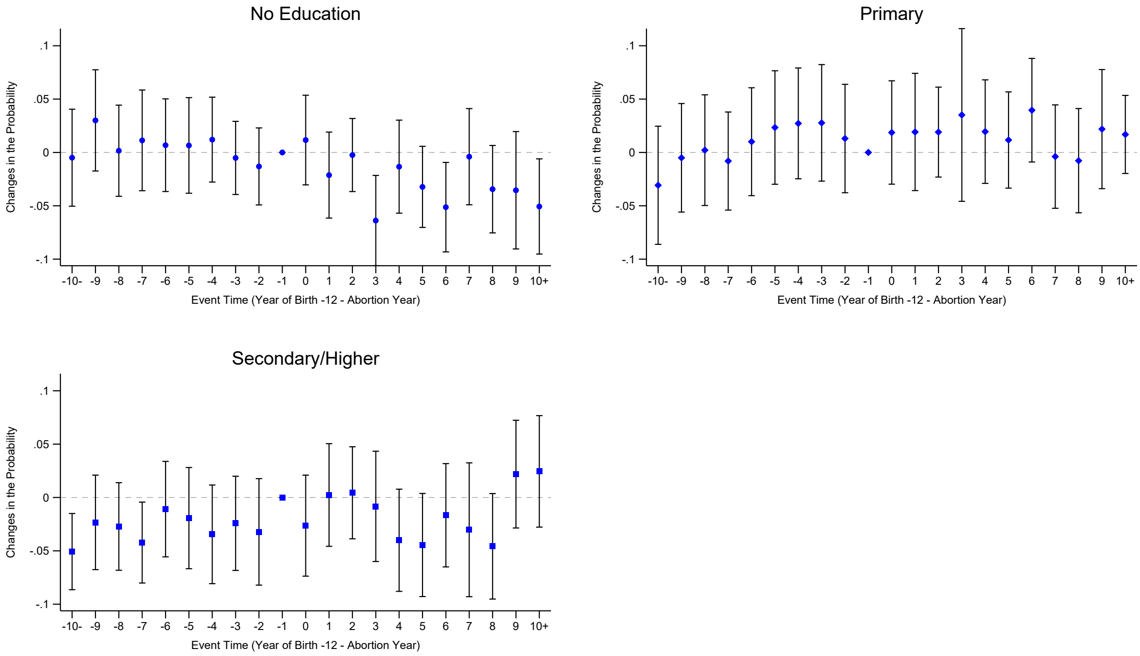
Note: The dependent variables is a dummy for whether the number of children is larger than three. The vertical axis reports changes in the probability. Panel A shows the effect of abortion on fertility restricting the sample to the 20 countries for which data on modern contraception is available. Panel B shows the effect of modern contraception. Panel C shows the effect of abortion controlling for modern contraception. The horizontal axis reports cohorts of women entering childbearing age x years after the policy with zero denoting women entering childbearing the age of the policy is introduced. Estimates are confined to the sub-sample of women who, by the time of the survey, have at least one child. Controls include:*i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status.Point estimates and 95 percent confidence intervals are provided. The error is clustered at an ethnic partitions level.

Figure B14: Effect of Abortion on Child Mortality Depending on Wealth.



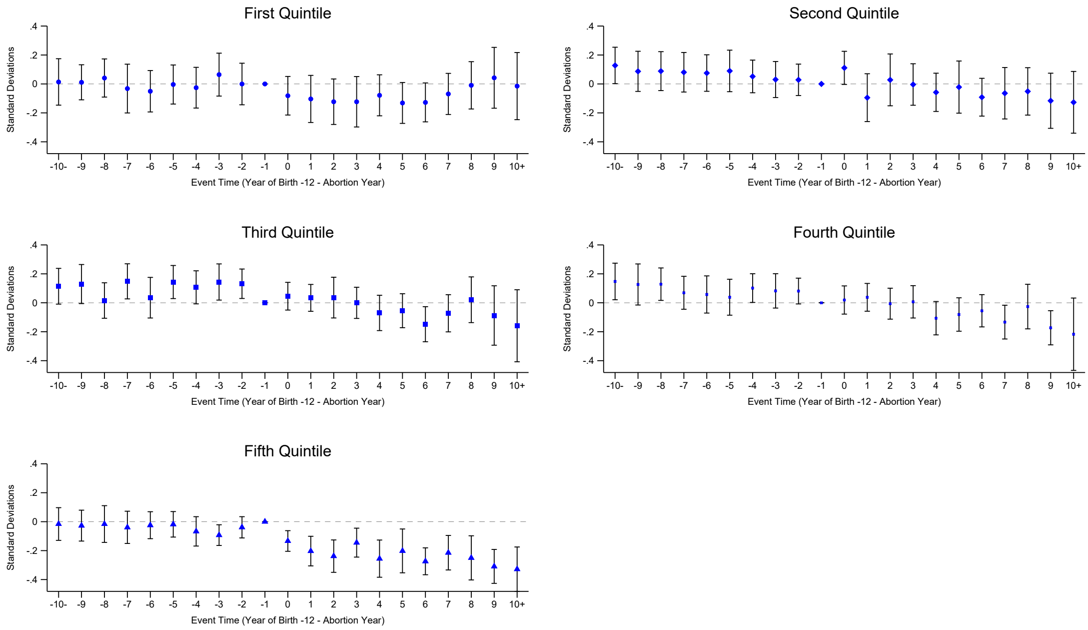
Note: The dependent variables is a dummy for whether at least one child is dead. The vertical axis reports changes in the probability. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Estimates are confined to the sub-sample of women who, by the time of the survey, have at least one child. Controls include:*i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status.Point estimates and 95 percent confidence intervals are provided. The error is clustered at an ethnic partitions level.

Figure B15: Effect of Abortion on Child Mortality Depending on Education.



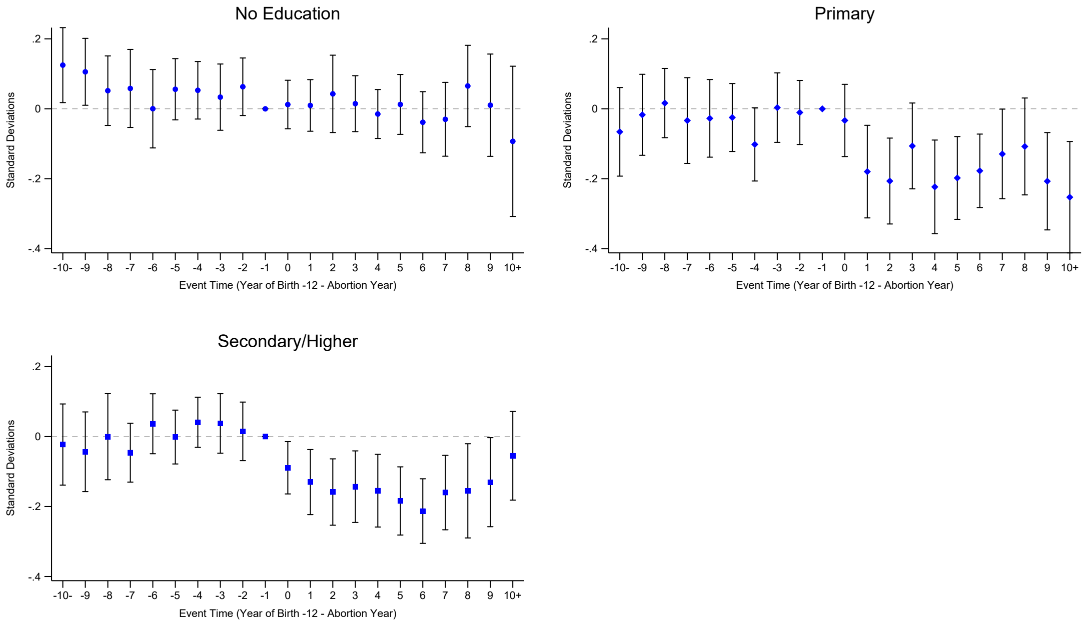
Note: The dependent variables is a dummy for whether at least one child is dead. The vertical axis reports changes in the probability. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Estimates are confined to the sub-sample of women who, by the time of the survey, have at least one child. Controls include:*i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status.Point estimates and 95 percent confidence intervals are provided. The error is clustered at an ethnic partitions level.

Figure B16: Effect of Abortion on Unwanted Children by Wealth



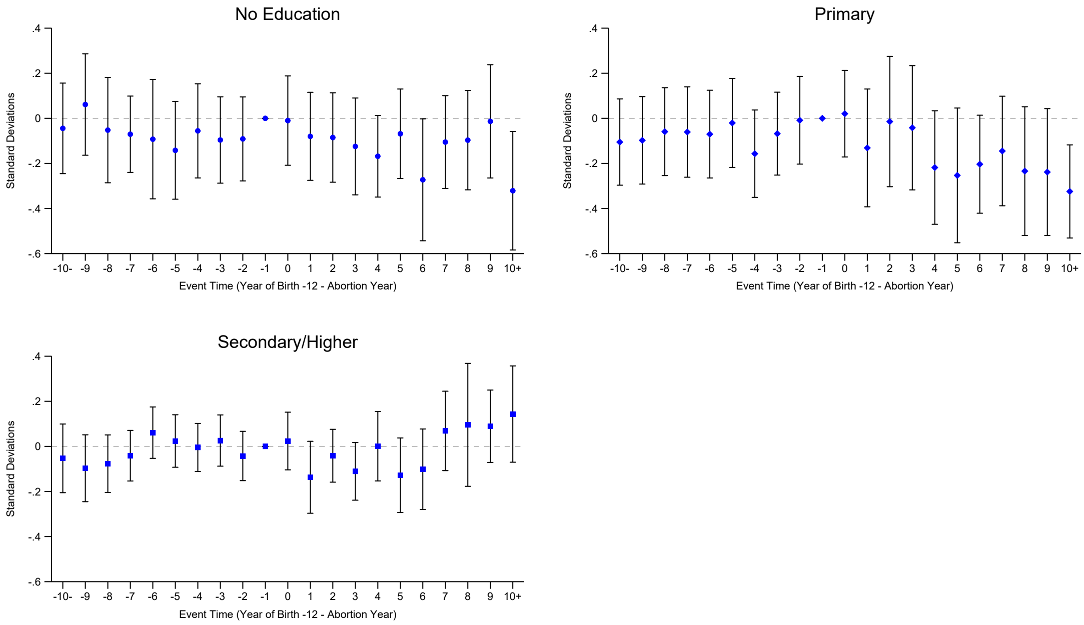
Note: The dependent variable is the standardized count of unwanted children. Panels on the top shows the effect among households in the the first (LHS) and second (RHS) quintile of the distribution of wealth. Panels in the middle shows the effect among households in the third and fourth quintile of the distribution of income. The Panel at the bottom shows the effect among households at the top of distribution of wealth. The vertical axis reports standard deviation changes. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Estimates are confined to the subset of women in the sample who, by the time of the survey, have at least one child. Controls include:*i* Country FE; *ii* Survey Year FE; *iii* Cohort FE; *iv* Ethnic Group FE; *v* Marital Status. Point estimates and 95 percent confidence intervals are reported. The error is clustered at an ethnic partitions level.

Figure B17: Effect of Abortion on Unwanted Children by Education.



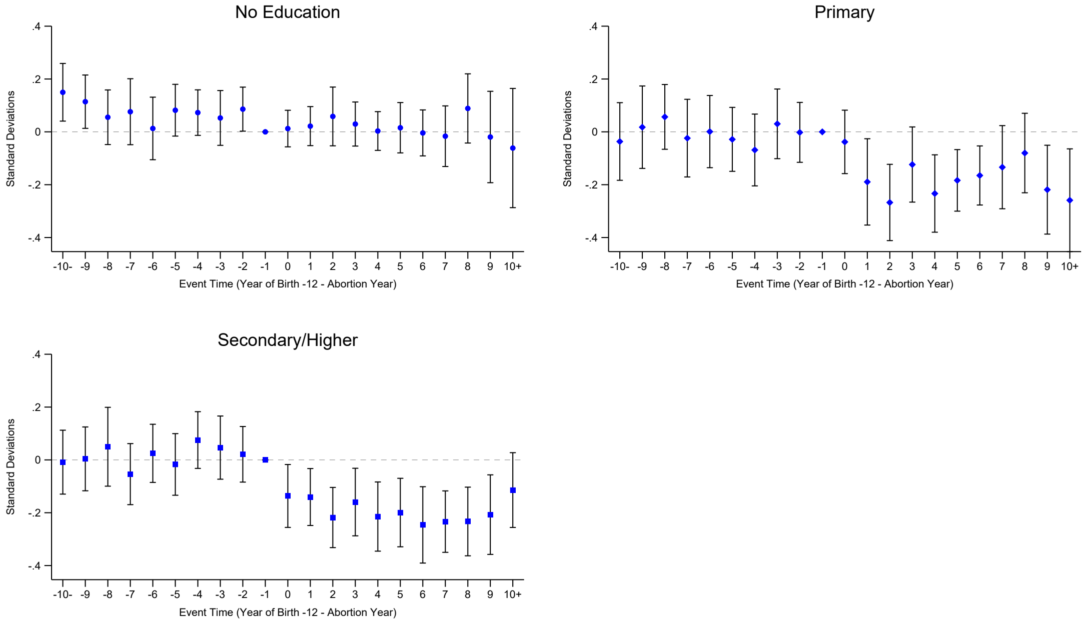
Note: The dependent variable is the standardized number of unwanted children. The three panels show the effect for women with no education (LHS), primary education (Middle) and Secondary and Higher (RHS) education. The vertical axis reports standard deviation changes. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Estimates are confined to the subset of women in the sample who, by the time of the survey, have at least one child. Controls include:*i* Country FE; *ii* Survey Year FE; *iii* Cohort FE; *iv* Ethnic Group FE; *v* Marital Status. Point estimates and 95 percent confidence intervals are reported. The error is clustered at ethnic an partitions level.

Figure B18: Effect of Abortion on Unwanted Children by Education Among Women Using Contraception.



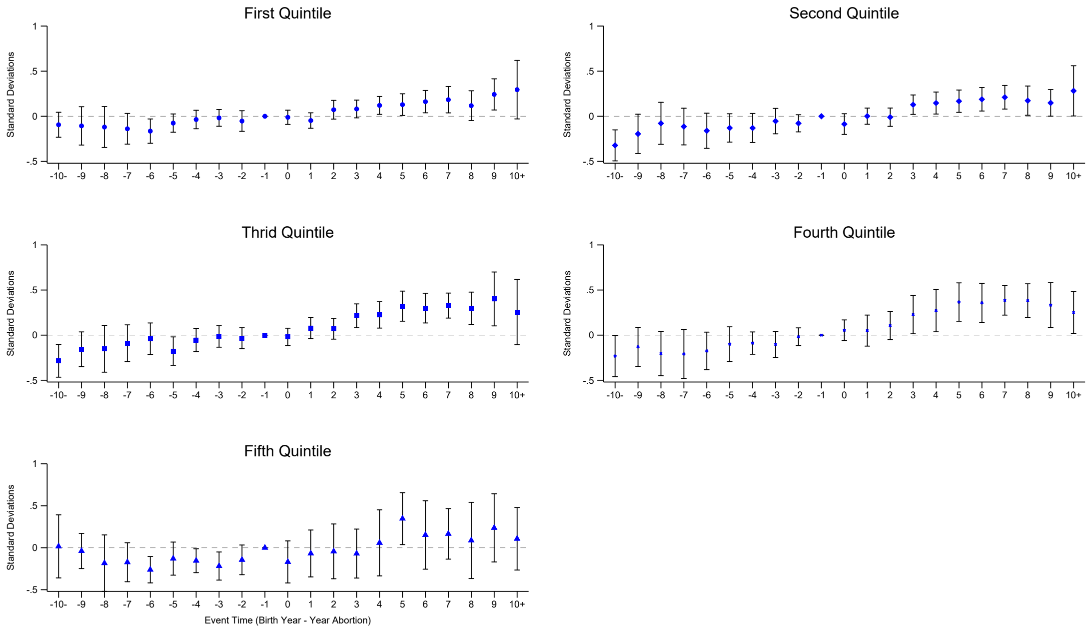
Note: The dependent variable is the standardized number of unwanted children. The three panels show the effect for women with no education (LHS), primary education (Middle) and Secondary and Higher (RHS) education. The vertical axis reports standard deviation changes. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Estimates are confined to the subset of women in the sample who, by the time of the survey, have at least one child. Controls include:*i* Country FE; *ii* Survey Year FE; *iii* Cohort FE; *iv* Ethnic Group FE; *v* Marital Status. Point estimates and 95 percent confidence intervals are reported. The error is clustered at an ethnic partitions level.

Figure B19: Effect of Abortion on Unwanted Children by Education Among Women not Using Contraception.



Note: The dependent variable is the standardized number of unwanted children. The three panels show the effect for women with no education (LHS), primary education (Middle) and Secondary and Higher (RHS) education. The vertical axis reports standard deviation changes. The horizontal axis reports event periods with 0 denoting women born 12 years before the treatment and positive integers denoting younger women (i.e., 1 if born eleven years before, 2 if born 10 years before, etc.). Estimates are confined to the subset of women in the sample who, by the time of the survey, have at least one child. Controls include:*i* Country FE; *ii* Survey Year FE; *iii* Cohort FE; *iv* Ethnic Group FE; *v* Marital Status. Point estimates and 95 percent confidence intervals are reported. The error is clustered at an ethnic partitions level.

Figure B20: Effect of Abortion on Children's Education by Wealth.



Note: The dependent variable is the standardized level of attained education. Panels on the top shows the effect among households in the the first (LHS) and second (RHS) quintile of the distribution of wealth. Panels in the middle shows the effect among households in the third and fourth quintile of the distribution of income. The Panel at the bottom shows the effect among households at the top of distribution of wealth. The vertical axis reports standard deviation changes. The horizontal axis reports event periods with 0 denoting children born the year the policy is implemented. Estimates are confined to the subset of children above 6 not currently enrolled at school. Controls include: *i* Country FE; *ii* Survey Year FE; *iii* Cohort FE; *iv* Ethnic Group FE; *v* Marital Status. Point estimates and 95 percent confidence intervals are reported. The error is clustered at an ethnic partitions level.

Appendix C

Table C1: Differences in Means

	(1) Abortion		(2) No Abortion		(3) Differences	
	mean	sd	mean	sd	b	t
Birth Intervals (EA36)	0.178	0.382	0.406	0.491	0.228***	(67.238)
Genital Cut (EA37)	0.496	0.500	0.684	0.465	0.188***	(65.404)
Boy Segregation (EA38)	0.351	0.477	0.656	0.475	0.304***	(86.340)
Insistence on Virginity (EA39)	0.725	0.446	0.463	0.499	-0.262***	(-74.851)
Polygyny (EA40)	0.074	0.261	0.082	0.274	0.008***	(5.240)
Distance from Colonial Rail	4.012	2.265	3.406	2.657	-0.605***	(-49.550)
Distance from Explorer Routes	1.445	1.565	1.442	1.400	-0.003	(-0.420)
Distance from Christian Mission	1.125	1.498	1.270	1.492	0.145***	(19.356)
Distance from Water Body	0.482	0.465	0.598	0.621	0.116***	(42.965)
Distance from the Coast	6.301	3.372	4.885	3.611	-1.416***	(-81.452)
Distance from Major City	0.807	0.809	0.789	0.753	-0.019***	(-4.729)
Elevation	869.019	594.460	638.050	615.107	-230.969***	(-76.560)
Ruggedness	101.993	97.148	90.239	92.561	-11.754***	(-24.706)
Temperature	23.302	3.717	24.374	3.423	1.072***	(59.697)
Precipitation	1088.018	534.638	1154.853	512.579	66.834***	(25.462)
Distance from Health Center	0.038	0.044	0.040	0.071	0.003***	(8.688)
Observations	70973		91785		162758	

Table C2: Summaries Statistics

	count	mean	sd	min	max
Total Children	234059	2.845176	2.731222	0	18
Unwanted Children	216904	-2.505998	2.799579	-30	12
Dead Children	234059	.2126088	.409154	0	1
Dead Daughter	234059	.1229818	.328417	0	1
Dead Son	234059	.1398664	.3468492	0	1
Very Small Child	83319	.0129142	.1129053	0	1
Educational Attainment	234042	1.012233	.8772052	0	3
Currently Working	228077	.6054973	.4887447	0	1
Skilled Employed	222677	.1142013	.3180563	0	1
Distance from Colonial Rail	234059	3.145471	2.390878	.0004469	12.82328
Distance from Explorer Routes	234059	1.236728	1.346735	.0004001	7.984598
Distance from Christian Mission	234059	1.018779	1.34581	.0011362	9.166163
Distance from Water Body	234059	.5199116	.5990326	.0000583	4.316145
Distance from the Coast	234059	5.060861	3.527226	.0001615	15.44024
Distance from Major City	234059	.7315426	.6997128	.0004287	4.988281
Elevation	234059	698.3988	588.0786	-275.6914	2654.152
Ruggedness	234059	96.28276	97.25754	1.633169	830.6405
Temperature	234059	23.93195	3.421665	13.02668	29.96607
Precipitation	234059	1132.263	533.0306	46.56164	4117.857
Distance from Health Center	234059	.0363488	.0529502	9.90e-14	1.323589
Birth Intervals	92534	.2527611	.4345975	0	1
Genital Cut	163811	.5660304	.4956223	0	1
Boy Segregation	103294	.6300947	.4827811	0	1
Insistence on Virginity	98754	.4553841	.498008	0	1
Polygyny	177246	.0739537	.2616963	0	1

Table C3: Average Treatment Effect

	(1) Children Dead	(2) Unwanted Children
abortion	-0.029**	-0.108***
	(0.011)	(0.029)
Adj.R-squared	0.135	0.288
Observations	171332	158146
Sample Mean	0.484	0.219
Ethnic FE	Yes	Yes
Country FE	Yes	Yes
Year FE	Yes	Yes
Individual Controls	Yes	Yes
Geographic Controls	No	No

Notes: The dependent variables are a dummy for whether any child has died and the standardized number of unwanted children. Estimates are confined to the subset of women in the sample who, by the time of the survey, have at least one child. Controls include:*i*) Country FE; *ii*) Survey Year FE; *iii*) Cohort FE; *iv*) Ethnic Group FE; *v*) Marital Status. Clustered standard errors at the ethnic partition level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.