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THREE ESSAYS ON FAMILY, EDUCATION AND HEALTH IN DEVELOPING COUNTRIES

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A ma mère Agnès et à mon epoux Mahuéna

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Sigles et abbréviations

ABC:	Abstinence, Being faithful, correct and consistent Condom use
AIDS:	Acquired ImmunoDeficiency Syndrome
DHS:	Demographic and Health Surveys
EA:	Enumeration Area
INStaD-Benin:	Institut National de la Statistique et de la Demographie du Bénin
Max:	Maximum
Min:	minimum
Obs:	Observation
OLS:	Ordinary Least Squares
RDD:	Regression Discontinuity designs
STD:	Standard Deviation
STI:	Sexually Transmitted Infection
UNICEF:	United Nations International Children's Emergency Fund
HIV:	Human Immunodeficiency Virus

Résumé

Cette thèse est organisée en trois chapitres et s'articule autour des questions liées à la famille, à l'éducation et à la santé dans les pays en développement.

Le premier chapitre s'intéresse à la comprehension de la maladie VIH et de son lien avec les caractéristiques socioéconomiques des populations en Afrique Subsaharienne. Dans ce chapitre, j'analyse l'existence d'une relation causale entre le niveau d'éducation et le fait d'être porteur du virus VIH chez les femmes. Grâce à la reforme de gratuité de l'éducation primaire adoptée et mise en oeuvre en Zambie dès 2002 et qui a contribué à une augmentation substantielle du niveau d'éducation chez les femmes, j'estime une regression sur discontinuité que j'interagis avec la construction de nouvelles écoles. Les résultats montrent qu'une augmentation exogène de l'éducation des femmes conduit à une augmentation du taux de VIH; et qu'il n'y a pas d'évidence que la connaissance que les femmes ont du VIH soit liée à l'augmentation de leur niveau déducation. Aussi, l'éducation des femmes n'améliore pas leur comportement à risque. Cet effet positif de l'éducation sur le VIH est plutôt dû à l'urbanisation accrue des femmes les plus instruites.

Le deuxième et le troisième chapitre portent sur le confiage des enfants en Afrique. Dans le chapitre 2, que j'ai co-écrit avec Caleb Gbeholo, nous examinons les déterminants de confiage des enfants et les caractéristiques de l'enfant confié. À cet effet, nous utilisons les données d'une enquête que nous avons organisé et réalisé au Bénin en 2022 et qui porte sur les conditions de vie dans l'enfance et la qualité de vie à l'âge adulte. Les analyses

montrent que le niveau d'éducation des parents et la perte d'un parent pendant l'enfance sont associés au confiage des enfants. En ce qui concerne le choix de l'enfant confié, les résultats montrent que les filles sont généralement les plus confiées et la probabilité d'être confié décroît strictement avec l'ordre de naissance de l'enfant dans la fratrie.

Le chapitre 3 est co-écrit avec Caleb Gbeholo, Raphael Godefroy et Joshua Lewis. Il étudie l'effet du confiage sur l'éducation et la fertilité. En utilisant les mêmes données que celle du chapitre 2, nous montrons que les adultes confiés dans leur enfance sont moins susceptibles de fréquenter une école que leurs frères et soeurs non confiés. Nous montrons que cette différence du niveau d'éducation s'est accrue après la réforme du système éducatif dans les années 1990 au Bénin. Par ailleurs, nous trouvons qu'il n'existe aucune différence de fertilité entre les enfants confiés et les frères et soeurs non confiés. Nous estimons que le confiage peut expliquer une part importante de la difference de niveau d'éducation entre les hommes et les femmes.

Mots-clés: Éducation, réforme d'éducation, VIH, comportement à risques, regression sur discontinuité, confiage, ordre de naissance, genre, Afrique, Zambie, Benin, échantillonnage, urbanisation, fertilité, enquète.

Abstract

This dissertation is organized in three chapters and revolves around issues related to family, education and health in developing countries.

The first chapter studies how education affects women's HIV infection. By using an education reform that led to a sharp increase in women's education in Zambia, I estimate RDD, interacted with geographic differences in school supply. I find that an increase in female education led to HIV higher rate. I find no evidence that education affected women's HIV knowledge and their risky behaviors. Instead, the results are driven by the increased urbanization of the better educated women.

The second and third chapters address the practice of child fostering in Sub-saharan Africa. In the chapter 2, co-authored with Caleb Gbeholo, we examine the determinants of child fostering across and within family in Benin. In this purpose, we rely a dataset that comes from a unique survey that we designed and conducted in Benin in 2022. We find that parents' education and the lost of one parent during childhood are associated with child fostering. The fostered child is chosen according his gender and his birth order, with daughters facing a high risk of fostering during childhood. Furthermore, the child probability to be foster is steady decline by birth order.

The chapter 3, co-authored with Caleb Gbeholo, Raphael Godefroy and Joshua Lewis, studies the effect of child fostering on education and fertility. Using the same dataset as in chapter 2, we estimate that adults who were fostered as a child are signifi-

cantly less likely to have attended school than their siblings. We show that this difference in education achievement increased after the launch of an education reform in the 1990s. We find no difference in fertility. We estimate that the practice of child fostering may account for a substantial share of the gender gap in education.

Mots-clés: Education, Reform of education, HIV, risky behavior, discontinuity regression design, birth order, gender, Africa, Zambia, Benin, sampling, Child Fostering, fertility, Urbanization, survey.

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Chapter 1

Is schooling enough? Education and HIV: Evidence from Zambia

1.1 Introduction

The positive correlation between education and health is well documented in the literature (Grossman, 2017), and some studies have proven that this correlation reflects at least partly the causal effect of education on health (Lleras-Muney, 2005).

The aim of this paper is to estimate the causal impact of education on HIV infection. HIV has been one of the main causes of premature disability and death in sub-Saharan Africa in the past decades. Yet, the evidence of any impact of education on infection is unclear. A series of studies (Oster, 2005; Fortson, 2008; Paxson and Case, 2013; Duflo et al., 2015) have found little or no effect of education on the probability of being infected with HIV. HIV being relatively rare, though, the estimation of the effect of education on HIV may require relatively larger samples of observations than the ones used in those studies, or exogenous changes in education of a larger magnitude.

To address these problems, my paper focuses on Zambia. HIV infection is a distinctly important public health issue in Zambia. While the first case had been reported in 1988, 14% of total mortality was due to HIV disease in 1991, representing more than 15,000 deaths (Zambia National AIDS Program). In the 2018 Zambia Demographic Health Survey (DHS) reported that HIV prevalence among females aged 15-49 years was 14.2%, compared to 7.5% for males of the same age. These numbers indicate that Zambia is one of the countries where HIV is much more prevalent in sub-Saharan Africa.

To estimate the impact of education on HIV infection, I use a natural experiment that increased girls' education. Until the late 1990s, girls were much less likely to be enrolled in school than boys in general, and girls dropped out twice more than boys (Nkhata et al., 1998). In 2002, Zambia government announced and implemented free educational reform in the country. This reform abolished tuition fees and the mandate for primary pupils to wear uniform. Consequently, this policy reduces drastically the cost of education. As a result, the reform led to a large increase in women's education.

The data for the estimations are from the 2013 and the 2018 Zambia Demographic and Health Surveys. I use parametric and non-parametric regression discontinuity designs on women born between 1982 and 1994 to estimate how the reform affects female education and HIV infection. By using women's birth year as an assignment variable, I estimate RDD while taking into account geographic differences in school provision across the country.

I find that the 2002 educational reform led to a sharp jump in female education between the first treated and last non-treated birth cohorts of women. Women in the treated cohorts are 12.4% more likely to complete primary school. The educational reform also increases women's total years of education by 10.2%. I attribute these changes to the reform alone, since no other change seems to have affected women born around the end of the 1980s and early 1990s.

Regarding HIV, I find that the reform increased the probability of being HIV

positive. Numerically, there is an increase of 18% of the probability of being tested HIV positive for women who benefited from the reform.

These findings may hide heterogeneous effects due to the difference in education supply in terms of schools capacity across the country. Indeed, geographic differences in school availability could mitigate the effectiveness of the reform across the country (Duflo, 2001). To address this point, I construct for each province, an index of school supply that accounts for the number of schools built by the government between 1999 and 2005 per ten thousands children[1]. Using this index, I split the sample into high supply provinces and low supply provinces and I investigate the effect of the reform in the two groups [2].

I find that the reform has positive and significant effect on women's education and women's HIV infection in low supply provinces, and the patterns are robust alternative controls. Indeed, the reform is associated with a 18.7% increase in women's probability to achieve primary school and with 15.4% increase in women's total years of education. Also, the reform entails 29% increase in HIV infection among young women. As a result, I find that one additional year of education increases women's probability to contract HIV infection by 25.7%. I also find that the reform has no effect either on women's education or women's HIV infection in high supply provinces. There is no clear evidence on why I find no effect of the reform in high supply provinces. However, it could be that the reform occurred at a period of continuously increasing enrollment so that the slope of this trend is large enough to be much larger than any possible jump due to the reform.

I then investigate the mechanisms underlying the positive relationship between education and HIV infection. I find that the results cannot be attributed to the increase in the number of lifetime sexual partners of educated women, but that the increase in female education did not improve women behaviors about having safe sex, which is in

[1] children under 15 years old

[2] I rank the provinces in a descending order of the index and I split the sample by choosing a threshold. High supply provinces are provinces with a high index value, and low supply provinces are provinces with a low index value relatively to the threshold

contrast with De Walque (2007) yet consistent with Oster (2012).

I also find no change in women's bargaining power, so that Anderson (2018)'s finding that women who are less able to negotiate safe sex practices are more vulnerable to HIV than those who have more bargaining power to negotiate safe sex practices may not apply here.

Instead, what I do find is that more educated women are more likely to live in urban areas. Like Cutler and Miller (2005), I argue that my estimation of an effect of education on HIV may result from an impact of education on the probability of living in an urban area, where HIV prevalence is higher.

This paper contributes to three distinct strands of economic literature. First, it contributes to the literature that links education to health behaviors. Studies have generally found that education contributes to good health behaviors (Jensen and Lleras-Muney, 2012; Cutler and Lleras-Muney, 2010). However, this paper shows that the increase in female education does not change women's health behaviors about STIs. An important lesson from this study is that education, itself, is not sufficient to induce good behaviors at least in the case of HIV disease.

Second, it contributes to the literature on the determinant of HIV in Africa. Previous studies have documented a relationship between HIV infection and socioeconomic status. Several studies find that HIV is positively correlated with education (Over and Piot, 1991; Gregson et al., 2001; Hargreaves and Glynn, 2002; Fortson, 2008; Paxson and Case, 2013) whereas others show that the correlation could be negative (Iorio and Santaeulàlia-Llopis, 2016). Certains papers underline that HIV infection is correlated with sex, age, income and place and residence (Magadi, 2017; Magadi and Desta, 2011). I find that education alone is not necessary a tool to fight against all kind of diseases, particularly HIV infection - as pointed out by Duflo et al. (2015), education alone did not reduce HIV infection. I find that female education can affect positively women's HIV infection

when education does not change women's health behaviors in risky environment.

Third, this paper contributes to the literature on the links between urbanization and health. Indeed, the literature about the relationship between urbanization and health provides evidence that living in the city is dangerous for health (Cutler and Miller, 2005). This paper aligns with this finding. Urbanization sounds to be the channel through which education affected positively women's HIV infection.

The remainder of the paper proceeds as follows : section 1.2 provides some background on the context and the 2002 educational reform; section 1.3 presents the conceptual framework; section 1.4 describes the data; section 1.5 presents the empirical strategy; in section 1.6, section 1.7 and section 1.8 I present and discuss the results. section 1.9 concludes.

1.2 Background

Zambia is a country in southern Africa organized into 10 provinces [3]. Zambia population is concentrated mainly around Lusaka in the south and the Copperbelt province in the northwest. Zambia is constituted of many ethnic groups. However, the most representatives are Bemba and Tonga. Each ethnic group has particular ancestral norms. For example, Bemba people precluded premarital sexual behavior of girls by early marriage whereas Tonga people permitted it.[4]

Before the 21st century, literacy and school attendance in Zambia was low. In fact, during the first ten years of independence of Zambia, the primary and the secondary school enrollment have doubled. The enrollment has increased from 378,417 in 1964 to 858,191 in 1974 in primary school and from 13,871 in 1964 to 65,764 in 1974 in secondary

[3]The ten provinces are: Muchinga, Western, Copperbelt, North western, Northern, Southern, Eastern, Luapula, Central and Lusaka

[4]Ethnographic Atlas

school (Zambia ministry of education, 2015)[5]. After this expansion, the education system stagnated and was neglected for lack of means. As a result, enrollment rates in basic education have declined even though the school-going age population was growing quickly. Literacy rates have not improved but have tended to deteriorate and the gender gap in educational attainment persisted. Girls dropped out school earlier than boys in general and this situation was worse in the no denser area like the villages due to the lack of the means, the cost of the distance and the strong demand for child labour (Swainson, 1995).

In the late 1990s, the government of Zambia elaborated the Basic Education Subsector Plan (BESSIP) for 1999-2002 to improve access to quality of basic education. In February 2002, he announced the abolition of tuition fees and the non-obligation for students to wear school uniforms to encourage demand for education. This was applied immediately. So the reform has reduced the cost of education and it represents an incitation for educational demand for the poor. News schools were built gradually in each province to support the reform. Table 1.1 shows the distribution of the new schools by province from 1999 to 2005.

1.3 Conceptual Framework

There are many positive traits of having education. Indeed, education can help people to think, feel, and behave in a way that contributes to their well-being by improving, not only their personal utility, but also their community (Al-Shuaibi, 2014; Currie and Moretti, 2003).

In this paper, I take advantage from free primary education in Zambia - that increased significantly women education - to assess the effect of an exogenous increase in education on women HIV infection. I find that an increase in female education affects positively women's HIV infection through urbanization. In this section, I provide a theo-

[5]Education for All 2015 National Review Report: Zambia

retical evidence that support this result.

Many factors could explain the relationship between education and HIV infection depending on whether this relationship is positive or negative. It could be marriage, believe about the disease, risky behavior, environmental risk etc. In a case of this paper, I develop a theoretical model of HIV infection and show under what assumptions education could affects positively HIV infection. I suppose that individual HIV status depend on the extent in which he involves in risky sexual behavior, what I call sexual risk (p); and the HIV prevalence in his living area, what I call environmental risk (y). This is reasonable assumption since HIV disease is a sexually transmitted disease. Furthermore, I allow p and y to depend on education(x), while keeping the other factors constant.

My empirical analysis consists by examining the reduced-form relationship between education (x) and HIV infection, ie $\frac{\partial HIV}{\partial x}$. This reduced form relationship between education and HIV can then be derived by using partial derivative:

$$\frac{\partial HIV}{\partial x} = \frac{\partial HIV}{\partial p}\frac{\partial p}{\partial x} + \frac{\partial HIV}{\partial y}\frac{\partial y}{\partial x} \tag{1.1}$$

- $\frac{\partial HIV}{\partial p}$ stands for, ceteris paribus, the relationship between HIV infection and sexual risk. The risk of HIV infection is increasing in risky sexual behavior such as having multiple concurrent partners or unprotected sex. So, $\frac{\partial HIV}{\partial p} > 0$ (Oster, 2005; Stoneburner and Low-Beer, 2004; Potts et al., 2008). Besides, $\frac{\partial HIV}{\partial p}$ is increasing in the HIV prevalence in the individual living areas. Regions with high HIV prevalence will have a stronger relationship between sexual behavior and HIV infection than regions with low prevalence.

- Besides, $\frac{\partial HIV}{\partial y} > 0$, the risk of HIV infection increases with the prevalence of HIV in an area (y) conditional on the risky behavior of individuals.

- $\frac{\partial p}{\partial x}$ represents the relationship between sexual risk and education. Education can be an instrument that aids in the understanding of risks and the behaviors that reduce

risks in order to improve health conditions. Thus, *this relationship ($\frac{\partial p}{\partial x} < 0$) will be negative*. But if education does not improve HIV risk perception, *this relationship will be positive,($\frac{\partial p}{\partial x} \geq 0$).*

- $\frac{\partial y}{\partial x}$ represents the relationship between education and the prevalence of HIV in an area. Apart from the elderly, educated people live mainly in urban area (or in developed regions) because of economic opportunities or people in urban (developed) area are more educated (resources are available for this purpose). In general, more developed regions have higher HIV prevalence than less developed regions. So, educated people are more likely to live in high HIV prevalence area, ($\frac{\partial y}{\partial x} \geq 0$).

In summary,

a. if education does not improve the risk perception, or the individual risky behavior does not change after receiving education, the relationship between HIV infection and education will be positive ($\frac{\partial HIV}{\partial x} \geq 0$).

b. if education improve the risk perception, or the individual risky behaviors change after receiving education, the relationship between HIV infection and education is ambiguous. It depend on the magnitude of the change and environmental risk.

1.4 Data

The data used in the frame of this study comes from two rounds of Demographic and Health Surveys (DHS) conducted in 2013 and 2018 in Zambia. The DHS are data collected by surveying a nationally representative sample of women (aged 15-49) and men (aged 15-59) in developing countries. The sample size varies across countries between 5,000 and 30,000 households. Initially the surveys consist in interviewing individuals on their socioeconomic, demographic and cultural characteristics. A blood test section has been

adding, since 2001, to the verbal interview to test for various health conditions, including HIV status. Thus, there is no bias in HIV status since the blood test is anonymous, voluntary, and non-informative to respondents.

The sample that I use in this paper is made up of 11492 women born between 1982 and 1994. Those women are described by their sociodemographic characteristics (age, education, place of residence, matrimonial status), reproductive health characteristics (number of lifetime sexual partners, the contraceptive methods), their ethnicity and HIV status. Table 1.2 gives more details about these variables.

I use the women's birth year to define the treatment variable. In Zambia, the legal age to be enrolled in primary school is 7 years old, and primary education consists of seven grades (Zuilkowski et al., 2012). Then, I consider that a woman potentially benefits from the free education reform if she is less than 14 years in 2002. As a result, the beneficiaries are the 1989-1994 birth cohorts women and the non-beneficiaries, the 1982-1988 birth cohorts women.

1.5 Empirical strategy

The impact of the eligibility to 2002 Zambia educational reform on the probability to achieve primary school and on HIV infection is estimated by using non-parametric and parametric regression discontinuity Designs. The main equation for estimation is :

$$Y_{ic} = \alpha + \beta\, I_c^{89-94} + I_c^{89-94} \times f(dist_c) + I_c^{82-88} * f(dist_c) + \gamma\, X_i + \varepsilon_{ic} \tag{1.2}$$

Where Y_{ic} denotes any outcome of interest for individual i who belongs to birth cohort c. Outcomes of interest are the following variables: HIV status, primary education,

number of sexual partners, place of residence, use of contraceptive methods, woman's knowledge about HIV prevention[6], woman's bargaining power about safe sex.

In the baseline equation, I_c^{89-94} is a treatment variable. It is equal to 1 for individuals who are born between to the 1989-1994 birth cohorts. Those women are young enough in 2002 to benefit from the reform. In other words, the assignment variable is woman's birth year and the cutoff is 1989 since the reform was implemented in 2002 for the seven years of primary school and the legal age for primary school entry is seven years old. The term X_{ic} is a vector of individuals controls including ethnicity. β is the coefficient of interest that captures the effect of the reform on our outcomes of interest.

To estimate the size of the discontinuity in outcomes and treatment, I follow standard methods of regression discontinuity analysis as in Imbens and Lemieux (2008) and Lee and Lemieux (2010). First, I restrict the data to a small window around the cutoff (1989) and I use a rectangular kernel so that the weight on each observation decays with the distance from the cutoff. I choose the bandwidths by a cross-validation procedure where the relationships between the main outcomes of interest and education is estimated with local linear regressions.

Second, within bandwidths, I estimate the baseline equation 1.2 by including separate age trend terms above and below the cutoff. The effect of the treatment is estimated by running a pooled regression on both sides of the cutoff point via OLS. To choose the form of the polynomial f (.) which fits the data well , I follow the procedure indicated in Lee and Lemieux (2010). I start with linear function. Thereafter, I add the set of bin dummies - used to graphically depict the data- to the regression and jointly test the significance of the bin dummies. After the test with linear regression, the bin dummies are not jointly significant for the difference outcomes. So, the polynomial f (.) is linear for the different estimations.

[6](Abstinence, always use condoms during sex; have one sex partner only, who has no other partners)

1.6 Results

1.6.1 Baseline results

I start by presenting graphical evidence of the effect of the 2002 Zambia educational reform on the main outcomes and the results of RDD estimation.

Figure 1.1 and Figure 1.2 plot respectively the mean of being HIV positive and the average of years of education by cohort in our sample. Figure 1.1 shows a large discontinuous jump in the average of years of the education and in the probability to achieve primary school among the first beneficiary cohort that benefit from 2002 educational reform. Among subsequent cohorts, the average of years of the education and the probability to achieve primary school continued to rise, coinciding with the continued expansion in access of education and with the extent to which they benefited from the reform. However, this improvement of women's education seems not to be returned into a clear drop in the HIV prevalence rate in this female population in general (Figure 1.2). The probability to be HIV positive is still decreasing, following the trend we observe prior the reform.

Following this graphical analysis, I run the RDD estimates of my baseline equation. Table 1.3 presents the results of the effect of education on HIV infection. I start by running a simple OLS estimates of the correlation between education and HIV while controlling for individuals ethnicity and the survey year fixed effects(cols 1-2). As we can observe, there is a strong and significant association between the total years of education completed by a woman and her probability to be HIV positive. This estimate is biased because of the endogeneity of education. The use of FPE and RDD estimates allows to correct the endogenous bias in the relation between education and HIV status. In cols.3-4, I present the RDD estimates of the effect of the reform on education. In line with graphical

analysis, we can observe that the educational reform increases significantly the probability to achieve primary school. The estimates show that the reform increases the probability to achieve primary school by 12,3% [7]. Moreover, I present in the cols.5-6, the effect of the reform on women's probability to be HIV positive. The estimates show that women who benefit from the reform are more likely to be HIV positive[8]. Indeed, the reform is associated with 18% increases in women's probability to be HIV positive.

1.6.2 Geographic heterogeneous effects

The patterns that we observe in subsection 1.6.1 can dissimulate heterogeneous effects within the sample. Geographic differences in school supply could mitigate the effectiveness of the reform.To address this concern, I use official data on the increase in school building to assess the geographic differences in school supply. Table 1.1 presents the number of new schools per 10000 children aged 0-15 in each province between 1999 and 2005, meaning 3 years before and 3 years after the implementation of the reform. In Muchinga province, about 91 new basic schools were built per 10000 children aged 0-15 between 1999 and 2005 whereas about 64 new basic schools were built in Central. I use this index to split the sample into two groups of provinces, depending on whether the relative increase in school construction between 1999 and 2005 is below or above 77.1 schools per 10000 children[9]. The provinces with high supply of new schools are the provinces whose index is greater than or equal to 77.1. These are provinces that have had more new constructed schools per 10000 children between 1999 and 2005 to fill the classroom gap. The other provinces, ie those with an index less than 77.1, are considered to be provinces with low supply. In order to distinguish the effect of the reform in the two groups, I estimate a variant of our baseline equation where I account for the possible

[7]This relative effect is obtained by dividing the absolute effect of reform on the completion of primary education by its sample mean: $\frac{0.0785}{0.6355}$

[8]the non-parametric RDD confirm the results about Primary education and HIV in all sample see: Table 1.4

[9]I discuss this threshold and use other thresholds in the robustness checks of section 1.8

heterogeneity in the response within the two groups. The estimated equation is as follows:

$$\begin{aligned} Y_{ic} = \alpha + \lambda\, I_i^{low} + \beta_1\, I_c^{89-94} * I_i^{High} + \beta_2\, I_c^{89-94} * I_i^{Low} \\ +[I_c^{89-94} * f(dist_c) + I_c^{82-88} * f(dist_c)] * I_i^{High} \\ +[I_c^{89-94} * g(dist_c) + I_c^{82-88} * g(dist_c)] * I_i^{Low} \\ +\gamma\, X_{ic} + \varepsilon_{ic} \end{aligned} \tag{1.3}$$

I_i^{High} and I_i^{Low} are dummy variables equal 1 if individual i is from a high supply of new schools provinces and low supply of new schools provinces respectively. These dummy variables represent the provinces groups. f(.) and g(.) are polynomial functions that control smoothly for the relative distance from birth cohort to the cutoff. All other variables are defined as in equation 1.2. I run OLS estimates and I use the approach of Cameron et al. (2011) to address the spatial correlation. I cluster the standard errors along ethnicity dimension.

The figures 1.3 show the effect of the reform in provinces with low and high supply provinces. As we can see, there is a sharp increase in female education in provinces with low supply. In opposite, there is no clear jump in female education in provinces with high supply. These results could be due to many reasons. It could be the result of a continuously increasing enrollment in certain provinces so that the slope of this trend is large enough to be much larger than any possible jump due to the reform. In other words, the reform was adopted spontaneously in provinces with low supply whereas it was adopted gradually in the provinces with high supply. The figures 1.4 plot the average (without trend) of HIV infection by cohort in the two groups of provinces. We can see that there is a positive change in the level of HIV infection in provinces with low supply whereas any change cannot be observed in provinces with high supply.

I run the equation 1.3 and the results are presented in Table 1.5. The first row

reports the effect of the reform on various outcomes in provinces with low supply whereas the second row reports the results for provinces with high supply. As we can observe in cols.1-4, the reform has positive effect on both women's probability to completion primary education and women's total year of education in provinces with low supply. The effects are large in magnitude and statistically significant. In fact, young women who benefit from the reform are 11.4 percentage points more likely to complete primary education, which represents 18.7% of the sample mean. Relatedly, the reform increases women's total year of education by 15.4%. Moreover, the reform is associated with a large and significant increase in HIV infection in provinces with low supply. As we can observe in cols.5-6, women who benefit from the reform are 4.2 percentage points more likely to be HIV positive. This effect corresponds roughly to 29% of the average HIV positive rate in the sample. Consequently, the sharp increase in women's education induced by the free schooling reform has a positive and significant effect on HIV infection among women. In fact, one additional year increase in women's total years of education is associated with 25.7% in HIV rate among women.

In opposite to the provinces with low supply, the reform has no effect in the provinces with high supply, either on women's education, or on women's HIV infection. In point of fact, as we can see in Table 1.5, the reform has positive but non significant effect on education (cols 1-4). Also cols. 5-6 show that there is no effect on women's HIV infection in provinces with high supply.

1.7 Exploring the potential channels

In this section, I explore the potential channels underlying the positive effect of education on HIV among women. Women could contract HIV through different manners, starting from individual risky behavior towards HIV infection to the environmental or neighbourhood risk associated with the disease.

1.7.1 Exploring the role of risky behavior of educated women

I leverage the richness of DHS data to investigate in which extent the reform is associated with women's reproductive health and women's risky behavior towards HIV. In DHS surveys, women have been asked questions about their total number of lifetime sexual partners, their knowledge about contraceptive methods that help to avoid HIV. They have also been asked questions about which contraceptive methods that they use and their opinion on whether a husband can beat his wife if she refuses sex to him. Based on those information, I define four measures of women's reproductive health and women's risky behavior towards HIV:

Sexual_partner: is a dummy variable equal 1 if the respondent has had at least two sexual partners in her lifetime.

Avoid_HIV: is a dummy variable defined for single women and takes 1 if a woman reports never have sex or use condoms as contraceptive methods.

ABC: is a dummy variable that takes 1 if a woman reports to know the ABC of HIV prevention (Abstinence, Being faithful, Condom use).

"Beat wife who refuses sex to husband": is a dummy variable that takes 1 if a woman agrees that a man can beat her wife if she refuses sex to him

I assess the effect of the reform on each of these variables (in the group of provinces with low supply in new schools) by running a variant of the baseline equation. The estimates are presented in cols 3-6 of table 1.6. These results show that the reform has no association with women's sexual risk attitudes or women's reproductive health behaviors. The effect of the reform is not significant for any of the four outcomes. This results are suggestive that there is no difference in health attitudes between women who benefit from the reform and those who do not. As a result, the educational difference in HIV infection could not be explained by differences in health behavior between beneficiaries and the non-beneficiaries.

1.7.2 Exploring the role of urbanization

In the subsection 1.7.1, I argue that the positive effect of education on HIV infection cannot be attribute to any change in the risky behavior of educated women. The increase in HIV infection that we observe among educated women could be explained by the environmental risk of HIV infection faced by educated women. In this section, I explore whether the effect is due to urban residency of educated women. The intuition behind this channel is guided by the fact that, according to the DHS data, HIV infection rate among men is 15.22% in urban areas and 8.31% in rural (Table 1.2). In other words, women living in urban face a higher risk of engaging with an infected man relatively to those living in rural areas. If the urbanization mechanism is at work, it will return into two implications. First, we should expect the reform to be associated with a high urban residency, ie cohorts that benefit from the free education policy will be more likely to reside in urban areas. Second, the reform should be associated with a positive and significant effect on both education and HIV infection in urban areas, but should affect only education in rural areas. I test these predictions and present the results in Table 1.7. Col.1 presents the results where I run the baseline equation by using urban residency as dependent variable. The estimates show that cohorts that benefited from the reform are 5.6% more likely to live in urban areas, representing 12% of urban residency in the sample. Consequently, one additional year of female education increases urban residency by 16%. Furthermore, cols 2-4 show that the reform has positive et significant effect on both education and HIV infection in urban areas. However, cols 5-7 show that the reform has positive effect on education (cols. 5-6), but no impact on HIV infection in rural areas (col7). Also, we can observe that the effect on primary education is higher in rural areas than in urban areas(9.5% vs 23%). Then, we can emphasis that despite of its positive impact on education, the reform is not associated with a positive effect on HIV infection in rural areas. As a result, urbanization of educated women seems to be a mechanism at work.

1.8 Robustness

In this part, I perform a couple of robustness check with the purpose of coming up with some potential issues that could drive my main results.

1.8.1 Migration

To investigate the geographic heterogeneity in the effect of the reform on education and HIV infection, one must know in which province each women was living at the time of primary education. Since such information is not in DHS, I assign each woman to her province of residence at the time of the survey, assuming that women do not move from their initial province of residence after primary education. The measurement error that stems from this assignment could bias the main results if the reform induces inter provincial migration among women. To address this issue, I rely on information provided by Zambia DHS on migration. Women have been asked how long they have been living at their current place of residence. The answer is "always" if they always live at that place. If not, they report the total years spent at the current place of residence. Unfortunately, only the 2018 DHS data reports the previous provinces of residence. Then, I use these information to construct a variable that accounts for inter provincial migration after primary education. And I run the baseline estimates on this variable to investigate whether the reform is associated with migration.

Table 1.8 presents the results. First, Only 16% of the sample migrate between provinces after primary education. Second, the estimates show that the reform has no effect on migration between provinces. This results suggest that our findings is not bias by interprovincial migration.

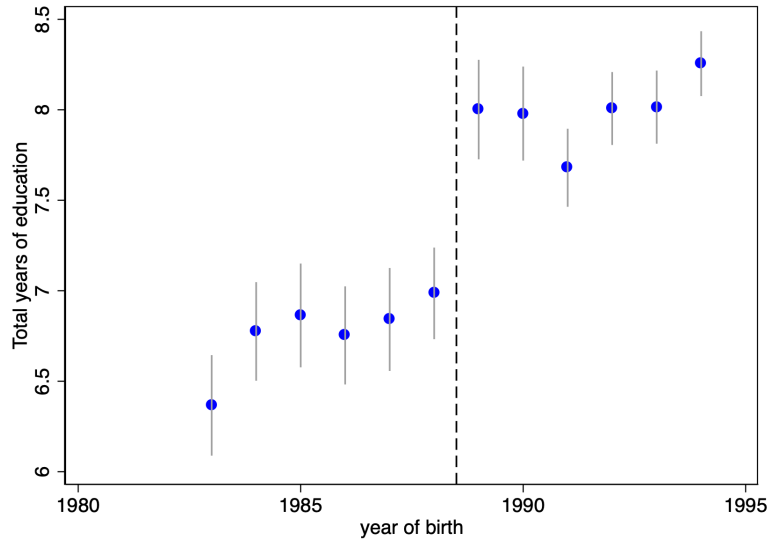
1.8.2 Sensitivity to the threshold

To analyze the heterogeneous effect of the reform, I split the sample by using an index that accounts for the number of schools built in each provinces. By using a threshold of 77.1 schools per 10000 children, I identify four (04) provinces with high supply in new basic schools and six (06) provinces with low supply in new basic schools. In this section, I investigate how the estimates are sensitive to the threshold. To do so, I change the threshold to split the sample into three (03) provinces with high supply and seven (07) provinces with low supply and I estimate the baseline equation in each group giving this subdivision. The results are presented Table 1.9. The results are quite similar to the patterns that we observe in subsection 1.6.2. They are consistent with the main findings of this paper.

1.9 Conclusion

It is believed that increasing female education is an important step in improving maternal health in developing countries. However, the direction of the effect of education specifically on HIV disease is very controversial in the literature of health economics. This paper assesses the effet of female education on the HIV infection by using 2002 free primary education reform in Zambia. I find, through RDD, that women' access to education contributed to a significant increase in women's HIV infection. The effect appear to have been driven by urbanization and unprotected sex. These results underline the necessity to support women's education with education on safe and secure sex.

Figure 1.1: Education, DHS 2014, 2018



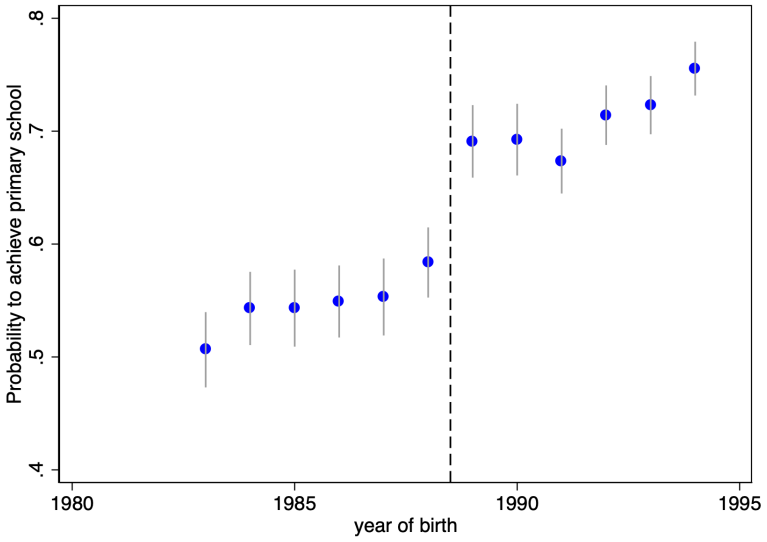
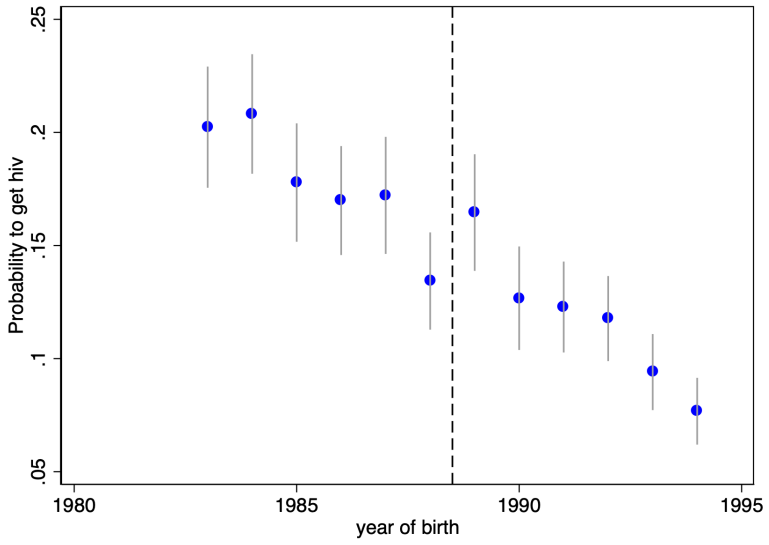
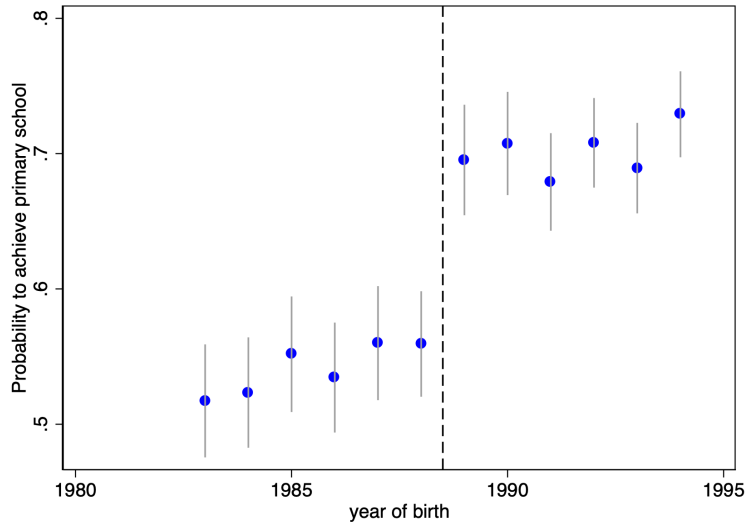


Figure 1.2: Women probability to get HIV, DHS 2014-2018

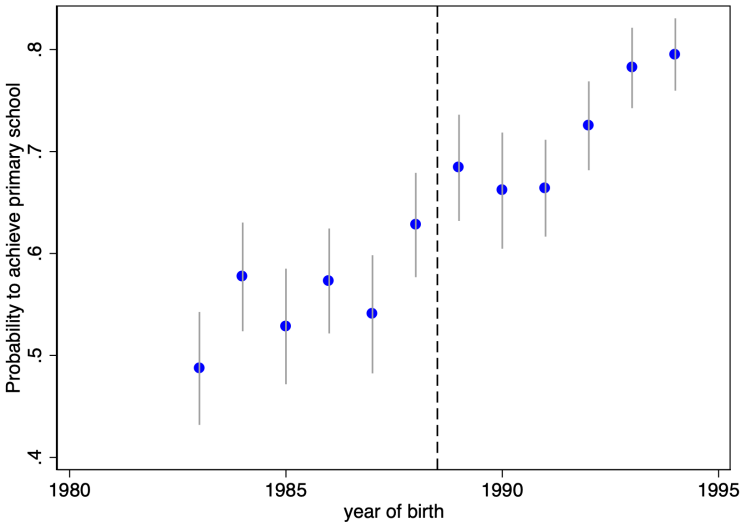


Notes: Each point represents the average of outcome variable by cohort. Each full line represents the interval of confidence of the point that it contains. The vertical dash separates the last non beneficiary cohort (1988) and the first beneficiary cohort (1989) of the reform.

Figure 1.3: Primary education by group of province, DHS 2014, 2018

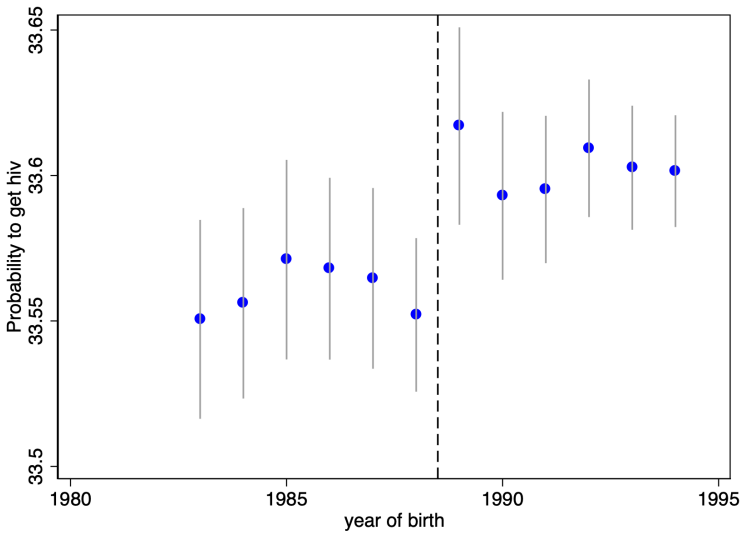


(a) Provinces with a **low** supply in new basic schools

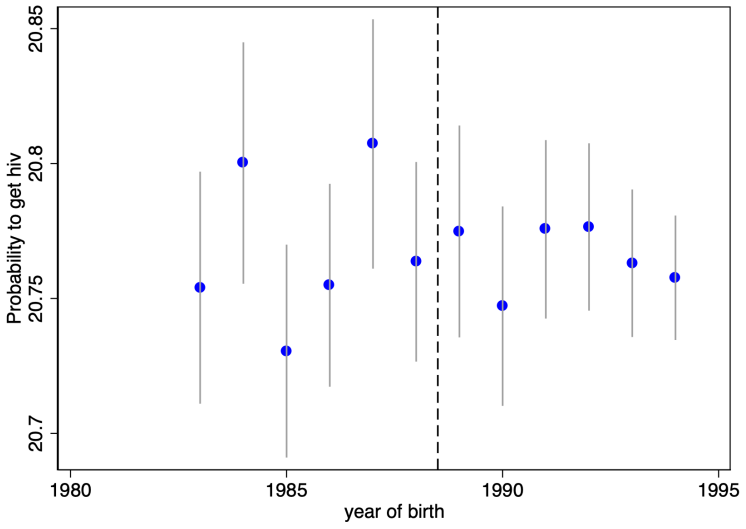


(b) Provinces with a **high** supply in new basic schools

Figure 1.4: Women probability to get HIV by group of province , DHS 2014, 2018



(a) Provinces with a **low** supply in new basic schools



(b) Provinces with a **high** supply in new basic schools

Notes (Figure 1.4a and Figure 1.4b): Each point represents the average of outcome variable by cohort. Each full line represents the interval of confidence of the point that it contains. The vertical dash separates the last non beneficiary cohort (1988) and the first beneficiary cohort (1989) of the reform. **Figure 1.4b and Figure 1.4a are without trend.**

Table 1.1: Construction of schools in Zambia

	Provinces	Number of school built between 1998 and 2005	Number of children under 15 years old	Index
1	muchinga	296	32577	90.86
2	western	314	38253	82.09
3	copperbelt	604	78239	77.20
4	north western	252	32654	77.17
5	northern	390	50610	77.06
6	southern	527	71048	74.18
7	eastern	486	70950	68.50
8	luapula	292	44360	65.83
9	central	366	56964	64.25
10	lusaka	447	84622	52.82

Notes: Index column contains the number of new basic schools built between 1998-2005 per 10000 children aged 0-15. Source: Ministry of Education, Government of Zambia; census 2010.

Table 1.2: some statistics

		Obs.	Mean	Confidence interval (5%)
	HIV	11,492	0.1425	(0.1361, 0.1489)
	Total years of education	11,486	7.4294	(7.3582, 7.5006)
	Primary education	11,489	0.6354	(0.6266, 0.6442)
	Urban residency	11,492	0.4755	(0.4664, 0.4847)
	Sexual partner	11,492	0.2615	(0.2535, 0.2695)
	knowledge of ABCs	11,326	0.7480	(0.7400, 0.7560)
	Use methods to avoid HIV	1,554	0.1197	(0.1035, 0.1358)
	Beat wife who refuses sex to husband	11,238	0.3248	(0.3161, 0.3335)
	Movement between provinces	4,654	0.1667	(0.1560, 0.1775)
	Rural exodus	5,935	0.1503	(0.1412, 0.1594)
	Reform	11,492	0.5373	(0.5282, 0.5464)
	Group	11,492	0.6339	(0.6251, 0.6427)
	Men's HIV rate	21,643	0.1116	(0.1074, 0.1158)
	HIV	6,027	0.0881	(0.0809, 0.0953)
	Total years of education	6,024	5.9421	(5.8511, 6.0330)
	Primary education	6,025	0.4822	(0.4695, 0.4948)
	Sexual partner	6,027	0.2456	(0.2347, 0.2564)
	knowledge of ABCs	5,918	0.7349	(0.7236, 0.7461)
Rural	Use methods to avoid HIV	2,184	0.0989	(0.0864, 0.1114)
	Beat wife who refuses sex to husband	5,895	0.3997	(0.3872, 0.4122)
	Movement between provinces	2,614	0.1186	(0.1062, 0.1310)
	Reform	6,027	0.5291	(0.5165, 0.5417)
	Group	6,027	0.6531	(0.6410, 0.6651)
	Men's HIV rate	12,722	0.0831	(0.0783, 0.0879)
	HIV	5,465	0.2026	(0.1919, 0.2132)
	Total years of education	5,462	9.0698	(8.9763, 9.1632)
	Primary education	5,464	0.8044	(0.7938, 0.8149)
	Sexual partner	5,465	0.2790	(0.267, 0.2909)
	knowledge of ABCs	5,408	0.7624	(0.7510, 0.7737)
Urban	Use methods to avoid HIV	2,308	0.2175	(0.2007, 0.2343)
	Beat wife who refuses sex to husband	5,343	0.2422	(0.2307, 0.2537)
	Movement between provinces	2,040	0.2284	(0.2102, 0.2467)
	Reform	5,465	0.5464	(0.5332, 0.5596)
	Group	5,465	0.6128	(0.5999, 0.6257)
	Men's HIV rate	8,921	0.1522	(0.1448, 0.1597)
	HIV	4,207	0.1362	(0.1258, 0.1466)
	Total years of education	4,207	7.6202	(7.5018, 7.7385)
	Primary education	4,207	0.6499	(0.6354, 0.6643)
	Urban residency	4,207	0.5030	(0.4879, 0.5181)
	Sexual partner	4,207	0.3002	(0.2864, 0.3141)
High new offer	knowledge of ABCs	4,172	0.7845	(0.7720, 0.7970)
	Use methods to avoid HIV	1,605	0.1564	(0.1386, 0.1742)
	Beat wife who refuses sex to husband	4,106	0.3422	(0.3277, 0.3567)
	Movement between provinces	1,659	0.1627	(0.1450, 0.1805)
	Rural exodus	2,098	0.1606	(0.1449, 0.1764)
	Reform	4,207	0.5415	(0.5264, 0.5565)
	Men's HIV rate	7,523	0.1082	(0.1012, 0.1152)
	HIV	7,285	0.1462	(0.1381, 0.1543)
	Total years of education	7,279	7.3191	(7.2301, 7.4081)
	Primary education	7,282	0.6270	(0.6159 , 0.6381)
	Urban residency	7,285	0.4597	(0.4483 , 0.4712)
	Sexual partner	7,285	0.2391	(0.2293 , 0.2489)
	knowledge of ABCs	7,154	0.7267	(0.7164, 0.7371)
Low new offer	Use methods to avoid HIV	2,257	0.1936	(0.1773 , 0.2099)
	Beat wife who refuses sex to husband	7,132	0.3148	(0.3040 , 0.3256)
	Movement between provinces	2,995	0.1689	(0.1555 , 0.1824)
	Rural exodus	3,837	0.1446	(0.1335, 0.1558)
	Reform	7,285	0.5349	(0.5235, 0.5464)
	Men's HIV rate	14,120	0.1134	(0.1082, 0.1186)

Table 1.3: Education and HIV (Full sample)

	(1) HIV	(2) HIV	(3) Total years of education	(4) primary	(5) HIV	(6) HIV
Total years of education	0.0044***	0.0041***				
	(0.0011)	(0.0011)				
Reform			0.7642***	0.0785***	0.0268**	0.0257**
			(0.2194)	(0.0194)	(0.0124)	(0.0123)
Birth cohort polynomial			Linear	Linear	Linear	Linear
Ethnicity FE	No	Yes	Yes	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,486	11,486	11,486	11,489	11,492	11,492
Mean	0.1426	0.1426	7.4294	0.6354	0.1425	0.1425

Notes: Columns 1 and 2 report the results of OLS estimate. Columns 3, 4, 5 and 6 report the results of estimate of different regression based on Equation 1.2 and include a linear polynomial control for year of birth. Standard standard errors are reported in parentheses. ***,**, * denote significance at the 1%, 5%, and 10% level, respectively.

Table 1.4: Education and HIV (Non-parametric RDD)

	All provinces		Low supply in new basic schools #		high supply in new basic schools	
	Primary education	HIV	Primary education	HIV	Primary education	HIV
	(1)	(2)	(3)	(4)	(5)	(6)
Bandwidth below	5.16	4.15	5.22	2.04	5.02	4.08
Bandwidth above	2.01	5.40	5.28	5.68	5.57	5.02
difference (jump)	0.1120	0.026	0.1331	0.0652	0.0843	0.0073
	(0.0298)	(0.0162)	(0.0258)	(0.0250)	0.0354	(0.0271)

Notes: # Provinces with a low supply in new basic schools are Northern, Eastern, Lusaka, Southern, Central and Luapula. Each column report the result of Non-parametric RDD. All include a linear polynomial control for year of birth and the bandwidths are chosen by a cross-validation procedure.

Table 1.5: Education and HIV (RDD)

	(1)	(2)	(3)	(4)	(5)	(6)
	Primary education		Total years of education		HIV	
$I_c^{89-94} * I_i^{low}$	0.1241***	0.1178***	1.1710***	1.1278***	0.0423**	0.0423**
	(0.0225)	(0.0187)	(0.2387)	(0.2247)	(0.0187)	(0.0184)
$I_c^{89-94} * I_i^{high}$	0.0132	0.0120	0.1471	0.1337	-0.0005	-0.0031
	(0.0162)	(0.0156)	(0.1774)	(0.1729)	(0.0058)	(0.0061)
Ethnicity FE	No	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Birth cohort polynomial	Linear	Linear	Linear	Linear	Linear	Linear
Observations	11,489	11,489	11,486	11,486	11,492	11,492
Mean of dep. var. in G	0.627	0.627	7.319	7.319	0.146	0.146
Mean of dep. var. in (1-G)	0.6499	0.6499	7.620	0.136	0.136	

Notes: Each column reports the result of estimate from a different regression based on Equation 1.3. All include a linear polynomial control for year of birth. The first line represents the provinces of low supply in new basic schools and the second line is the provinces of high supply in new basic schools. Standard errors are reported in parentheses. ***,**, * denote significance at the 1%, 5%, and 10% level, respectively.

Table 1.6: Potential channels: Effect on reproductive health behaviors

	(1) Primary education	(2) HIV	(3) Sexual partner	(4) Use methods to avoid HIV	(5) ABC	(6) Beat wife who refuses sex to husband
Reform	0.1157***	0.0422**	0.0070	-0.0276	0.0212	-0.0200
	(0.0188)	(0.0184)	(0.0128)	(0.0336)	(0.0176)	(0.0147)
Birth cohort polynomial	Linear	Linear	Linear	Linear	Linear	Linear
Ethnicity FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,282	7,285	7,285	2,257	7,154	7,132
Mean	0.6270	0.1462	0.2391	0.1936	0.7267	0.3148

Notes: Each column report the result of estimate from a different regression based on Equation 1.2. All include a linear polynomial control for year of birth. Standard errors are reported in parentheses. ***,**, * denote significance at the 1%, 5%, and 10% level, respectively.

Table 1.7: Potential channels: Urbanization

		Urban			Rural		
	Urban residency	Primary education	Total years of education	HIV	Primary education	Total years of education	HIV
Reform	0.0559***	0.0760***	0.9213***	0.0778**	0.1128***	0.9479***	-0.0019
	(0.0135)	(0.0230)	(0.2517)	(0.0383)	(0.0203)	(0.2579)	(0.0143)
Birth cohort polynomial	Linear	Linear	Linear	Linear	Linear	Linear	Linear
Ethnicity FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,285	3,348	3,346	3,349	3,934	3,933	3,936
Mean	0.4597	0.7948	8.8918	0.2063	0.4842	5.9812	0.0950

Notes: Each column report the result of estimate from a different regression based on Equation 1.2. All include a linear polynomial control for year of birth. Standard errors are reported in parentheses. ***,**, * denote significance at the 1%, 5%, and 10% level, respectively.

Table 1.8: Movement between provinces after primary education

	(1) Movement between provinces	(2) Total years of education	(3) Primary education
Reform	0.0043	0.4247***	0.0638***
	(0.0118)	(0.1326)	(0.0124)
Ethnicity FE	Yes	Yes	Yes
Birth cohort polynomial	Linear	Linear	Linear
Observations	4,654	4,688	4,688
Mean of dep. var.	0.1667	7.3471	0.6143

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1.9: Education and HIV (RDD), provinces with **first seven low** supply in new basic schools

	(1) Primary education	(2) Primary education	(3) Total years of education	(4) Total years of education	(5) HIV	(6) HIV
$I_c^{89-94} * I_i^{Low}$	0.1074***	0.1028***	1.0386***	1.0086***	0.0353**	0.0350**
	(0.0209)	(0.0177)	(0.2421)	(0.2276)	(0.0163)	(0.0159)
$I_c^{89-94} * I_i^{High}$	0.0128	0.0110	0.0900	0.0722	0.0018	-0.0011
	(0.0248)	(0.0241)	(0.1747)	(0.1689)	(0.0117)	(0.0124)
	(0.0260)	(0.0379)	(0.2203)	(0.3467)	(0.0362)	(0.0179)
Ethnicity FE	No	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Birth cohort polynomial	Linear	Linear	Linear	Linear	Linear	Linear
Observations	11,489	11,489	11,486	11,486	11,492	11,492

Notes: Each column report the result of estimate from a different regression based on Equation 1.1. All include a linear polynomial control for year of birth. The provinces with supply in new basic schools are: Muchinga, western and Copperbelt. The line represents the group of low supply in new basic schools and the second line is the group of high supply in new basic schools. Standard standard errors are reported in parentheses. ***,**, * denote significance at the 1%, 5%, and 10% level, respectively.

Table 1.10: Contraception method in baseline group

	Current marital status	Abstinence	No contraception method	Condom	Other method different from condom	Total	Total
High	Without partner	14.62	60.79	4.74	19.85	100	30.38
	With partner/husband	0	48.87	3.2	47.93	100	69.02
	Total						100
Low	Without partner	12.71	60.62	2.93	23.74	100	38.15
	With partner/husband	0	50.54	2.92	46.54	100	61.85
	Total						100

Notes: Each cell contains the proportion of women using a category of contraceptive method according to having a given marital status.

Chapter 2

Determinants of Child fostering: Evidence from a novel survey in Bénin

2.1 Introduction

Child fostering is the transfer of children from their biological parents to another home where they are raised and cared for by foster parents. The practice is widespread in developing countries namely in sub-Saharan Africa (Cotton, 2021).

Many studies aim to understand why this practice is used, and propose a wide variety of explanations (Bose-Duker et al., 2021). For instance, the seminal work of Ainsworth (1996a), who has developed an economic model that examines both demand and supply sides of child fostering market, give support to domestic labour motives of child fostering, where children are sent out to other households to perform domestic tasks. Also, Serra (2009) argue that both labor and human capital motives may coexist in a context where biological parents send their children into a high socioeconomic status household

to enjoy with a better educational attainment or a better social network. So, the foster parents receive the fostered children as they constitute an important source of labor force either for household work or various economic activities. Child fostering could then affect children's welfare in both positive and negative direction (Gibbison and Paul, 2005; Lachaud et al., 2016b; Sands et al., 2009).

Although research on the economic motives of the practice are documented in the literature, little attention has been given to the empirical determinants of child fostering. Research on the empirical determinants of child fostering are very rare particularly because of the non availability of a suitable dataset to address the question. The ideal dataset should contain for each children, detailed information on parent-child coresidence, duration of periods of nonresidence, reasons for parent-child separation, and details on the households that welcome the nonresident children. For the best of our knowledge, a such dataset does not exist for any country. Cotton (2021), for example, estimates prevalence of child fostering in Sub-Saharan Africa by using Demographic and Health Surveys (DHS) datasets on 36 countries in Sub-Saharan Africa. Although the DHSs are nationally representative, they provide limited information on child nonresidence. Respondents, namely women are asked about current coresidence with each of their living children, regardless of their current age. Using this variable as a measure for child fostering presents several drawbacks: First, it is not suitable to measure child fostering for children aged 15 and more since they could reside elsewhere for other reasons (marriage, employment, etc.). Secondly, it does not tell anything about child nonresidence before or after the survey for children who currently coreside with their mother. Most of works use surveys where child fostering data are collected almost in the same way as in DHSs (Akresh, 2009b; Lachaud et al., 2016b).

The point of this paper is to address this gap. To do so, we analyze a unique dataset that comes from a survey that we designed and conducted in Benin in 2022. In this survey, we collect on respondents and their full siblings, detailed information on

their family backgrounds, socio-demographic characteristics as well as whether they have been fostered during childhood. The richness of our dataset allows us to investigate the determinants of child fostering both across and within families. We start by analyzing the predictors of a family's decision to foster a child. Also, we test whether child's birth order affects the probability to be a fostered child during childhood. In fact, aside from situations requiring child fostering (illness, divorce, or death (Cohen, 1985)), children are frequently sent to live with non-natal family members as part of a deliberate, and often mutually beneficial, arrangement between families (Madhavan, 2004; McDaniel and Zulu, 1996). Some authors underline that households that receive fostered children benefit from the labor force of the fostered child and from the social insurance of investing in non biological children (Bledsoe, 1990; Bradley et al., 1997). Since older children can perform tasks more easily than younger children, they are likely to be fostered. Then, one could expect child's birth order to be a determinant factor in the choice of fostered child.

We further investigate whether child gender contributes to the choice of the child to foster. In developing countries, especially in Africa, gender norms prescribe domestic work as primarily the responsibility of women. The parents educate their children according to these norms so that girls acquire the ability to do domestic work as they grow up through education unlike boys. Caring for a fostered girl is then more beneficial than caring for a boy for the foster parents because in addition to the social insurance of investing in other people's children, they will benefit from labor of fostered girl (domestic works, selling in the market, etc.).

We find that both maternal and paternal educational attainment are negatively significantly associated with child fostering across families. About 10 percent increase in the proportion of mothers who complete primary education would be associated with 8 percent decline in the proportion of child fostering families [1]. We find similar results for father's educational attainment. Also, having lost one parent during childhood is

[1]Families that have fostered at least one child during his childhood

positively associated with being fostered in childhood.

Concerning the within siblings determinants of child fostering, we find that child's birth order has an important and significant effect on child's probability to be fostered in childhood, even within the same sibship. Indeed, relatively to the first child of the sibship, the subsequent child of the sibship are less likely to be foster, and this decline is monotonic across birth order. This result remains robust to controls for children's individual characteristics, family backgrounds as well as family fixed effects. As child birth order is correlated with family size, controlling for family fixed effects allow us to cancel out the compound effect of family size on child fostering. Also, we find that child's gender is also determinant for fostering and within the same sibship, girls are 4 percentage points more likely to be foster than boys, which represents 25% of the sample mean.

This paper makes three major contributions to the existing literature. Firstly, we contribute to the literature on child fostering by collecting relevant data that is more suitable to study the topic. Most of previous works in this literature use data where individuals are still at risk of being fostered (young children) and then the real fostering status is not observed for all of them at the time of data collection. For the best of our knowledge, this is the first paper that study child fostering by using data on adults who have already passed childhood and for whom the real fostering status could be observe. This allow us to provide, for the first time, direct estimates of the actual prevalence of the practice.

Secondly, this paper contributes to the literature on the determinant of child fostering in Africa. Previous studies point out several factors describing the families who have fostered or are more likely to foster their children. These factors are mainly associated to mother or to initial household of the fostered child: gender of household head, woman place of residence, marital status, work status and education (Isiugo-Abanihe, 1985b; Cotton, 2021; Beck et al., 2015a). In this paper, we show that parents' education is associated with child fostering. More educated parents are less likely to foster their

children. Fathers' education is more important than mother education. Additionally, we find that the death of one of the parents in the childhood is associated with child fostering. Fathers' death is more important than mother death.

Thirdly, the nature of our dataset allows us to study the within family characteristics of fostered child by comparing individuals within the same sibship. In general, previous studies focused on analyzing the characteristics of households that practice child fostering. However, Beck et al. (2015a) analyze the characteristics of the fostered child in a descriptive perspective without accounting for family fixed effects. In this paper, we go further by showing that birth order and gender matter for the choice of the child to foster out. The remainder of the paper proceeds as follows : section 2.2 describes the data; in section 2.3 we present and discuss the results ; section 2.4 concludes.

2.2 Data

2.2.1 Sample selection and summary statistics

The main database that we use in this paper comes from a field survey that we designed and carried out in Bénin (Western Africa) in 2022. It consisted in surveying households randomly drawn from Cotonou, the capital district of the country and two of neighboring municipalities which are Abomey-Calavi and Seme-Kpodji.

Cotonou also called Littoral department is composed of several ethnic groups living together. The Fon and relatives, the Adja and relatives and the Yoruba and relatives constitute the three important demographic ethnic groups. The Fon and relatives represent approximately 50% of the population. The populations of the Littoral are essentially Christians (more than 50%), Muslim and adept at traditional religion. Cotonou appears as a place of work emptying of its population every evening towards the adjoining munic-

ipalities of Abomey-Calavi and Sèmè-Kpodji.

The survey sample consisted of 1300 households selected through a 2-stage sampling process and is provided by the National Statistical Agency of Benin(INStaD-Benin) from the 2013 general population and housing census database. The design is quite similar to the one which is used in the frame of the Demographic and Health Survey. At the first stage, 65 enumeration areas (EA) were selected proportionally to the size of each of the three districts. Secondly, we randomly selected 20 households within each enumeration area, for a total sample size of 1300 households.

The data collection process is described as follows. First, each household was visited by a team of one female enumerator and one male enumerator. At the first visit, the enumerators presented and explained the objectives of the survey to the household members [2] and then asked for their consents to participate in the project. Ultimately, 114 households refuse to participate in the study, yielding a sample of 1186 households, corresponding to 91.2% of the baseline sample. After they give their consents, the household members were asked for the suitable moment to be addressed the survey questionnaires. Subsequently or during the following visits, enumerators started by addressing a household questionnaire to the head of household. The household questionnaire was designed to collect detailed information on the socio-demographic characteristics (age, gender, ethnicity, education, literacy, etc.) of all the household members regardless of their affiliation to the head of household as well as on the characteristics of household accommodation. After addressing the household questionnaire, we determined whether the household is eligible for individual interviews. Individual interviews consisted in the administration of a female eventually a male questionnaire to the head of household and eventually his spouse. Women's current age was targeted to determine the eligibility of the household to undertake to the individual questionnaire. When the head is a female, the household is eligible if she is 18-55 years old. When the head is a male, the household is eligible if his

[2] namely the head and his/her spouse

spouse is 18-55 years old. Households where there is no female, spouse are considered to be eligible if he is at least 18 years old. Ultimately, we identify 1029 eligible households to the individual survey. A man questionnaire was administered to the male respondents by the male enumerator and a woman questionnaire was administered to the female respondents by the female enumerator. In the individual questionnaire, respondents were asked questions about their fertility (age at first birth, number of children ever born), marital outcomes (age at first marriage, socioeconomic outcomes of their spouse), socioeconomic characteristics (education, labor market participation). Also, each questionnaire devoted a section for questions about respondents' siblings. In this part of the questionnaire, we collected information about respondent's birth order as well as detail information on the respondents' siblings (brothers and sisters from the same father and same brother as the respondent). Furthermore, we devoted a section to the childhood living conditions of the respondents. In this section, we have collected information about the socioeconomic characteristics of the respondent's parents, we ask also child fostering, parental death or parental separation during childhood. The female and eventually the male respondents undertook the quiz in private and away from another person or eventually their spouse. The surveys were conducted in either French, Fon, Goun or Mina, according the language fluently spoken and understood by the respondent.

Table 2.1 presents some basic summary statistics for the sample. Overall, women are more younger than men; and this difference is statistically significant. They have also about 3 fewer years of education relative to men. In the same vein, 42% of women have complete primary education whereas corresponding proportion is 72% for men. Also, 77% of women are currently married or living with a partner and 12% of those married women declared to be living in polygamous relationship. Furthermore, women in the sample got married and give first birth by 23 years old in average whereas the corresponding age is 27 years for men. The average women's fertility is around 3 children.

2.2.2 Child fostering pattern in Bénin

According to our data, 35% of families have at least one child fostered during childhood, which returns into 16% of individuals fostered during childhood. Girls are more fostered than boys. In fact, as we report in Table 2.1 , 17% of women were fostered whereas the corresponding proportion is 15% for men. Importantly, girls are fostered 1.5 years earlier than boys. Women were fostered at 7.5 years old and men at 9 years old on average. This is informative that respondents were fostered at a period they are supposed to be enrolled for primary education.

Furthermore, for the first time in the economic literature, our survey allows us to provide evidence for the reasons why the respondents were fostered as well as the parental affiliation with the welcoming households. As we report in Table 2.2, there is a clear gender difference in the reason of fostering. In fact, while 33% of fostered women were fostered to perform domestic works in the host family, only 12% of the fostered men were fostered for the same reason. In other words, girls are almost three times more likely to be fostered than boys to complete domestic tasks. Also, 49% of the fostered men were fostered for schooling reason whereas the corresponding proportion is 24% for women. This means that half of the fostered boys are fostered to go to school while only a quarter of the fostered girls are fostered for the same reason. This is also informative that boys are twice more likely to be fostered for schooling reasons than girls. Moreover, 20% of women reported being fostered due to financial problems in the biological family and the corresponding proportion is only 7% for men. This is showing that women are three times more likely to be fostered than men when financial issues occur in their biological family.

In Table 2.3, we report the main parental affiliations with households where individuals have been fostered during childhood. It appears that in one third of cases, either the men or women have been cared for by their father's brother or sister. The corresponding proportion for mother's siblings are only 8% for men and 17%. A potential

explanation for this gap could be the fact that in Benin's traditional society, families are organized through patrilineal descent systems and children belong to their father's kinship which have more duties over them in term of education or transmission of cultural values than their mother's kinship.

2.3 Specifications and empirical results

2.3.1 Parental educational attainment and child fostering

In this section, we analyze the characteristics of families who practice child fostering. We consider that a given family has practiced child fostering if at least one child from this family has been fostered during childhood. In the frame of our survey, this means that respondents or one of their siblings were reported to have been fostered during childhood. The family characteristics that we consider in this analysis include father's educational attainment, mother's educational attainment, the family size, and the type of parents' union (polygamous union or not). Parental educational attainment is measured by the completion of primary education and the family size is proxied by the number of full siblings in the family including the respondents. We analyze the correlates of child fostering by running the following OLS regression:

$$Y_f = \alpha + X_f\beta + \varepsilon_f \tag{2.1}$$

where Y_f is dummy variable taking 1 if the family f has fostered out at least one child and X_f a vector for family characteristics.

Table 2.4 presents the results where we regress the dependant variable sequentially on the family backgrounds that we describe above. As we can observe, parental educational attainment appears as a key predictors of child fostering at family level. Indeed,

both father's education and mother's education are negatively and significantly associated with child fostering. This is suggestive that less educated parents are more likely to foster out one of their children during childhood.

2.3.2 Child's individual characteristics and child fostering

In this section, we analyze to what extent the birth order of the child matters in the choice of the child to foster out.

Table 2.5 presents the average of child fostering rate as well as the distribution of child fostering by birth order. There is a clear pattern of declining of child fostering for high birth orders. However, these summary statistics can be misleading in that we are not controlling for family size, cohort effects, or any other socioeconomic backgrounds or demographic characteristics that may influence these statistics. As we argue in table 2.1, child fostering varies by child gender. Then, in the case where gender distribution varies across birth orders, not controlling for gender can lead to misleading interpretations. Furthermore, one could imagine that child fostering differs across children's birth cohorts since the supply of education may increase over time, leading to a decrease in the cost of child's schooling in return. We need then to control for birth cohorts or age groups at least. As a result, we estimate the relationship between birth order and child fostering in a regression framework where we control both for individual characteristics and family backgrounds.

In table 2.6, we present estimates for the full sample (Columns 1-3), and both for female sample (columns 4-6) and male sample (columns 7-9). For each sample, we start by controlling for individual characteristics. Columns 1, 4, 5 show the results for the full sample, the female sample and the male sample respectively. Column 1 show that relative to the first child, there is a decline in child fostering by birth order after controlling for individual characteristics although the estimates is insignificant for the

second and the third birth order. In column 4, we observe that there is a steady decline in child fostering by birth order relatively to the first child among female siblings. The estimates is bigger and highly significant for each subsequent birth order . Concerning the male sample, we observe that there is no clear evidence that the subsequent sons are less likely to be fostered than the first-born son. The estimates for male sample are quite noisy. We move forward by adding family background controls to the previous regression. Family background controls include family size, father's educational attainment, mother educational attainment, and a dummy for whether the parents are involved in polygamous relationship. The results are presented in column 2, column 5 and column 8 for the full sample, the female sample and the male sample respectively. As we can observe, the pattern looks quite similar to what we observe in the previous regression either in term of magnitude or significance. These results are informative that family background is not a key determinant of choice of the child to foster out.

Moreover, the choice of the child fostered out could be a function of some unobservable characteristics that vary across families. For example, families where parents have preference for sons could choose to foster daughters out in order to relax family's budget constraint to support sons schooling. In this case, if the gender is correlated the birth order, not controlling for these unobservable characteristics could be problematic. We account for this potential issue by controlling for family fixed effects instead of the family background characteristics that we discussed earlier. The underlined hypothesis we make here is that the unobservable characteristics are constants within each family so that controlling for the family fixed effects will cancel them out of the estimates. Columns 3, 6, 9 show the results where we control for the family fixed effect for the full sample, the female sample and the male sample respectively. As we can observe, the probability to be fostered out is still decreasing by birth orders relatively to the first child, either for the full sample or the female sample. We do not find any change in the pattern of the male sample's regression comparatively to its previous version. These results is suggestive that birth order is a key determinant in the choice of child to be fostered out during childhood.

This pattern is more important for girls than boys.

2.3.3 Family shocks during childhood and child fostering

The existing literature on child fostering has pointed out the role of income shocks (Akresh, 2009b) and remarriage (Grant and Yeatman, 2014) for fostering decision. While parental death could be an important source of negative income shock for the family, it can also return into the remarriage of the living parent. In this section, we investigate whether family shocks such as parental death experienced during childhood is associated with child fostering. To do so, we run OLS estimates of the following regression:

$$Y_{if} = \alpha + \beta_1 \times Father\_death_i + \beta_2 \times Mother\_death_i + X_i\Gamma + X_f\Delta + \varepsilon_{if} \tag{2.2}$$

where Y_{if} is an indicator for whether individual i from family f was fostered out during childhood; $Father\_death_i$ (resp. $Mother\_death_i$) is a dummy variable that takes 1 if the father (resp. the mother) of individual i died before the individual was 15 years old. X_i is a vector of individual characteristics including birth order, gender and age while X_f is a vector of family background characteristics and include parent's educational attainment, the family size and a dummy for parental polygamous union. By definition, individuals who lost both parents before age of 15 were fostered during childhood. As a result, we restrict the sample to individuals who have lost no more than one parent before age of 15. Table 2.7 presents the estimates where we control sequentially for individuals characteristics and family background variables we discussed above. We find, in column 1, that both parental deaths are positively associated with the fostering during childhood. However, as we can observe in the column 3, the positive association with the mother's death is no more significant once we add the additional controls. This result is suggestive that father's lost is more predictive of fostering during childhood, at least in the context of our study. In fact, there is potentially both economic and cultural explanation to support this

finding. First, men are the first and the main financial resources provider for the family in most developing countries, namely in Bénin where women are specialized in domestic or low ranking activities. As a result, the potential decline in the family's income is more important in the case of the father's death than the mother's death. Secondly, this finding could be explained by the fact traditional societies in Bénin are organized through patriarchal norms. Women marry through a patrilineal descent system and then children belong to their father and his kinship. Consequently, in the absence of the father, children are more likely to be kept from their mother and be educated by father's siblings, namely if their mother remarry. In opposite, in the absence of their mother, children reside mainly with their father.

2.4 Conclusion

In this paper, we investigate the determinants of child fostering which is a widespread practice in Africa. By using a new dataset from Benin, we find that less educated parents are more likely to practice child fostering. Also, we document that individuals that experiencing a family shock such as parental death in childhood is associated with being fostered out during childhood. Furthermore, we identity child's gender and child's birth order as keys determinant of the choice of child fostered out within a family.

Table 2.1: Summary statistics over the respondents

	Men		Women		Mean difference test	
	Mean	STD	Mean	STD	Difference	(p-value)
Age of respondents	40.51	(11.7)	36.47	(9.3)	4.04	(0.0000)
Primary	0.72	(0.5)	0.46	(0.5)	0.26	(0.0000)
Total Years of education	9.13	(5.3)	5.91	(5.2)	3.22	(0.0000)
Ever married	0.77	(0.4)	0.79	(0.4)	-0.02	(0.4305)
Age at marriage	26.93	(5.0)	22.90	(4.0)	4.03	(0.0000)
Polygynous union	-	(-)	0.12	(0.3)	-	(-)
Age at first birth	27.64	(5.1)	23.19	(4.2)	4.45	(0.0000)
Total fertility	3.08	(2.6)	2.92	(1.7)	0.16	(0.1798)
Child fostering	0.18	(0.4)	0.25	(0.4)	-0.07	(0.0029)
Age at fostering	9.04	(3.7)	7.54	(3.6)	1.50	(0.0014)

Note: Polygynous union is defined for women only here
Source: Author's calculation from survey data

Table 2.2: Reasons of Child fostering

	Men	Women
Give help to the host family in domestic tasks	0.12	0.33
Death/separation of parents	0.07	0.10
Scholing	0.49	0.24
Sickness	0.03	0.02
Financial problems in biological family	0.07	0.20
Host family have no child	0.00	0.02
Migration of parents	0.01	0.01
Other reasons	0.22	0.09

Source: Author's calculation from survey data

Table 2.3: Foster parents

	Men	Women
Father's brother/sister	0.32	0.33
Mother's brother/sister	0.08	0.17
Paternal grand_Parents	0.07	0.06
Maternal grand_parents	0.07	0.07
Father/Mother's cousin	0.05	0.03
Respondent's Brothers/Sisters	0.05	0.03
Other relative	0.11	0.08
Unrelated family	0.25	0.23

Source: Author's calculation from survey data

Table 2.4: Child fostering status and its correlates

	child fostering status (1)	child fostering status (2)	child fostering status (3)	child fostering status (4)
Mother education	-0.1526***	-0.1002***	-0.0960**	-0.0927**
	(0.0348)	(0.0387)	(0.0388)	(0.0389)
Father education		-0.0884***	-0.0872***	-0.0883***
		(0.0300)	(0.0300)	(0.0300)
Family_size			0.0103	0.0109
			(0.0070)	(0.0070)
Polygyny				0.0407
				(0.0263)
Observations	1,299	1,299	1,299	1,299
$MeanofDep.Var$	0.35	0.35	0.35	0.35

Notes: Robust standards errors in parentheses. The unit of observation is a respondent's family.

*** significant at 1%.

Table 2.5: Distribution of child fostering across birth order

	Mean	STD
First birth	0.183	(0.38)
Second birth	0.179	(0.38)
Third birth	0.173	(0.37)
Fourth birth	0.146	0.35
Fifth birth	0.131	(0.34)
Sixth birth	0.117	(0.32)
Whole sample	0.163	(0.36)

Source: Author calculation from field survey data

Table 2.6: Child fostering and birth order

	All siblings			Female siblings only			Male siblings only		
	Foster (1)	Foster (2)	foster (3)	Foster (4)	Foster (5)	Foster (6)	Foster (7)	Foster (8)	Foster (9)
second child	-0.0098	-0.0108	-0.0130	-0.0548***	-0.0531***	-0.0428**	-0.0051	-0.0029	-0.0049
	(0.0133)	(0.0133)	(0.0137)	(0.0155)	(0.0156)	(0.0180)	(0.0153)	(0.0154)	(0.0181)
third child	-0.0178	-0.0183	-0.0246	-0.0735***	-0.0720***	-0.0598**	0.0044	0.0101	-0.0150
	(0.0148)	(0.0148)	(0.0167)	(0.0199)	(0.0202)	(0.0256)	(0.0197)	(0.0198)	(0.0257)
fourth child	-0.0453***	-0.0462***	-0.0518***	-0.0816***	-0.0815***	-0.0675*	-0.0022	0.0058	-0.0507
	(0.0162)	(0.0164)	(0.0192)	(0.0280)	(0.0284)	(0.0344)	(0.0296)	(0.0283)	(0.0346)
fifth child	-0.0580***	-0.0619***	-0.0644***	-0.1222***	-0.1238***	-0.0895**	-0.0254	-0.0154	-0.0576
	(0.0184)	(0.0181)	(0.0233)	(0.0344)	(0.0348)	(0.0418)	(0.0452)	(0.0421)	(0.0460)
sixth child	-0.0795***	-0.0821***	-0.0840***						
	(0.0219)	(0.0208)	(0.0266)						
gender	-0.0216**	-0.0208*	-0.0401***						
	(0.0109)	(0.0109)	(0.0099)						
Age group. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Family controls		Yes			Yes			Yes	
Family Fixed effects			Yes			Yes			Yes
Observations	5,009	5,009	4,880	2,551	2,551	2,160	2,458	2,458	2,100
	0.0058	0.0164	0.5350	0.0104	0.0196	0.6177	0.0004	0.0144	0.6112

Notes: Standards errors in parentheses are clustered at family level. The unit of observation is the respondents and their siblings. Foster is a dummy variable taking the value 1 if the individual was fostered out during childhood. Columns 1-3 contains estimates for all siblings, columns 4-6 contains estimates for female siblings, columns 7-9 contains estimates for male siblings. Even columns include family fixed effects. *** , ** , * significant at 1%, 5% and 10% respectively

Table 2.7: Parental death in childhood and child fostering

	fostered child (1)	fostered child (2)	fostered child (3)
Mother's death	0.1124*	0.1119*	0.0935
	(0.0576)	(0.0576)	(0.0587)
Father's death	0.0430*	0.0540**	0.0517**
	(0.0242)	(0.0246)	(0.0239)
Individual controls	No	Yes	Yes
Family controls	No	No	Yes
Observations	4,747	4,747	4,747
Mean of Dep. Var	0.16	0.16	0.16

Notes: Robust standards errors in parentheses. The unit of observation is individuals (respondents and their siblings). *** significant at 1%.

Chapter 3

Child fostering, education and fertility: Evidence from Benin

3.1 Introduction

One of the main characters of Victor Hugo's novel *Les Misérables* is a child named Cosette who is placed in a family who abuses her, before being saved by Jean Valjean who provides her with an education. The practice of child fostering depicted in the novel was common among poor families in early-19th-century France, and remains widespread in many lower income countries today. Across countries in Sub-Saharan Africa, more than one quarter of households foster a child, with rates ranging from 15 percent in Ghana to 37 in Namibia (Vandermeersch, 1997; Roby, 2011). As in the story of Cosette, it is unclear whether or not this practice improves the lot of children.

Among researchers and policymakers, there is considerable debate regarding the consequences of child fostering. On the one hand, many researchers believe that while fostering benefits the remitting family, it is harmful to the children who are sent out (Ainsworth, 1996b; UNICEF, 1999; Fafchamps and Wahba, 2006). On the other hand,

scholars argue that this practice may benefit fostered children, by providing them access to better nutrition, education, and job opportunities (Zimmerman, 2003; Akresh, 2006). In large part, the lack of consensus stems from an absence of empirical evidence on the consequences of child fostering on later-life outcomes.

In this paper, we study the effects of child fostering on later-life outcomes. We focus on two main outcomes: education and fertility. Our analysis draws on a unique dataset drawn from a survey of 1,299 adults that we conducted in Benin in 2022. Survey respondents were asked detailed questions about themselves and each of their (adopted and non-adopted) siblings. These data allow us to construct complete family structures for 5,533 individuals belonging to 1,299 families. These data allow us to estimate family fixed effects regressions that compare outcomes across adopted versus non-adopted siblings.

Child fostering is widespread in Benin. In our sample, roughly 35 percent of families fostered at least one child. The rates of child fostering in Benin have also remained remarkably stable throughout the past half century, despite rapid economic development in recent decades. Given the persistence of this norm, it is imperative to understanding its impacts.

We find that child fostering is associated with significant decreases in education. In comparison to their biological siblings, fostered children are significantly less likely to report having attended school. The patterns are stable across specifications, including models that control for flexibly for gender and birth order effects. Our preferred estimates imply that child fostering led to a relative decrease of 6.3 percent. This effect size is large. In comparison, it is roughly half the size of the gender gap in school attendance in Benin. In contrast, we find no consistent evidence that being fostered in childhood affects subsequent childbearing decisions. Within-family estimates of child fostering on fertility are generally small and statistically insignificant.

The estimated effects of child fostering on school attendance are robust to a number

of alternative covariates and specifications. The findings are similar in specifications that control flexibly for either birth order or gender-specific birth order effects. Since birth-order may have independent effects on child education (Black et al., 2005), these models allow for norms regarding which birth-order siblings are sent out (Dohouin and Gbeholo, 2023).

A second concern is that the results reflect within-family differences in exposure to changing household circumstances. Researchers have argued that child fostering can be a response to household income shocks (Bledsoe, 1994; Akresh, 2009a). If so, the decrease in relative school attendance rates among fostered individuals may simply reflect the direct impact of the shock, which lowered their probability of attendance relative to (older) siblings whose school decisions pre-dated the event. To address this issue, we re-estimate versions of the main specification that include an additional covariate for whether the respond has an older sibling who was fostered. Intuitively, this control captures the possibility that a change in family economic circumstances may simultaneously affect the decision to foster a child as well as educational investment decisions in that child and subsequent younger siblings. Although somewhat less precise, the results from these regressions support the baseline findings.

Next, we study the relationship between educational access, child fostering, and school attendance. The analysis exploits a series of educational reforms in the mid-1990s, that expanded school access. We document a sharp increase in school attendance among cohorts born after 1988, who were young enough to take advantage of these reforms. Nevertheless, we find no evidence that the reforms improved outcomes among fostered children. Instead, we find systematically larger negative impacts of child fostering on school attendance among post-1988 cohorts, We also find that there was no change in rates of child fostering among younger cohorts who were exposed to the reforms. Together, these results suggest that the educational reforms, while promoting school attendance more broadly throughout the country, have also exacerbated inequality in school outcomes

across fostered and non-fostered siblings.

Finally, we study the implications of child fostering for our understanding of the gender gap in school attendance. To do this, we estimate within-family male-female differentials in school attendance separately for 1) the sample of non-adopted siblings and 2) the sample all biological siblings (both non-adopted and adopted). The former corresponds to the standard approach used to evaluate within-household gender inequality (e.g., Rosenzweig and Schultz, 1982; Oster, 2009; Jayachandran and Pande, 2017), but will fail to capture within-household gender gaps arising from differential treatment of fostered daughters.

We find that estimates of the school attendance gender gap based on non-adopted siblings substantially underestimates actual within-family gender differences in education. Comparing the results based on the two samples, we find that the true within-family gender gap is 10 to 15 percent larger than the one found based on non-adopted siblings. A simple calculation, based on the two sets of estimates, implies that the gender gap in school attendance among fostered children is nearly twice as large as it is for non-fostered siblings.

We also find that the presence of child fostering alters our understanding of the 1990s educational reforms' impact on gender differences in schooling. Among non-fostered siblings, we estimate that the reforms led to a 33 percent reduction in the gender gap in school attendance. Nevertheless, these estimates overstate the benefits of the policy, since they do not account for the impact on fostered siblings. When we include the full sample of non-adopted and adopted siblings, we estimate a smaller convergence of 29 percent. Moreover, calculations based on these two estimates imply that the reforms had a much smaller impact on the large gender gap in school attendance among the subsample of fostered children.

This paper contributes to the literature on child fostering in Sub-Saharan Africa.

There is a large literature in anthropology and sociology that seeks to understand the causes and consequences of child fostering (see Ariyo et al., 2019, for a review). Most of this research is qualitative analysis, or assessments based on cross-household comparisons.[1] Most closely related to our paper is work by (Akresh, 2006) and (Beck et al., 2015b) who use a similar within-biological family approach to study the effects of fostering on contemporaneous child outcomes in Burkina Faso and Senegal. We build on this research by studying the long-run effects of child fostering on adult educational and fertility outcomes.[2] Moreover, our dataset spans an extended fifty year time horizon, allowing us to assess the evolution of this practice and its interaction with evolving educational policy.

More broadly, this paper contributes to the literature on intra-household inequality. A number of researchers have studied the allocation of assets within households, and explored how within-household inequality can influence population-level measures of inequality and poverty (see, Dercon and Pramila, 2000; Dunbar et al., 2015; Brown et al., 2019, for example). These studies have been based exclusively on intact family units, which may not reflect the realities of kinship arrangements in many developing countries. Our findings highlight how widespread use of child fostering can alter assessments of within-family inequality, with potentially important implications for policy evaluation.

3.2 Child fostering in Sub-Saharan Africa

In Sub-Saharan Africa, the practice of child fostering, in which parents send biological children out to live in another household is widespread. Rates of child fostering vary,

[1]For example, a number of researchers have relied on comparisons of outcomes between fostered children and children in the receiving family (e.g., Case et al., 2000; Zimmerman, 2003). Nevertheless, these comparisons are hampered by unobservable differences in genetic or health endowments that may differ across the two groups of children.

[2]Given the often temporary nature of kinship arrangements, which may last for periods of several months to multiple years (Isiugo-Abanihe, 1985a), contemporaneous effects of child fostering on school attendance may not reflect differences in completed schooling.

but in most countries more than one in four households send a child out to be fostered (Roby, 2011). Early work by anthropologists found that in west and southern Africa, between 16 and 25 percent of children were fostered away from their biological family at any particular time (Page, 1989). The prevalence of child fostering in Sub-Saharan Africa coincides with a longstanding tradition of communal responsibility for raising children (Bachan, 2014; Lachaud et al., 2016a). Child fostering is usually arranged informally, with children typically sent out to extended family members or family friends without intervention from state authorities (Assim, 2013; Zimmerman, 2003). In some cases, when a child is fostered, a formal contract may be written that may specify whether the child will work or not, go to school, or learn a job, and whether there will be any form of monetary transfer between the biological and the child fostering families. The duration of child fostering varies widely from a period of several months to many years (Isiugo-Abanihe, 1985a).

Researchers have identified a number of motivations for child fostering. Child fostering may be used as a coping mechanism, and parents may send a child to be fostered in response to a negative economic shock, conflict, or family breakdown (Goody, 1982; Beck et al., 2015b; Akresh, 2009a). Many scholars view child fostering as a form of child domestic labor, and that remitting families send out children in an implicit exchange with the recipient family, or to obtain greater social prestige or cement social ties (Ainsworth, 1996b; Roby et al., 2014). Relatedly, (Akresh, 2009a) shows that the gender composition of children among the biological family is linked to the practice of child fostering.

Other research has emphasized the benefits of being fostered. Scholars have argued that child fostering enables children to benefit from both formal and informal job training, and to access networks that may ultimately improve upward mobility (Goody, 1982; Isiugo-Abanihe, 1985a). Relatedly, when school access is limited, biological families may foster children to promote educational opportunities (Isiugo-Abanihe, 1985a; Zimmerman, 2003; Akresh, 2009a). This last mechanism suggests public policy that promote

more widespread educational access would be expected to diminish the demand for child fostering.

In Benin, child fostering is a common practice. In our dataset, 35 percent of families fostered at least one children, and roughly 16 percent adults report having been fostered during childhood.

Despite the widespread practice, relative few families foster all their children. Indeed, among families that fostered a child, just 12 percent send out all their children (in our sample of observations, in most cases, families in which all siblings were fostered lost one or both parents in childhood).

3.3 Data

We use an original dataset that derives from a survey that we designed, and that was conducted in Benin in 2022. (Dohouin and Gbeholo, 2023) provide a detailed description of the dataset.

Survey respondents are a random sample of 1,299 individuals who were between 16 to 85 years old at the time of the survey, and lived in one of three main cities in Benin. Respondents were asked questions about themselves and all their biological siblings (who shared the same mother and father), regardless of whether they co-resided during childhood.[3] Thus we have information on 5,533 individuals, from 1,299 families. Unless otherwise mentioned, we refer to all members of a family, i.e. a respondent and his or her biological sisters and brothers, as the 'siblings' of the family, regardless of whether they were fostered.

The survey provides information on completed education and fertility of all siblings

[3]The data do not allow us to link children from polygynous families who share the same father but have different mothers.

(regardless of child fostering status). For each family, we also identify the gender, age, and birth order of all children, as well as information on which siblings were sent out to be fostered before they were 15 years old.[4] We also observe socioeconomic variables during childhood including education levels of both (biological) parents and ethnic group. Table 3.1 reports descriptive statistics of the variables used in this paper.

While the data provide a unique opportunity to assess the consequences of child fostering in later-life, two caveats should be emphasized. First, the information on sibling outcomes are reported by the respondent (not the sibling), and so particular outcomes may be subject to measurement error. Given the strong kinship ties in these societies, and the fact that child fostering primarily occurs among extended family or friends, respondents are generally well-informed about the main outcomes (gender, birth order, education, and fertility) of their siblings, regardless of fostering status. Nevertheless, we find evidence of considerable measurement error and missing values for measures of sibling ages.[5] Given these issues, our preferred analysis relies on controls for sibling birth order (as opposed to age), although we also present estimates based on age controls as a robustness test. Second, the value of most variables (education, fertility, etc.) are unknown for siblings who are deceased. Thus the sample is based on comparisons across living siblings only. The influence of selective mortality should be modest, given that the share of deceased siblings is less than 4 percent in the sample (see Table 3.1).

[4]This age was selected to avoid issues related to teenage marriage.

[5]In particular, we observe 'heaping' of ages at round numbers. This issue is not unique to our survey, and has been identified in other surveys conducted in low-income countries (Lyons-Amos and Stones, 2017; Fayehun et al., 2020).

3.4 Empirical Framework

For any outcome of interest y_i, observed for adult i, the specification for the estimations is a variant of:

$$y_i = \alpha + c_f + \beta Fostered_i + \gamma z_i + e_i \tag{3.1}$$

where $Fostered_i$ is a dummy variable equal to 1 if and only if individual i was fostered by age 15, and where c_f are family fixed effects. Variable y_i is an outcome of interest for individual i, primarily related to education or fertility, and z_i denotes a vector of control variables which include gender and either age fixed effects or birth order fixed effects. All estimations are in OLS, with robust standard errors.

Unless otherwise indicated, the sample of observations comprises individuals who are 15 or older and alive at the time of the survey.[6] All biological brothers and sisters from the same mother and father of any individual in the sample (and who are 15 or older and alive at the time of the survey) are in the sample as well. We refer to all biological children of the same mother and father as the siblings of a family.

The coefficient of interest is β, which identifies within-family differences in outcomes across fostered and non-fostered siblings. These estimates need not capture the causal impact of child fostering per se, since non-fostered siblings may experience spillover effects arising from the child fostering of a sibling. For example, if child fostering a child enables families to increase investments in non-fostered children, the coefficient β would overstate the negative educational impact of child fostering, relative to a counterfactual scenario in which no child were sent out. Instead, the coefficients should be interpreted as relative effects that capture the extent to which child fostering may have increased or

[6] Individuals whose age is missing (169 individuals out of 5533) are excluded from the sample of observations for the estimations using the variable Fostered.

decreased within-family inequality. Moreover, similar to other within-family fixed effects estimation approaches, the analysis does not control idiosyncratic child-specific attributes that may simultaneous influence parental decisions to foster and subsequent long-run outcomes.

3.5 Results

3.5.1 Impacts of child fostering on education and fertility

Table 3.2 reports the results of the OLS estimation of Equation 3.1 where the dependent variable,Went to school, is a binary equal to 1 if and only if sibling i ever attended school. Columns 1 - 4 report results from models that do not control for family fixed effects, while columns 5 - 7 include family fixed effects.

Across the various specifications, we find a negative and statistically significant relationship between having been fostered and education. Column 1 reports the raw relationship between child fostering and school attendance without any family-level controls. The estimate decreases by roughly one third when we include family-level controls for parental education, ethnicity and an indicator for polygynous marriage (col. 2). These patterns are consistent with the fact that there is a strong link between parental education and the decision to foster out a child (Dohouin and Gbeholo, 2023). Once we condition on these limited number of family characteristics, the effects are fairly stable across different controls for siblings age and birth order (cols. 3 and 4). Our preferred specification that rely on within-family variation show similar negative impacts of child fostering on school attendance (cols. 5-7). Notably, the inclusion of family fixed effects leads to only a modest decrease in the point estimates compared to models that control for a handful of family characteristics (cols. 2 versus 5).

The effect sizes on child fostering in Table 3.2 are large in magnitude. Our preferred estimate (col. 7), implies that children who were fostered were 6.3 percent = (0.049/0.78) less likely to attend school than their non-fostered siblings. In comparison, the within-family gender-gap in school attendance is 15.8 percent = (0.123/0.78). Thus, fostered children experience a little less than half the education penalty of daughters.

In Table 3.3, we re-estimate the baseline specifications with an additional control for whether the individual has an older sibling who was fostered. These estimations are motivated by the fact that child fostering is used for parents who face some negative economic shock. If so, the shock may simultaneously lead a family to foster a child old enough to be fostered, and impede investment in education in younger children.

The effects of being fostered on education are unaffected by controls for whether an older sibling was fostered. The main point estimates remain statistically significant and are of similar magnitude to the baseline estimates. Meanwhile, once we include family fixed controls, we find no significant direct impact of an older sibling having been fostered on an individual's own education. Together, these findings suggest that unobserved within-family differences in exposure to unobserved shocks are unlikely to explain the observed relations between child fostering and education documented in Table 3.2

Next, we study the effects of child fostering on subsequent fertility decisions. Tables 3.4 and 3.5 report the estimates for total fertility, and whether the individual had a child before age 20. We find no robust relationship between child fostering and either outcome. Although some of raw estimates for total fertility are positive and statistically significant, once we condition on birth order or age, their size decreases and the effects are no longer significant (Tables 3.4). These pattern is unsurprising, given the strong correlation between total fertility and age. Meanwhile, none of the estimates for teenage fertility are statistically significant (Table 3.5).

Together the findings in Tables 3.2 – 3.5 suggest that child fostering led to persistent

decreases in educational attainment but had little impact of subsequent fertility decisions. In the subsequent analysis, we explore the interaction of this practice with policy reforms in the educational system.

3.5.2 Expansions in school access and the consequences for child fostering and educational attainment

In this section, we explore how increase in school access affect the incentive to foster and the consequences of child fostering for within-family differences in education. In principle, expansions in educational access can have ambiguous effects on the incentive to foster a child. On the one hand, better access to public schools may reduce the financial incentive to send children out to finance their siblings' education. On the other hand, the reforms may increase the incentive to concentrate resources on a select number of non-fostered children in an effort to promote their educational opportunities. Similarly, the effects of school access on the education gap between fostered and non-fostered siblings is unclear, and educational reforms may either lead to a convergence in educational outcomes, or lead adopted siblings to fall farther behind.

To study these issues, we exploit a series of educational reforms in Benin in the early 1990s that dramatically expanded access to schooling. In 1993, the government of Benin undertook a series of reforms aimed at expanding access to education.[7] The state sought to increase school access through a large-scale project of school building and teacher training. The focus of these investments was on primary school, and following the reforms, the number of primary classrooms increase by 58 percent from 1992 to 2000 (Gaye, 2003).

[7]The impetus for these reforms was first spelled out in Articles 10-14 of the 1990 Beninese national constitution, which recognized education as a right and stated that the state should progressively provide primary education free of charge. These issues were raised in response to the previous decade's stagnating educational outcomes.

Given the timing of these reforms, which began to take effect in 1994 (Gaye, 2003), we split the sample into individuals who were born before or after 1988, who were either young enough or too old to have benefited from the expansion in access. To avoid measurement error, we use the age of the respondent as an exogenous proxy for the ages of all the siblings.[8] In Figure 3.6, we report the share of people who attended school by birth cohort (aggregated over even and odd years). The figure shows the increase in average education of all individuals born after 1987 that increases in magnitude over time. These patterns align with the timing of investment, that did not occur immediately but rather over a series of several years.[9]

In Table 3.6, we explore empirically whether patterns school attendance and child fostering diverged across pre-versus post-1988 cohorts. Here, we report estimations without family fixed-effects only. Across families, many individuals were born far enough from 1987 so that measurement error in individual year of birth may not affect these estimations.

In columns 1 and 2, we find that younger cohorts experience a sharp increase in school attendance rates, consistent with the patterns observed in Figure 3.6. Meanwhile, columns 3 and 4, show no evidence that expansions in educational opportunities led to decreases in the practice of child fostering.

The results in Table 3.6 highlight a potentially unintended consequence of the educational reforms. While these reforms appear to have increased schooling among the overall population, they have also not altered the practice of child fostering. To the extent that this practice continues, on average, to be associated with lower levels of school attainment, this effect may have counteract the overall benefits of these reforms. To study this issue, we next explore whether the reforms themselves altered the relationship between child fostering and education.

[8]Similar results are found when we split the sample by (potentially mis-measured) age of each sibling, regard of whether he or she is the respondent.

[9]In 2006, the government also eliminated all tuition fees for primary school attendance.

Table 3.7 reports the effects of child fostering on school attendance separately for subsample of respondents born before or after 1988. The within-family estimates show systematic differences in the effects of child fostering across the two cohorts, with *larger* negative estimates among post-1988 birth cohorts. These findings suggest that the expansion in educational access exacerbated the gap in school attendance between fostered and non-fostered siblings. Notably, these patterns contrast with the estimates for within-family gender gaps in school attendance.

Taken together, the results in Table 3.6 and 3.7 suggest that educational reforms aimed at reducing disparities in educational opportunities may have reinforced within-family differences in school attendance due to the widespread practice of child fostering.

3.5.3 Child fostering and the gender gap in education

To conclude the empirical analysis, we explore the implications of child fostering for the gender gap in school attendance. Table 3.8 reports estimates of the gender gap in school attendance. We report the results separately from the baseline specification without family fixed effects (cols. 1-4) and with family fixed effects (cols. 5-8).

Columns 1 and 5 report the estimates for the sample of non-fostered siblings, while columns 2 and 6 report the estimates for all siblings (both fostered and non-fostered). Across all specifications and samples, we estimate a large negative gender gap in school attendance that is highly significant. Nevertheless, the estimated gender gap is systematically *larger* in samples that include fostered siblings. Indeed, by excluding fostered siblings from the sample, we underestimate the true gender schooling gap by roughly 10 to 15 percent. This differential stems from the fact that daughters who were sent out to be fostered experienced a disproportionate education penalty (relative to sons who were sent out). In fact, we can apply the relative effects found among non-fostered siblings versus all siblings to derive an estimate of the gender gap in schooling among fostered children.

A simple calculation, based on the estimates in columns 5 and 6, implies that the gender gap in school attendance among fostered siblings is -0.188, nearly twice as large as the gap among non-fostered siblings.[10]

These results highlight the double burden that the practice of child fostering imposes on daughters' educational opportunities. Girls are disproportionately sent out to be fostered, which reduces their schooling since fostered children, on average, obtain less education than their non-fostered siblings. Moreover, because of differences in the treatment of fostered sons and daughters, this child fostering 'penalty' is substantially larger for girls relative to boys.

Next we explore how the expansion in educational access following the 1990s reforms influenced the gender gap in school attendance. Columns 3 and 7 report the estimates for non-fostered siblings born after 1988, while columns 4 and 8 report the estimates for all siblings born after 1988. We estimate a significant decline in the gender education gap among non-fostered siblings. Comparing the point estimates from columns 5 and 7, we find that the gender gap in school attendance decreased by 33 percent $= (0.076 - 0.113)/0.113$ for younger birth cohorts. Meanwhile, the inclusion of fostered siblings reduces the magnitude of this decline to 29 percent (columns 6 and 8). Thus, the benefits of expansions in educational access for women appear to have been concentrated more among non-fostered daughters. Indeed, a simple computation based on the estimates in columns 5-8 shows that the gender gap in school attendance among fostered siblings was 0.157 for post-1988 cohorts, which is close to the 0.188 gender gap for full sample. Thus, the expansion in educational access, while improving relative school attendance for non-fostered girls, had less benefit for fostered daughters.

[10]This calculation is based on the fact that the overall gender gap in schooling can be rewritten as simply a weighted average of the gender gap among fostered and non-fostered children: $\beta_{fem}^{All} = \lambda \cdot \beta_{fem}^{Non-fostered} + (1-\lambda) \cdot \beta_{fem}^{Fostered}$, where β_{fem}^{All}, $\beta_{fem}^{Non-fostered}$, and $\beta_{fem}^{Fostered}$ represent the within-family gender gap in school attendance among all siblings, non-fostered siblings, and fostered siblings, respectively. Meanwhile λ is the share of children who are not fostered. Applying this equation along with the estimated coefficients $\beta_{fem}^{Non-fostered} = -0.113$ and $\beta_{fem}^{All} = -0.125$, and using $\lambda = 0.84$, we derive an estimate of $\beta_{fem}^{Fostered} = -0.188$.

The results of this section highlight the limitations of study within-family gender inequality with data on intact families, as has been the standard approach in the literature (see, Dercon and Pramila, 2000; Dunbar et al., 2015; Brown et al., 2019, for example). In settings in which the practice of child fostering is common, the selection of non-fostered siblings and the differential treatment fostered versus non-fostered sons and daughters may have first order implications for inequality measures and evaluation of policy effects.

3.6 Conclusion

This paper draws on a novel dataset of siblings to study the long-term consequences of child fostering in Benin. We find that fostered children experienced significant lower rates of school attendance than their non-fostered siblings. In contrast, we find no effects of child fostering on subsequent fertility decisions. The negative impacts of child fostering on school attendance have increased in magnitude among younger cohorts, despite educational reforms aimed at increase school access among vulnerable populations. The results also demonstrate that the widespread practice of child fostering has exacerbated within-family gender disparities in schooling.

Figure 3.1: Share of a cohort who attended school by year of birth

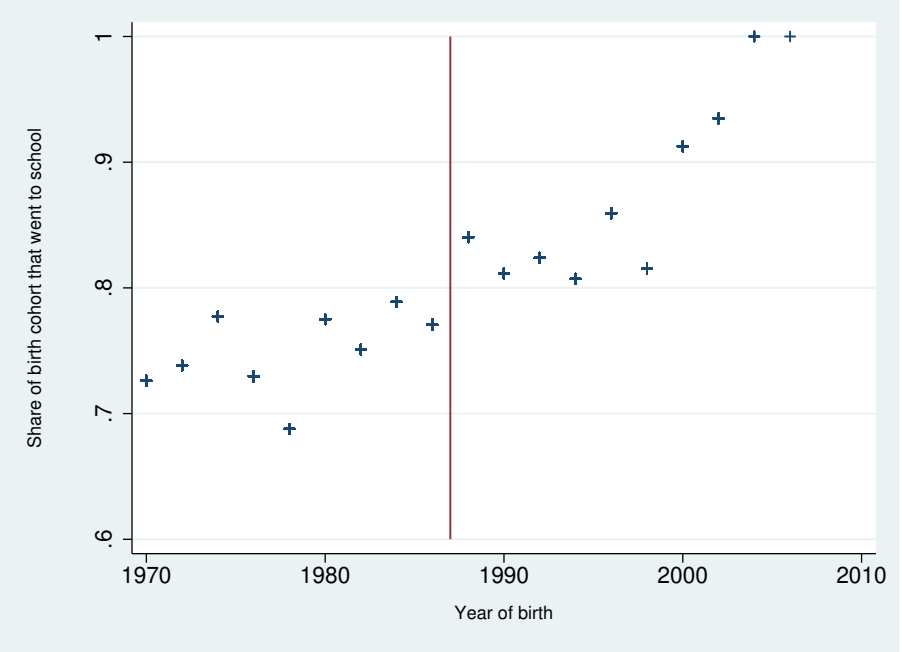


Table 3.1: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Individual was Fostered (by age 15)	5030	.16	.367	0	1
Individual is Alive	5533	.962	.192	0	1
Individual's Age in years	5151	37.29	12.199	0	85
Individual is 15 years old or older	5151	.977	.151	0	1
Individual's Birth order	5532	3.068	1.849	1	14
Individual is Female	5533	.502	.5	0	1
Individual's # Siblings (including self)	5533	5.123	1.972	1	14
Individual Born in 1988 or later	5030	.407	.491	0	1
Individual Went to school	5320	.777	.417	0	1
Individual's # Children	5273	2.712	2.22	0	20
Had a child by 20 years old	5215	.07	.255	0	1
Individual's Father has more than one wife	5533	.506	.5	0	1
Individual's Father went to school	5533	.495	.5	0	1
Individual's Father finished primary school	5533	.311	.463	0	1
Individual's Father went beyond primary school	5533	.234	.423	0	1
Individual's Mother went to school	5533	.286	.452	0	1
Individual's Mother finished primary school	5533	.118	.322	0	1
Individual's Mother went beyond primary school	5533	.076	.265	0	1
Individual's Ethnic group: Fon	5533	.447	.497	0	1
Individual's Ethnic group: Goun	5533	.121	.326	0	1
Individual's Ethnic group: other	5533	.433	.496	0	1
Individual has an older sibling who was fostered	5533	.201	.401	0	1
Number of families in the sample	1299				
# Families with one or more fostered siblings	451				
# Families with all siblings fostered	54				

Notes: The dataset derives from a survey of a random sample of 1299 respondents who were asked questions about themselves and all their biological siblings, conducted in Benin in 2022. We count as missing the value of the variable Fostered for individuals under 15, or for whom age is missing or who are deceased. # Siblings counts all children from the same biological parents. Age is not defined for deceased individuals.

Table 3.2: Child fostering and education

	Dependent variable: *Went to school*						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fostered	-0.130***	-0.088***	-0.089***	-0.087***	-0.055***	-0.050**	-0.049**
	(0.017)	(0.016)	(0.016)	(0.016)	(0.021)	(0.021)	(0.021)
Female	-0.143***	-0.148***			-0.123***		
	(0.011)	(0.011)			(0.011)		
Other covariates	No	Yes	Yes	Yes	No	No	No
Age x Sex FE	No	No	Yes	No	No	Yes	No
Birth order x Sex FE	No	No	No	Yes	No	No	Yes
Family FE	No	No	No	No	Yes	Yes	Yes
R2	0.045	0.153	0.189	0.156	0.584	0.606	0.589
# Observations	5030	5030	5030	5030	5030	5030	5030
Mean Dep.	.78	.78	.78	.78	.78	.78	.78

NOTES. This table reports the OLS estimation of the coefficients of the regression of a binary variable equal to 1 if and only if individual i went to school on a binary variable equal to 1 if and only if individual i was fostered as a child, and on control variables indicated at the bottom of each column. *Other covariates* are: dummy variables for each parents' education level, dummy variables for the family's ethnic group, and a dummy variable indicating whether the individual's father was polygynous. Robust standard errors in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level.

Table 3.3: Child fostering and education, controlling for child fostering of older siblings

	Dependent variable: *Went to school*					
	(1)	(2)	(3)	(4)	(5)	(6)
Fostered	-0.110***	-0.071***	-0.069***	-0.047**	-0.047**	-0.039*
	(0.018)	(0.017)	(0.017)	(0.023)	(0.023)	(0.022)
Older sibling fostered	-0.063***	-0.053***	-0.048***	0.065***	0.010	0.025
	(0.016)	(0.016)	(0.016)	(0.022)	(0.023)	(0.024)
Female	-0.144***					
	(0.011)					
Other covariates	No	Yes	Yes	No	No	No
Age x Sex FE	No	Yes	No	Yes	Yes	No
Birth order x Sex FE	No	No	Yes	No	No	Yes
Family FE	No	No	No	Yes	Yes	Yes
R2	0.048	0.195	0.161	0.569	0.606	0.590
# Observations	5030	5030	5030	5030	5030	5030
Mean Dep.	.78	.78	.78	.78	.78	.78

NOTES. This table reports the OLS estimation of the coefficients of the regression of a binary variable equal to 1 if and only if individual i went to school on a binary variable equal to 1 if and only if individual i was fostered as a child, on a binary variable equal to 1 if and only if individual i has an older sibling who was fostered as a child, and on control variables indicated at the bottom of each column. *Other covariates* are: dummy variables for each parents' education level, dummy variables for the family's ethnic group, and a dummy variable indicating whether the individual's father was polygynous. Robust standard errors in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level.

Table 3.4: Child fostering and fertility

	Dependent variable: *# Children*						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fostered	0.187**	0.036	0.015	-0.038	0.224*	-0.034	0.099
	(0.086)	(0.086)	(0.068)	(0.085)	(0.117)	(0.103)	(0.111)
Female	0.054	0.063			0.063		
	(0.062)	(0.061)			(0.060)		
Other covariates	No	Yes	Yes	Yes	No	No	No
Age x Sex FE	No	No	Yes	No	No	Yes	No
Birth order x Sex FE	No	No	No	Yes	No	No	Yes
Family FE	No	No	No	No	Yes	Yes	Yes
R2	0.001	0.045	0.453	0.092	0.530	0.665	0.605
# Observations	5001	5001	5001	5001	5001	5001	5001
Mean Dep.	2.7	2.7	2.7	2.7	2.7	2.7	2.7

NOTES. This table reports the OLS estimation of the coefficients of the regression of individual i's number of children on a binary variable equal to 1 if and only if individual i was fostered as a child, and on control variables indicated at the bottom of each column. *Other covariates* are: dummy variables for each parents' education level, dummy variables for the family's ethnic group, and a dummy variable indicating whether the individual's father was polygynous. Robust standard errors in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level.

Table 3.5: Child fostering and birth before 20

	Dependent variable: *Gave birth before 20*						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fostered	0.018	0.010	0.009	0.011	0.013	0.011	0.016
	(0.011)	(0.011)	(0.011)	(0.011)	(0.015)	(0.016)	(0.015)
Female	0.091***	0.091***			0.074***		
	(0.007)	(0.007)			(0.008)		
Other covariates	No	Yes	Yes	Yes	No	No	No
Age x Sex FE	No	No	Yes	No	No	Yes	No
Birth order x Sex FE	No	No	No	Yes	No	No	Yes
Family FE	No	No	No	No	Yes	Yes	Yes
R2	0.031	0.039	0.062	0.043	0.380	0.396	0.385
# Observations	4833	4833	4833	4833	4833	4833	4833
Mean Dep.	.07	.07	.07	.07	.07	.07	.07

NOTES. This table reports the OLS estimation of the coefficients of the regression of individual i's probability to have had a child by the time they turned 20 years old, on a binary variable equal to 1 if and only if individual i was fostered as a child, and on control variables indicated at the bottom of each column. The sample is restricted to individuals who are 20 years old or more. *Other covariates* are: dummy variables for each parents' education level, dummy variables for the family's ethnic group, and a dummy variable indicating whether the individual's father was polygynous. Robust standard errors in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level.

Table 3.6: Education and child fostering of individuals born in 1988 or later

	Dep. Var.: *Went to school*		Dep. Var.: *Fostered*	
	(1)	(2)	(3)	(4)
Born in 1988 or later	0.109***	0.094***	-0.009	0.010
	(0.011)	(0.011)	(0.010)	(0.011)
Female	-0.150***		0.021**	
	(0.011)		(0.010)	
Other covariates	Yes	Yes	Yes	Yes
Birth order x Sex FE	Yes	Yes	Yes	Yes
Family FE	No	No	No	No
R2	0.048	0.160	0.001	0.021
# Observations	5030	5030	5030	5030
Mean Dep.	.78	.78	.16	.16

NOTES. This table reports the estimation of the regression of the dependent variable on a binary variable equal to 1 if and only if individual i was born in 1988 or later. The dependent variable is individual i's probability to have attended school in columns 1 to 4, and individual i's probability to have been fostered as a child in columns 5 to 8. *Other covariates* are: dummy variables for each parents' education level, dummy variables for the family's ethnic group, and a dummy variable indicating whether the individual's father was polygynous. Robust standard errors in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level.

Table 3.7: Effect of child fostering on education, separately for individuals born before 1988, and for individuals born in 1988 or later

	Born before 1988						**Born in 1988 or later**					
	Dependent variable: *Went to school*											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Fostered	-0.137***	-0.091***	-0.090***	-0.045	-0.052*	-0.043	-0.118***	-0.084***	-0.091***	-0.078**	-0.066*	-0.075*
	(0.023)	(0.022)	(0.022)	(0.030)	(0.030)	(0.030)	(0.026)	(0.024)	(0.024)	(0.039)	(0.040)	(0.039)
Female	-0.179***			-0.156***			-0.101***			-0.085***		
	(0.016)			(0.016)			(0.015)			(0.018)		
Other covariates	No	Yes	Yes	No	No	No	No	Yes	Yes	No	No	No
Age x Sex FE	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
Birth order x Sex FE	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Family FE	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
R2	0.056	0.204	0.185	0.656	0.671	0.658	0.035	0.129	0.121	0.595	0.617	0.601
# Observations	2982	2982	2982	2982	2982	2982	2048	2048	2048	2048	2048	2048
Mean Dep. Var.	.74	.74	.74	.74	.74	.74	.84	.84	.84	.84	.84	.84

NOTES. This table reports the OLS estimation of the coefficients of the regression of individual i's probability to have attended school, on a binary variable equal to 1 if and only if individual i was fostered as a child, on the interaction of both, and on covariates, separately on two subsamples. The first subsample comprises all individuals born before 1987. The second subsample comprises all individuals born in 1988 or later. *Other covariates* are: dummy variables for each parents' education level, dummy variables for the family's ethnic group, and a dummy variable indicating whether the individual's father was polygynous. Robust standard errors in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level.

Table 3.8: Effect of child fostering on gender gap in education

	Dependent variable: *Went to school*							
	All		Treated		All		Treated	
	N-fostered	All	N-fostered	All	N-fostered	All	N-fostered	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.132***	-0.146***	-0.088***	-0.105***	-0.113***	-0.125***	-0.076***	-0.089***
	(0.012)	(0.011)	(0.016)	(0.016)	(0.012)	(0.011)	(0.019)	(0.018)
Family FE	No	No	No	No	Yes	Yes	Yes	Yes
R2	0.028	0.031	0.017	0.021	0.595	0.583	0.609	0.593
# Observations	4223	5030	1729	2048	4223	5030	1729	2048
Mean Dep.	.80	.78	.86	.84	.80	.78	.86	.84
Includes individuals:								
Who were fostered	No	Yes	No	Yes	No	Yes	No	Yes
Born before 1988	Yes	Yes	No	No	Yes	Yes	No	No

NOTES. This table reports the OLS estimation of the coefficients of the regression of individual i's probability to have attended school, on a binary variable equal to 1 if and only if individual i is female, separately on four samples of observations. The first subsample comprises only individuals who were not fostered as a child, the second sample comprises all individuals, the third subsample comprises only individuals who were not fostered as a child and born in 1988 or later, and the fourth subsample comprises only individuals who were born in 1988 or later. Columns 1 to 4 have no other covariates. Columns 5 to 8 include family fixed effects. Robust standard errors in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level.

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