INSTITUTO TECNOLÓGICO AUTÓNOMO DE MÉXICO

# ITAM

# El impacto de una política pública educativa en la mutilación genital femenina y la fertilidad en mujeres tanzanas

TESIS

QUE PARA OBTENER EL TÍTULO DE

## LICENCIADO EN ECONOMÍA

PRESENTA

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# Summary

In Tanzanian society, female genital mutilation and teen pregnancy are persistent issues. Despite government efforts to mitigate these practices, Tanzania remains one of the countries with the highest rates of both. This study examines the effect of a public policy on secondary education implemented by the Tanzanian government on female genital mutilation, teen pregnancy, and fertility in women who benefited from the educational reform. The results indicate that in areas where lower levels of secondary education were prevalent prior to the implementation of the reform, there was an increase in the years of education for the women who benefited from the policy. This increase in education years resulted in a delay in the age of sexual activity initiation and childbirth, as well as a decrease in the likelihood of having an adolescent pregnancy and a reduction in the number of children per woman. Additionally, there was a decrease in the likelihood of women being victims of genital mutilation and a reduction in the number of their daughters who underwent this procedure.

# Contents

# List of Tables

# List of Figures

# Introduction

The slow progress of sexual and reproductive health rights in Sub-Saharan African countries has prevented thousands of children and young people from achieving dignified development that enables them to reach their full potential and expand their freedom. In this region, patriarchal systems prevail, promoting female submissiveness and often embedding power dynamics as cultural and even religious values (UNICEF, 2023). These values promote the violation of fundamental rights, such as the right to a life free of violence and sexual and reproductive rights, through practices like female genital mutilation and teenage pregnancies.

In the last four decades, African countries have made efforts to reduce the incidence of violations of sexual and reproductive health rights by implementing public policies, ratifying international treaties, and strengthening their penal systems. For instance, Tanzania, the focus of this study, ratified the Convention on the Elimination of All Forms of Discrimination Against Women in 1985 and criminalized female genital cutting (FGC) in 1998, signed the Convention on the Rights of the Child in 1991, and the African Women's Protocol in 2007 (Yusuf and Fessha, 2013). However, despite these measures, FGC remains

prevalent in various regions of Tanzania, with an incidence of over 50% of total women in the Manyara region alone [1] (UN, 2016).

Likewise, Tanzania experiences high rates of female school dropouts, which are directly linked to teenage pregnancy rates (Madeni et al., 2011). This has resulted in approximately 30 percent of Tanzanian women giving birth before the age of 18, according to UNICEF (2023). Consequently, there is a need to assess the effectiveness of public policies in reducing the violations mentioned above and identifying strategies that promote a healthy and violence-free environment for adolescents.

The aim of this paper is to investigate a public policy that was implemented by the Government of Tanzania in 2002. Specifically, the policy was designed to enhance access to secondary schools while ensuring quality, management, and equity in education (Ministry of Education of Tanzania, 2023). The policy also aimed to increase the number of years of education, particularly among women, to improve educational outcomes through examinations, and to facilitate better resource management at the local level. To accomplish these objectives, the government increased scholarships for students in underdeveloped municipalities, expanded the teacher workforce, lowered tuition costs, and strengthened partnerships with non-governmental organizations.

The present study examines the relation between the level of

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[1]Manyara is one of the 31 administrative regions in Tanzania. It is known for its rich diversity of ethnolinguistic groups and communities, among which the Irakw community stands out as the largest in the country.

secondary education received by women and the following two variables: the incidence of teenage pregnancy and changes in women's attitudes towards female genital mutilation. To that end, I implemented an instrumental variable and a difference-in-difference strategy, using data from the Demographic and Health Program (DHS) surveys conducted in 2004, 2008, 2010, 2012, and 2016, as well as the 2002 Tanzania Census.

The study employs a difference-in-difference strategy (DiD) to distinguish between four distinct groups of respondents surveyed by the Demographic and Health Surveys (DHS). Specifically, the focus is on individuals eligible for the Secondary Education Development Program (SEDP), including those born after 1984. Additionally, a counterfactual group is included, consisting of individuals born before 1984. The study further differentiates these respondent types across regions with varying levels of program implementation. In order to measure the impact of education on fertility rates and on the prevalence of female genital cutting (FGC), an instrumental variable technique is utilized, with the DiD estimate on education serving as the first stage. Furthermore, the study examines pre-treatment trends in education and other relevant variables to ensure that any observed effects can indeed be attributed to the SEDP.

The first-stage estimators reveals that areas where the educational policy was implemented with greater intensity, witnessed a rise in the level of education among women who were eligible for the SEDP. Further, we find that education increases the age at which women have their first sexual intercourse and first child, lowers the average number of children born per woman, and reduces the probability of adolescent

pregnancies. Additionally, a higher number of years of schooling corresponded to a lower likelihood of female genital mutilation among respondents and a lower incidence of daughters undergoing FGC.

The principal contribution of this study to the existing literature is the establishment of a causal relationship between education policies and female genital mutilation, an area that, to my knowledge, has not been extensively explored in previous research. Additionally, this study adds to the growing body of literature on the effectiveness of public education policies in promoting gender empowerment.

This thesis is structured as follows: Chapter 1 offers an overview of the Tanzanian context regarding education, FGC, and fertility. Chapter 2 provides a comprehensive review of relevant literature and highlights the significant contributions made on this topic. Chapter 3 outlines the data sources and variables utilized in this research and introduces the empirical methodology employed. Chapter 4 presents the primary findings, and Chapter 5 concludes the thesis.

# Chapter 1

# Context

Following Tanzania's independence from the United Kingdom in 1961, the country undertook a significant overhaul of its education system with the aim of achieving economic, political, and social transformation. The ultimate goal was to develop a high-quality education system for Tanzanians by the year 2025. According to Lameck-Yusuph (2019), these education system modifications occurred in four distinct phases. The first phase, which spanned from 1961 to 1967, sought to eliminate the colonial education system and prevent educational segregation. In the second phase, the educational policy shifted towards building a socialist state, which continued until 1990. The third phase, from 1990 to 2014, focused on transforming the socialist education system into one that embraced a free market approach. Presently, Tanzania's education policy prioritizes providing universal education to its population.

In 2002, Tanzania initiated the Secondary Education Development Program (SEDP) with the aim of expanding the pool of qualified

teachers at the secondary level, increasing subsidies for students and schools in remote areas, reducing household expenses related to secondary education, and granting more scholarships to economically disadvantaged students. As a result, there was a notable surge in secondary school enrollment, which increased by 100.16% between 2000 and 2005 (Lameck-Yusuph, 2019).

Figure 1.1 demonstrates that the average number of years of education for women born after 1984 (those who are deemed to have benefited from the SEDP) is significantly higher compared to earlier cohorts. This suggestes a direct impact of the SEDP in improving the educational outcomes of these women.

**Figure 1.1. Evolution of the number of years of education among women over time**



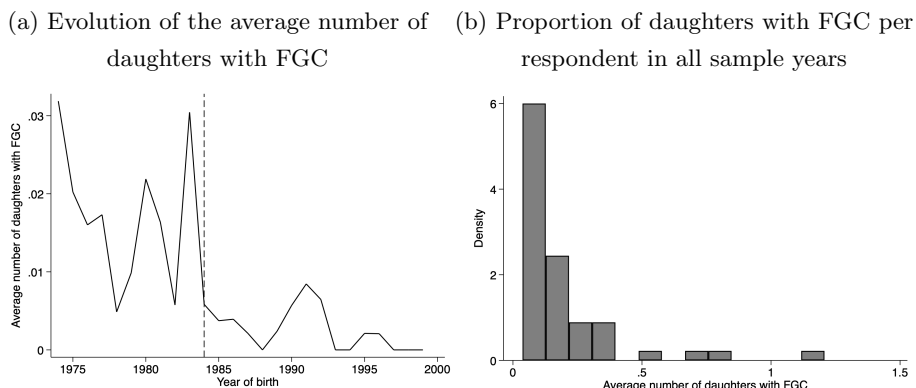*Source:* Demographic and Health Surveys. Own elaboration.

Female genital mutilation is a medical procedure that involves the partial or complete removal of external female genitalia. The procedure typically involves the excision of the clitoris, labia majora, and labia minora, and in certain instances, the vulva is sealed to prevent penetration. This practice is considered the "most invasive form to control women's sexuality" (Khalifa, 2022). In some cultures, it is viewed as a rite of passage for women, marking their transition into adulthood (UN Women, 2016).

As previously stated, despite the government's efforts to eradicate FGC throughout Tanzania, 10% of Tanzanian women had undergone the procedure as of 2016, with 35% having been cut before the age of one (UN, 2016). The persistence of this practice in Tanzania can be attributed to cultural and religious factors, with ethnic groups residing in rural areas being the primary practitioners of FGC. These groups believe that the circumcision of a woman is necessary for her to be married and that through marriage, the husband will have greater sexual control over her, leading to a higher perceived value and price in the marriage market. This is because, in some areas of Tanzania, a monetary amount is still paid to the bride's parents for transferring rights over the wife (Organisation for Economic Co-operation and Development, 2018).

Figure 1.2.a indicates a downward trend in the number of daughters who have been subjected to genital cutting since 1984 (year marked with a dashed line). Figure 1.2.b displays a histogram that shows the average proportion of daughters who have undergone FGC in each village in Tanzania. Only a few localities have more than one average mutilated daughter, whereas most settlements have less than 20% respondents

who subjected their daughters to the procedure. This suggests that some practices have contributed to modifying attitudes towards genital cutting, including SEDP.

**Figure 1.2. Evolution and proportion of daughters with female genital mutilation**

(a) Evolution of the average number of daughters with FGC

(b) Proportion of daughters with FGC per respondent in all sample years



*Source:* Demographic and Health Surveys. Own elaboration.

According to the World Health Organization (2021), adolescent pregnancy refers to a pregnancy where the mother is 19 years of age or younger at the time of the first gestation. In Tanzania, according to DHS data, half of the women give birth to their first child before the age of 20, with a median age of 19.8 years. From 2010 to 2016, the proportion of teenage pregnancies increased by 4%, with 52% of cases having no education at all, as school dropout was identified as a key factor. Furthermore, there are districts where this problem affects up to 45% of all adolescents (United Nations Population Fund, 2020).

Tanzanian women's fertility rate is significantly higher than the global rate, with an average of 5.2 children born per woman at the end of her

8

fertile life (DHS, 2015). While this rate has declined over time, it was still three children more than the worldwide rate of 2.46 children in 2015 (The World Bank, 2015).

Table 1.1 presents the descriptive statistics of the sample used for this research. [1] This table shows that the mean number of children born by women in the sample is 1.81. It covers different years and considers the respondent selection criteria of the DHS. It is worth noting that the average age of first childbirth is equal to the maximum limit for teenage pregnancy set by the WHO. The mean years of education for women in the sample is 6.31, which is slightly below the mandatory education requirement of 7 years in Tanzania (World Bank, 2020). The sample indicates that the average number of daughters who have undergone genital mutilation is less than one, providing an encouraging finding.

**Table 1.1. Descriptive statistics of the data**

|  | Mean | SD | Min | Max | N |
|---|---|---|---|---|---|
| Age | 24.77 | 6.82 | 15 | 43 | 58,116 |
| Education in years | 6.31 | 3.56 | 0 | 16 | 58,109 |
| Age at first birth | 19.05 | 3.14 | 7 | 38 | 16,195 |
| Total number of children | 1.81 | 1.95 | 0 | 6 | 58,110 |
| Daughters with FGC | .00840 | .1283 | 0 | 5 | 12,015 |

*Source:* Demographic and Health Surveys.

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[1]To avoid biasing the sample, outliers, such as an observation reporting 19 living children, were removed from the analysis.

# Chapter 2

# Literature review & theoretical argument

Regrettably, the literature pertaining to public policies aimed at reducing the incidence of female genital mutilation is limited. In a study commissioned for the Bulletin of the World Health Organization, Sipsma et al. (2012) reported that, among 10 African countries where female genital cutting is prevalent, 8 of them exhibit a negative correlation between parents education levels and the likelihood of daughters falling victims to FGC. The suggested causal pathway is that education increases awareness of the harmful effects of FGC within society. In a study analyzing the Demographic and Health Survey database for Sierra Leone, a two-stage least squares strategy was employed to instrument education and establish a causal relationship between longer periods of education, facilitated by primary education reform, and a reduced inclination to endorse FGC practices. However, this effect was found to be significant only among mothers, with no corresponding direct effect on men (Cannonier and

Mocan, 2018).

The prevalence of FGC is driven by existing social norms surrounding the price of women in marriage markets. To show this, Khalifa (2022) employs a difference-in-differences regression to examine evidence related to female genital mutilation. Her study reveals that a radio program aimed at reducing the practice of FGC leads to a decrease in its prevalence in Egyptian villages. However, due to high parental preferences for a high price to be paid during marriage, other practices such as marrying off girls at a young age or subjecting them to chastity tests start to increase. The study concludes that a different type of practice, distinct from cutting, which increases the value of women and their price, could lower the probability of parents subjecting their daughters to FGC.

The International Center for Research on Women suggests that education is an effective tool to combat genital mutilation, but notes that there is a dearth of causal evidence to support this claim (Masterson and Swanson, 2016). However, several studies have established a negative correlation between a mother's level of education and the likelihood of her daughters undergoing the cutting procedure. In Egypt, Modrek and Liu (2013) found a strong negative correlation if the mother had completed secondary school. In Nigeria, Cao and Mattina (2019)), reported a lower negative correlation if the mother had only completed primary school. The primary mechanism underpinning this correlation is that the decision to subject daughters to the procedure or not is predominantly made by mothers (Egyptian Ministry of Communications, 2006).

Several scholars have highlighted that the implementation of educational public policies leads to a significant increase in schooling among targeted individuals. To provide empirical evidence for this effect, Larreguy and Marshall (2017) utilized a difference-in-differences methodology and determined that the 1976 Nigerian basic primary education reform (UPE) led to a relative increase in educational attainment in local government areas that had previously exhibited low education rates before the implementation of UPE. Similarly, in Indonesia, the *Instruksi Presiden* (INPRES) program was found to increase the probability of children completing primary education by 12% (Duflo, 2001), while in Ghana, academic scholarships led to an increase of 1.241 total years of education among beneficiaries (Duflo et al., 2021).

In Sub-Saharan African countries, the relationship between education and the probability of becoming pregnant has also been examined. Research conducted in South Africa suggests that secondary school enrollment programs decrease the likelihood of teenage pregnancy (Rosenberg et al., 2015). Studies have found that increasing levels of education decrease the probability of teenage pregnancy, with the most significant effects observed among those with fewer resources and less schooling (Odimegwu and Mkwananzi, 2016). Therefore, it is apparent that adolescent girls from poorer households are the most affected by this phenomenon, and policies to encourage education should be focused on these groups (Yadufashije et al., 2017). In terms of maternal fertility, there is evidence that educational policies have successfully reduced the number of unwanted children in Ghana (Duflo et al., 2021).

The research cited in the previous paragraph provides a solid foundation for understanding the relationship between education, female genital mutilation, teenage pregnancy, and fertility. These studies suggest that increased education, especially among marginalized populations, can have positive effects in delaying sexual activity, early marriage, teenage pregnancy, and reducing FGC. However, it is important to note some limitations in the literature. First, while there are negative correlations between mothers' education and the likelihood of their daughters undergoing FGC, a solid causal relationship has not been established in all cases. Additionally, results may vary depending on the cultural and geographical context, requiring a region-specific approach. The present study contributes to this discussion by addressing the causal relationship between education and FGC, as well as teenage pregnancy, in the context of Tanzania. By evaluating the effects of a public policy on secondary education, this study seeks to provide stronger evidence on how education can directly influence decision-making and behaviors related to FGM and teenage pregnancy in this specific region. Lastly, it enriches the existing literature demonstrating the positive effects of education on society.

Based on the existing literature, we expect that an educational policy aimed at promoting secondary education in the most marginalized areas has a positive impact on the years of education of the targeted group (Duflo, 2001; Larreguy and Marshall, 2017; Duflo et al., 2021). This increase in schooling should lead to adolescents having their first sexual intercourse, first marriage, and pregnancy at a later age, thereby reducing the probability of having a child before the age of 19, as they are in a more controlled environment (Rosenberg et al., 2015). Additionally, by increasing women's education, their value in the

marriage market would increase, leading to higher household income. Simultaneously, this educational enhancement would raise awareness among mothers about the adverse effects of female genital mutilation (Sipsma et al., 2012). As a result, parents would be less likely to subject their daughters to FGM.

# Chapter 3

# Data & empirical strategy

## 3.1  Data

The current study draws upon data obtained from two sources, namely the Demographic and Health Survey (DHS) for Tanzania for the years 2004, 2008, 2010, and 2012, and the 2002 Tanzanian national census. The DHS provided information on several variables, including district, village, year of birth, age at first pregnancy and first sexual intercourse, number of children, and number of daughters who had undergone female genital cutting (FGC). Furthermore, the 2002 Tanzanian census was utilized to extract information on the intensity of the secondary education reform, which is the proportion of women born between 1974 and 1984 who did not complete their secondary education. As shown in Figure 3.1, the SEDP's intensity was high in several regions but was also relatively low in areas where student enrollment rates were already high prior to the implementation of the SEDP.

**Figure 3.1. Proportion of women who did not complete secondary education**
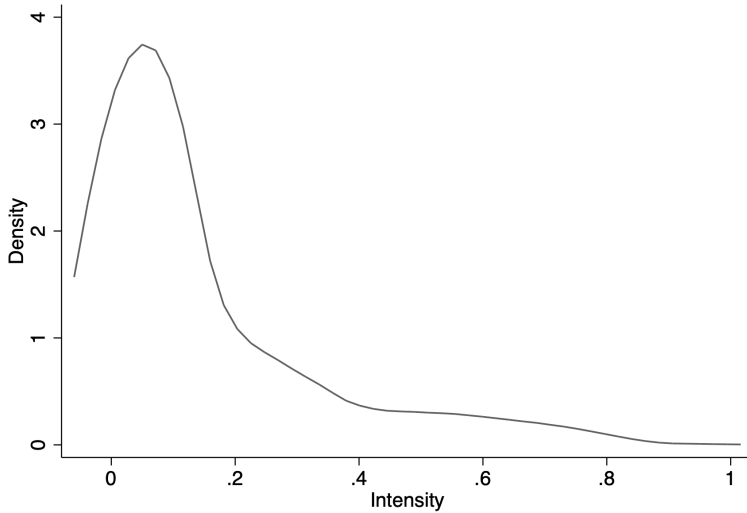
The age at which the respondents had their first child was obtained from the DHS databases. Based on this variable, a new variable was computed to indicate teenage pregnancy, taking the value of one if the respondent had a child before the age of 19 and zero otherwise. The number of daughters who had undergone FGC by each respondent was also retrieved from the same database, and a dummy variable was created to denote the presence or absence of FGC for each respondent. Finally, another dummy variable was generated to indicate the respondent's stance on the continuation of the practice of FGC.

### 3.1.1 Outcome variables

The outcome variables can be classified into three groups: education (used in the first stage), female empowerment, and female genital mutilation. For the first group, only the respondent's education measured in years was considered. For female empowerment, fertility variables were taken into account, including the number of living children, age at first childbirth, teenage pregnancy (coded as 1 if the respondent had a pregnancy before age 19 and 0 otherwise), age at first sexual intercourse, and age at first marriage.

Lastly, four variables related to genital mutilation were considered. The first is a dummy variable coded as 1 if the respondent was a victim of FGC and 0 otherwise, the second counts the number of daughters of the respondent who were victims of this practice, the third is a dummy variable measuring whether the respondent has heard of FGC (coded as 1 if she has heard of it and 0 otherwise), and the last variable measures the respondent's support for the continuation of FGC (coded as 0 if she wants it to stop and 1 if she wants the practice to continue). It is important to note that the number of observations may vary between each group due to differences in survey questions, some of which were omitted in certain surveys while others were included in all surveys.

## 3.2 Empirical strategy

The study employed a difference-in-differences model with instrumental variables to estimate the impact of education on the variables of female genital cutting (FGC) and teenage pregnancy. The reduced form presented below is a difference-in-differences regression that estimates the effect of exposure to the Secondary Education

Development Program (SEDP):

$$Y_{i,v,c,s} = \delta(PostSEDP_c \times Intensity_v) + \alpha_{vs} + \lambda_c + \epsilon_{i,v,t} \qquad (3.1)$$

The variables of interest for individual $i$, village $v$, cohort $c$, and survey $s$ are denoted as $Y_{i,v,c,s}$. Fixed effects are added for both the village $v$ at the survey $s$ $\alpha_{vs}$ and cohort $c$ $\lambda_c$. $PostSEDP_c$ is a dummy variable that takes a value of 1 if the individual was born after 1990 and 0 if born before 1984. For individuals born between 1985 and 1989, who are less likely to have benefited from the reform, the variable is assigned a value of 1/6 for 1984, 2/6 for 1985, and so on, until it is assigned a value of 5/6 for 1989. $Intensity_v$, as mentioned early, is the proportion of women at village $v$ that did not complete secondary school.

The identification assumption relies on the fact that without the SEDP, trends in the outcome variables would have been the same among villages with different intensities of the educational reform. Figures 3.2, 3.3, and 3.4 suggest that we cannot conclusively test the assumption of parallel trends, but they do provide suggestive evidence that, at the very least, there are parallel trends in the pre-period.

### 3.2.1 Instrumental variables

To estimate the effects of SEDP at the variables of interest, we would estimate the following regression using ordinary least squares (OLS):

$$Y_{i,v,c,s} = \tau Education_{i,v,c} + \alpha_{vs} + \lambda_c + \epsilon_{i,v,t} \qquad (3.2)$$

The variables of interest are denoted by $Y_{i,c,s,t}$. Education reflects the number of years the survey participant attended school and we include

the same fixed effects as in equation (3.1). However, the estimates could be biased. For this reason, education was instrumented using the following regression:

$$Education_{i,v,c,s} = \delta(PostSEDP_c \times Intensity_v) + \alpha_v + \lambda_c + \epsilon_{i,v,t} \quad (3.3)$$

Therefore, using the regression model (3.3), we estimate the instrumented regression model (3.2). In this way, we can obtain unbiased estimates.

Likewise, it is crucial to discuss the relevance of the instrument and the exclusion restriction. The relevance assumption relies on the fact that the instrument has some effect on the endogenous variable, in this case, given that we are using the intensity of the implementation of the SEDP as an instrument, it is plausible to argue that this reform had a relevant impact on women's education, as it aimed to improve access and quality of secondary education. This will be shown in Table 4.1, where it is clear the significance of the first stage.

Nevertheless, the exclusion restriction is more complex to justify in this context, because the educational reform not only affects women's education but also that of men. Consequently, we cannot conclusively assert that the estimated effects on variables related to mutilation and fertility can be solely attributed to the rise in women's education, as we must also take into account men's education.

In this context, it is crucial to recognize that our instrumental variable strategy could potentially result in less bias compared to a straightforward ordinary least squares (OLS) approach that solely regresses the variables of interest on women's education. OLS

coefficients may underestimate the true impact of education, as we might not fully account for the substantial influence that the SEDP had on education in Tanzania. However, it is important to acknowledge that we cannot entirely eliminate the possibility of residual bias stemming from unobservable factors that might simultaneously affect women's education and the outcomes under consideration.

## 3.3   Event study design

To test whether the parallel trends assumption is satisfied, it is essential to specify an event study for both the first stage (education) and the reduced form where the excluded year is 1983. The event study specification is presented below:

$$Y_{i,v,c,s} = \lambda_c + \alpha_{vs} + \sum_{t'=-T}^{0} \theta_{t'} \lambda_t Intensity_v + \sum_{t'=1}^{T} \theta_{t'} \lambda_t Intensity_v + \epsilon_{i,c,t}$$
(3.4)

It is worth noting that if $\theta_{t'}$ from -T to 0 is not equal to zero (statistically non-significant), it suggests that the parallel trends assumption is not satisfied.

### 3.3.1   Results of the event study design for the first stage and reduced form

Figure 3.2 displays the outcomes of Equation 3.3 about the respondents' years of education. It is apparent that prior to the implementation of the treatment, there were certain years when education exhibited significantly positive levels, although this may be attributed to unrelated

shocks rather than the country's public policies. However, a decreasing trend is observed until 1984, which is considered the commencement of the treatment period. It is worth noting that education has been on an upward trajectory since 1990 when all women became beneficiaries of the SEDP. These findings support the notion that the SEDP has been effective in enhancing women's education by increasing the number of years of schooling.

**Figure 3.2. Trends in years of education before and after the implementation of SEDP**
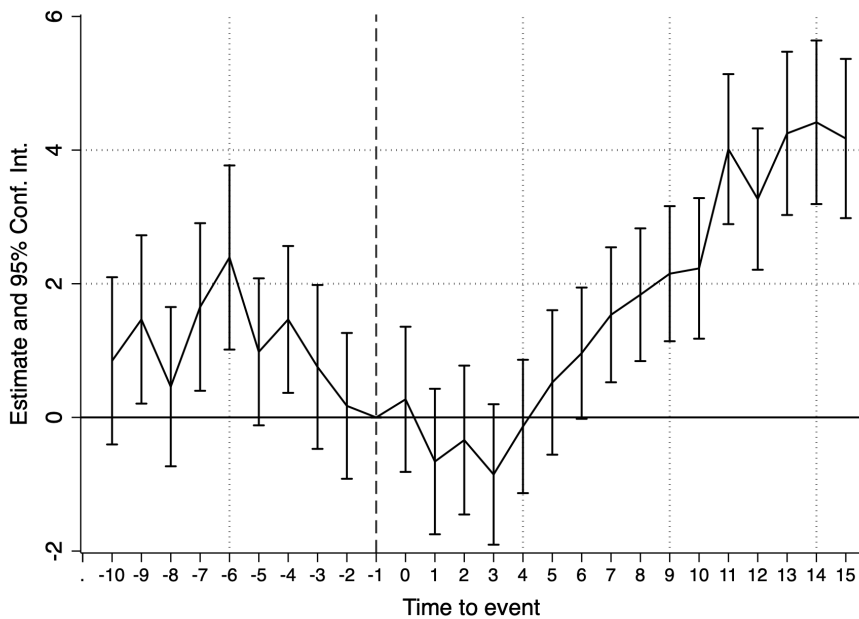


*Note:* This figure displays the coefficients from the event study design of Equation 3.3, with the dependent variable being the respondent's years of education. The model includes fixed effects for both the year of birth and the village. The dashed line represents one year before the implementation of SEDP. Additionally, the clustered 95% confidence intervals at the village level are presented. 1984 is represented here as 0.

# Figure 3.3. Trends of the variables of female empowerment before and after the implementation of SEDP
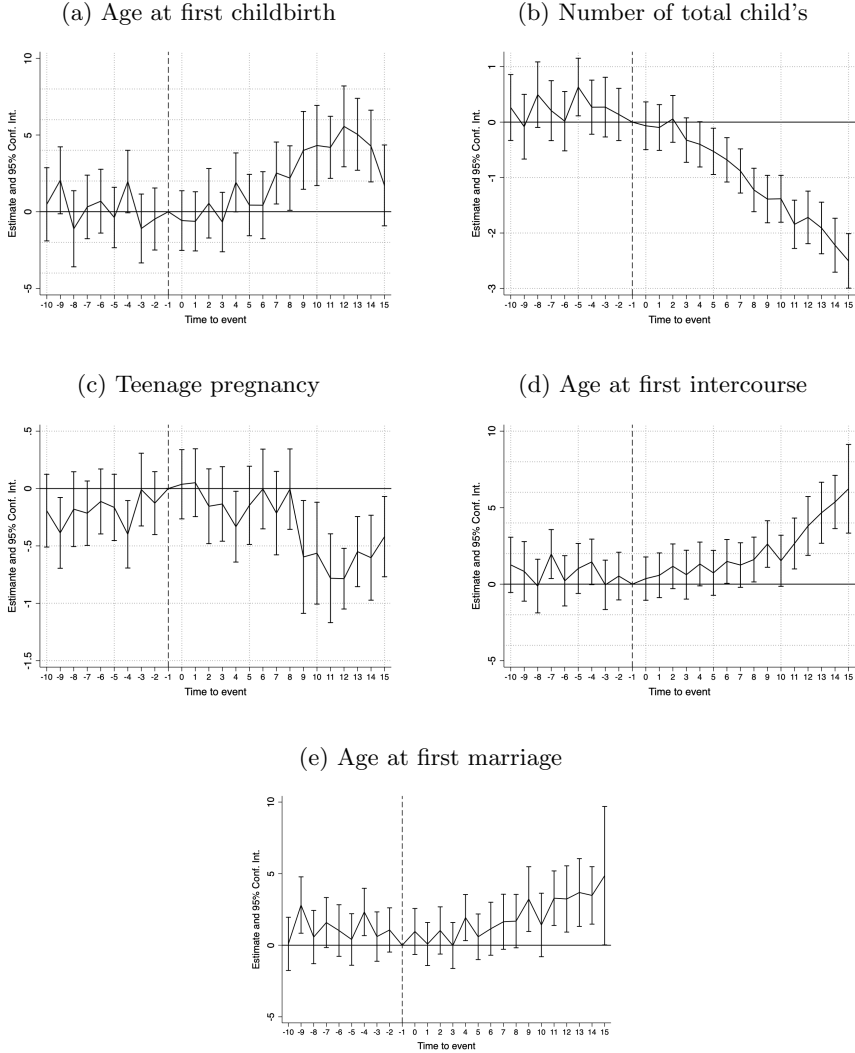


(a) Age at first childbirth

(b) Number of total child's

(c) Teenage pregnancy

(d) Age at first intercourse

(e) Age at first marriage

*Note:* This figure displays the coefficients from the event study design of Equation 3.3, with the dependent variable being the variables of Table 4.2. The model includes fixed effects for both the year of birth and the village. The dashed line represents one year before the implementation of SEDP. Additionally, the clustered 95% confidence intervals at the village level are presented. 1984 is represented here as 0.

Figure 3.3 illustrates the patterns observed prior to and following the introduction of the Secondary Education Development Program (SEDP) initiated by the Tanzanian government, in relation to variables associated with female empowerment. As depicted in Figure 3.2, most of the anticipated effects of the SEDP are observed to emerge from the sixth year after its implementation.

**Figure 3.4. Trends of the variables of female genital cutting
before and after the implementation of SEDP**

(a) Respondent victim of FGC

(b) Number of daughters with FGC



(c) Respondent has ever heard about
FGC

(d) Respondent supports the continuity
of FGC



*Note:* This figure displays the coefficients from the event study design of Equation 3.3, with the dependent variable being the variables of Table 4.3. The model includes fixed effects for both the year of birth and the village. The dashed line represents one year before the implementation of SEDP. Additionally, the clustered 95% confidence intervals at the village level are presented. 1984 is represented here as 0.
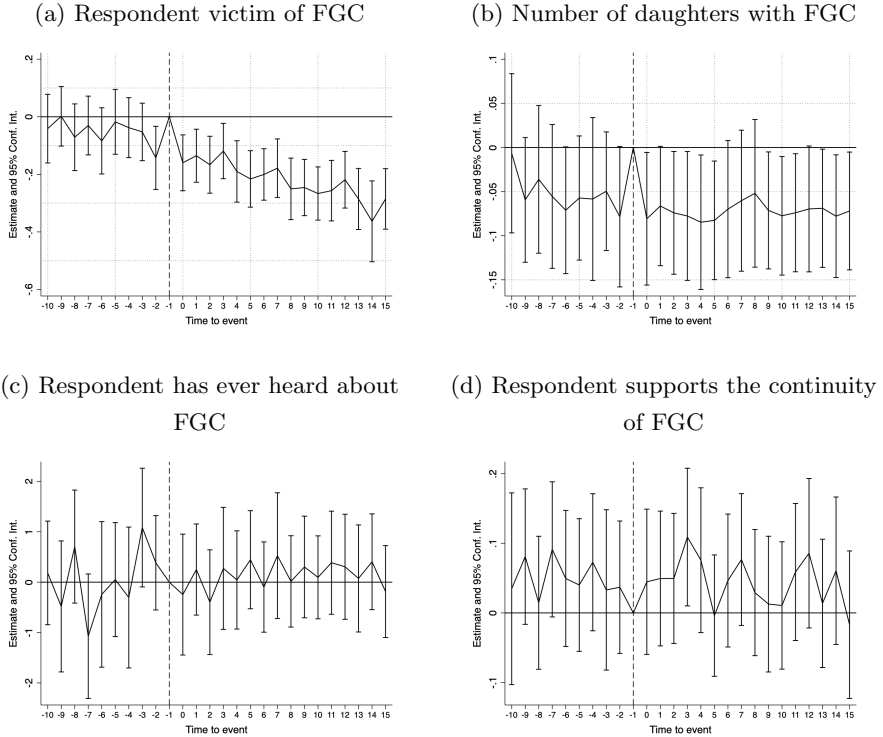
Figure 3.4 provides evidence that the parallel trends assumption holds for the variables identified in Table 4.3 (the female genital cutting variables). Therefore, we cannot reject the parallel trends assumption for both the first stage and the reduced form of the outcome variables, because we have suggestive evidence in favor of this assumption.

24

# Chapter 4

# Results

## 4.1 First stage results

To evaluate the effect of the SEDP on the overall years of education among the treated population, we estimate Equation (3.2). Table 4.1 presents the results of the first stage of the instrumental variable, which employs a difference-in-differences regression. The variable $PostSEDP \times Intensity$ captures the treatment effect in villages with greater program intensity after 1984, following the specified criteria for the years 1985 to 1989 mentioned above. This first stage is statistically strong, as indicated by the F-statistic of 34.73.

The first stage of the study found that the implementation of the SEDP led to a significant increase in the total education of the treated women, particularly in villages with low education rates before the reform, who experienced an estimated rise of 1.3 years. These results provide evidence that the SEDP was effective in improving the educational outcomes of the targeted population in Tanzania, as

anticipated earlier. At the same time, Table A.2 offers a robustness check where it is clear that if we define only the treatment population as the women born after 1989 the effect remains. However, this is not significant if we take the women born after 1984 as totally treated (Table A.1). All of these robustness checks can be seen in the Appendix.

**Table 4.1. Impact of the SEDP on the number of years of education (First stage)**

|  | (1) |
| --- | --- |
|  | Years of education |
| $PostSEDP \times Intensity$ | 1.269*** |
|  | (0.215) |
| Observations | 58,109 |
| Outcome mean | 6.320 |
| First-stage F-statistic | 34.73 |
| $R^2$ | 0.312 |

(1) was estimated using OLS. Village-clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

## 4.2   Female empowerment

Our study reveals a causal association between education and some of the variables associated with female empowerment. The main outcomes of the impact of the SEDP on female empowerment are reported in Table 4.2. Panel A shows the estimated correlation using the ordinary least squares (OLS) method, while panels B and C demonstrate the estimated causal effects of the SEDP on the pertinent

variables. The results provide compelling evidence of the causal impact of the SEDP on all variables, except for the age at first marriage of the respondents.

### Table 4.2. Impact of the SEDP on female empowerment

|  | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
|  | Age at first childbirth | Teen pregnancy | Number of childs | Age at first marriage | Age at first coitus |
| **Panel A. Correlation (OLS)** |  |  |  |  |  |
| Education (years) | 0.249*** | -0.031*** | -0.084*** | 0.268*** | 0.197*** |
|  | (0.009) | (0.001) | (0.002) | (0.007) | (0.005) |
| **Panel B. Reduced form (OLS)** |  |  |  |  |  |
| $Post - SEDP \times Intensity$ | 2.082*** | -0.128* | -1.435*** | 0.594 | 1.254*** |
|  | (0.474) | (0.073) | (0.104) | (0.407) | (0.299) |
| **Panel C. Instrumental variables (2SLS)** |  |  |  |  |  |
| Education (years) | 1.863*** | -0.115* | -1.131*** | 2.374 | 1.046*** |
|  | (0.685) | (0.063) | (0.179) | (3.092) | (0.300) |
| *Observations* | 16,195 | 16,195 | 58,110 | 29,950 | 30,525 |
| *Outcome mean* | 19.047 | 0.634 | 1.808 | 19.104 | 16.936 |

*Note:* Panel A and B were estimated using OLS. Panel C was estimated using 2SLS. Village-clustered standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Panel C of the first column reveals that an additional year of education thanks to the SEDP increases the age at which they experience their first pregnancy by approximately two years, thus confirming earlier research. Furthermore, the second column demonstrates that the probability of teenage pregnancy among SEDP beneficiaries decreases by 11.5 percentage points. This result may be attributed to the more structured environment that adolescents are exposed to, allowing them

27

to focus more on their educational pursuits. Additionally, our analysis shows that educational attainment is negatively associated with the number of children among program beneficiaries. Specifically, based on panel C of column 3, an increase in educational attainment by one year leads to a decrease of approximately one child per woman.

As shown in panels B and C of column 4, we do not observe any evidence of the impact of the educational reform on the age at first marriage, although our estimates suggest that education may increase this variable by two years. Finally, column 5 indicates that education has a positive causal impact on the age of first sexual encounter, with an increase of one year in the age at first intercourse for each additional year of education received by SEDP recipients.

## 4.3 Female genital cutting

The findings of the present study indicate a causal link between education and female genital cutting (FGC), as demonstrated in Table 4.3. Specifically, panel A reports the estimated correlation using ordinary least squares (OLS), while panels B and C present the estimated causal effects of education on FGC. It is noteworthy that the majority of women were found to be unaware of the practice of FGC, resulting in small estimators for columns 2 to 4, with the most notable effect being observed in columns 3 and 4 (statistically insignificant).

On one hand, our findings suggest that an additional year of education leads to a 10 percentage points reduction in the likelihood of the respondent being victim of genital mutilation (panel C of column 1). This could be attributed to the possibility that higher levels of

education enhance the bride price in the marriage market, resulting in a substitution effect between education and female genital mutilation. Additionally, education may lead to the replacement of harmful practices such as early marriage or virginity testing with more enlightened alternatives.

### Table 4.3. Impact of the SEDP on female genital cutting

|  | (1) Respondent was victim of FGC | (2) Number of daughters with FGC | (3) Respondent has heard about FGC | (4) FGC: continued or stopped |
|---|---|---|---|---|
| **Panel A. Correlation (OLS)** | | | | |
| Education (years) | -0.007*** | -0.0004 | 0.013*** | -0.005*** |
|  | (0.001) | (0.0003) | (0.002) | (0.001) |
| **Panel B. Reduced form (OLS)** | | | | |
| $Post - SEDP \times Intensity$ | -0.180*** | -0.018** | 0.110 | -0.0004 |
|  | (0.019) | (0.008) | (0.138) | (0.012) |
| **Panel C. Instrumental variables (2SLS)** | | | | |
| Education (years) | -0.100*** | -0.011* | -0.087 | -0.0002 |
|  | (0.020) | (0.006) | (0.135) | (0.007) |
| *Observations* | 15,022 | 12,015 | 3,342 | 15,015 |
| *Outcome mean* | 0.114 | 0.008 | 0.208 | 0.056 |

*Note:* Panel A and B were estimated using OLS. Panel C was estimated using 2SLS. Village-clustered standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Similarly, column 2 presents causal evidence indicating that an extra year of education results in a reduction in the number of daughters subjected to FGC. The small estimates is attributable to the low mean of the outcome. In line with previous research, the negative estimates

is thought to be explained by the fact that education heightens awareness of the harmful consequences associated with FGC, leading educated mothers to opt against performing FGC on their daughters.

Despite the significant and consistent correlations observed in columns 3 and 4, the reduced-form analysis (Panel B) suggests that the Secondary Education Development Program (SEDP) had no impact on whether the respondent had heard of female genital mutilation before or whether they support the practice. Consequently, the instrumental variable estimators (panel C) are small and not statistically significant.

# Conclusions

In 2002, the Tanzanian government launched an education policy aimed at boosting secondary education among its populace, called the Secondary Education Development Program (SEDP). The program was implemented via various strategies such as increased teacher training, provision of more scholarships to underprivileged individuals, and subsidies for specific school supplies. Previous literature has provided evidence that such initiatives impact not just education but also other facets of the lives of the target population, including political outcomes and increased workforce participation (Larreguy and Marshall, 2017; Duflo, 2001, Duflo et al., 2021). However, Tanzania remains one of the countries where female genital mutilation is still prevalent and where the rates of children per woman and teenage pregnancies are remarkably high, making it pertinent to explore the effects of the 2002 SEDP on these variables.

The present research examines the impact of a universal secondary education policy on the sexual outcomes of those affected, namely, fertility rates, teenage pregnancy, and the prevalence of female genital cutting (FGC). Difference-in-differences and instrumental variable estimates indicate that the Secondary Education Development

Program (SEDP) successfully increased schooling levels among the target population by more than one year. Furthermore, the analysis reveals a causal relationship between sex education and schooling, as one additional year of education reduces fertility rates, the probability of teenage pregnancy, and delays the age of first sexual intercourse and first pregnancy. Additionally, the likelihood of female genital cutting among the respondents and the number of daughters of respondents subjected to FGC both decline.

In conclusion, this study suggests that educational policies have effects beyond their academic outcomes, which can lead to an improvement in the well-being of the individuals targeted by these policies, as demonstrated by the results of this study and the existing literature. Future research in the field of education and female genital cutting should continue in this direction, as there is evidence of a negative correlation between education and the prevalence of FGC in daughters. Additionally, it is important to continue exploring the additional effects of educational interventions on various aspects of life in order to generate proposals that can improve the overall quality of life at a global level.

# Appendix A

# Regression Tables

## A.1  With $Post \geq 1984$

### A.1.1  First Stage

**Table A.1. Impact of the SEDP on the number of years of education with $Post = 1$ if Year of Birth $\geq$ 1984(First stage)**

|  | (1) |
| --- | --- |
|  | Years of education |
| $PostSEDP \times Intensity$ | 0.0993 |
|  | (0.195) |
| Observations | 58,109 |
| Outcome mean | 6.320 |
| First-stage F-statistic | 0.258 |
| $R^2$ | 0.311 |

(1) was estimated using OLS. Village-clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

# A.2  With $Post \geq 1989$

## A.2.1  First Stage

**Table A.2. Impact of the SEDP on the number of years of education with $Post = 1$ if Year of Birth $\geq$ 1989 (First stage)**

|  | (1) |
| --- | --- |
|  | Years of education |
| $PostSEDP \times Intensity$ | 1.610*** |
|  | (0.188) |
| Observations | 58,109 |
| Outcome mean | 6.320 |
| First-stage F-statistic | 73.58 |
| $R^2$ | 0.312 |

(1) was estimated using OLS. Village-clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

## A.2.2 Female Empowerment

### Table A.3. Impact of the SEDP on female empowerment with $Post = 1$ if Year of Birth $\geq$ 1989

|  | (1) Age at first childbirth | (2) Teen pregnancy | (3) Number of childs | (4) Age at first marriage | (5) Age at first coitus |
|---|---|---|---|---|---|
| **Panel A. Correlation (OLS)** | | | | | |
| Education (years) | 0.249*** | -0.031*** | -0.084*** | 0.268*** | 0.197*** |
|  | (0.009) | (0.001) | (0.002) | (0.007) | (0.005) |
| **Panel B. Reduced form (OLS)** | | | | | |
| $Post - SEDP \times Intensity$ | 2.015*** | -0.111* | -1.275*** | 0.665* | 1.145*** |
|  | (0.474) | (0.073) | (0.104) | (0.407) | (0.299) |
| **Panel C. Instrumental variables (2SLS)** | | | | | |
| Education (years) | 1.603*** | -0.0885* | -0.792*** | 0.799** | 0.790*** |
|  | (0.512) | (0.0517) | (0.0873) | (0.388) | (0.190) |
| *Observations* | 16,195 | 16,195 | 58,110 | 29,950 | 30,525 |
| *Outcome mean* | 19.047 | 0.634 | 1.808 | 19.104 | 16.936 |

## A.2.3  Female Genital Mutilation

### Table A.4. Impact of the SEDP on female genital cutting with $Post = 1$ if Year of Birth $\geq$ 1989

|  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
|  | Respondent was victim of FGC | Number of daughters with FGC | Respondent has heard about FGC | FGC: continued or stopped |
| **Panel A. Correlation (OLS)** | | | | |
| Education (years) | -0.007*** | -0.0004 | 0.013*** | -0.005*** |
|  | (0.001) | (0.0003) | (0.002) | (0.001) |
| **Panel B. Reduced form (OLS)** | | | | |
| $Post - SEDP \times Intensity$ | -0.152*** | -0.0110* | 0.130 | -0.00461 |
|  | (0.0167) | (0.00647) | (0.122) | (0.00964) |
| **Panel C. Instrumental variables (2SLS)** | | | | |
| Education (years) | -0.0812*** | -0.00643 | -0.524 | -0.00245 |
|  | (0.0147) | (0.00404) | (2.316) | (0.00515) |
| *Observations* | 15,022 | 12,015 | 3,342 | 15,015 |
| *Outcome mean* | 0.114 | 0.008 | 0.208 | 0.056 |

*Note:* Panel A and B were estimated using OLS. Panel C was estimated using 2SLS. Village-clustered standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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