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Stakes too High for Women? Gendered Examination of an Education Reform in Kenya

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Abstract: This paper examines the relationship between women's education and their empowerment, using six waves of the nationally representative Kenya Demographic Health Surveys (KDHS). We utilize the change in the educational system in 1985 as a source of positive exogenous shock. We particularly focus on women who were exposed to the new regime and how their exposure status affects their perceptions and practices in decision making. The Ordinary Least Squares regression (OLS) results indicate an increase in education for women exposed to this reform, followed by the delay in their age at first birth, a reduction in female genital mutilation practice on their eldest daughters, a decrease in sexual domestic violence, and enhancement in their household decision making. Media exposure, partners' characteristics, and wealth endowment are the possible pathways through which women's empowerment is achieved.

Keywords: KDHS, education, women's empowerment, Kenya, gender

1. Introduction

Investment in education has significant effects on productivity, earnings, and the ability of people to contribute to economic development meaningfully. Education is one of the effective tools for empowering women to fully participate in the development process and overcome gender disparity, which remains a pertinent issue worldwide. International conventions such as the Millennium Development Goals (MDG3) and United Nations Sustainable Development Goals (SDG5) adopted gender parity and holistic empowerment of all girls and women as one of the goals to be achieved by 2015 and 2030, respectively. Despite making significant strides in breaking barriers to accessing education, girls' schooling is still sidestepped in some of the developing economies (UNESCO, 2015), thus depriving the girls of the right to education and the ability to compete with their male counterparts. In the Global South, cultural norms that hinder women from owning property are the main contributors to gender disparity (Agarwal & Bina, 1994). Human capital investments that sideline women slow countries' pace of achieving their developmental goals (Alderman & King, 1998). Moreover, Duflo (2012) suggests that economic development bridges the gender imbalance between men and women. According to the World Bank (2012), the economic returns of investing in women's education are considerably higher than those of similar investments in men's education.

Women in Kenya face a myriad of obstacles, such as female genital mutilation (FGM) in some communities, gender-based violence, underrepresentation in key national decision-making positions, disparity in educational attainment, wage differentials, and resource control as the gender gap has widened since 2006. In 2021, the World

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Economic Forum Global Gender Gap Index averaged 0.68 globally and ranked Kenya in 95 out of 153 countries with an average score of 0.692 as the distance bridged toward parity. In Kenya, women's labor participation rate was 72.4% compared to 76.8% for men, while the ratio of women legislators, senior officials, and managers was 24.8% compared to 75.2% for men. The proportion of women who were members of parliament and others holding ministerial positions stood at 21.6% and 30.4%, compared to 78.4% and 69.6%, respectively, for men, while the literacy rate among women was 78.2% compared to 85% in men (World Economic Forum, 2021).

The existing evidence on the effect of education and women's empowerment is mixed (Le & Nguyen, 2021; Mocan & Cannonier, 2012; Samarakoon & Parinduri, 2015) and the empirical evidence for through which education empowers women in Kenya is fragmented (Omwami, 2015; Ponge, 2013). The current paper provides new evidence from Kenya to the discourse by examining the role of education on women's empowerment and addresses the research question: How does education affect women's empowerment and through what channels?

Our study exploits the exogenous variation of the 1985 primary education reform in Kenya, which extended the duration of primary education by one year to eight years to delineate the effect of women's exposure to the new regime on their empowerment. Individuals born ex-ante 1971 experienced seven years of primary education, while individuals born ex-post 1971 experienced one more year in school since 1985, provided they did not drop out. We used six waves of the Kenya Demographic Health Surveys (KDHS) datasets and examined whether education explains the variation in women's empowerment outcomes after controlling for unobserved heterogeneity such as ethnicity, region, and time trend. Previous studies indicate that women who have at least primary education have high bargaining power on matters of family planning, child nutrition, access to and control of assets and are less likely to experience FGM. The data on the composition of women within various birth and education cohorts indicate whether education is empowering women. We measure women's empowerment through the multi-dimensionality lenses discussed later, along with their bargaining ability in the household. Specifically, we focus on the influence of women's education on decision-making patterns about large household purchases, early marriages, attitudes toward domestic violence, and FGM, as obtained by the DHS surveys.

The remainder of this paper proceeds as follows: Section 2 reviews different perspectives on the effects of women's education on their empowerment, followed by Section 3 provides some background on Kenyan education. Section 4 presents our data sources and identification strategy. Section 5 discusses the results, robustness checks, placebo tests, heterogeneity analysis, and potential mechanisms. Section 6 outlines the conclusions and policy implications.

2. Literature review

2.1 *Literature on the effect of women's educational attainment on their empowerment*

Women's empowerment involves the emancipation of women from embedded restrictive gender norms to enable them to make autonomous social, economic, political, and health decisions (Kabeer, 2005; WHO, 2008). This definition is used as a point of reference throughout the study. Theories of women's empowerment describe the position of women from multiple dimensions, such as liberal feminist views and economic bargaining. As a point of departure, our paper is based on both theoretical framings. The liberal feminist approach criticizes the dichotomization of men and women into public and private domains, respectively. In the private domain, women engage in unpaid household chores, child-rearing, and caring for the elderly. In contrast, the public domain is seen as male-centered, where monetary rewards, power, personal development, and status are eminent. Women's empowerment is multidimensional and should be evaluated from the triad-economic, social, and political perspectives (Bradley & Khor, 1993; Kabeer, 2005). The economic dimension looks at women's employment, division of work at home, access, and control of resources. The political dimension concerns women's representation in political positions, domestic abuse, and sensual independence. In contrast, the social dimension focuses on kinship relations, women's enrolment in higher education, accessing information, the average age of marriage, reproductive rights, and investments in the education of daughters compared to sons.

The intra-household bargaining theory suggests that members' interactions are forms of games characterized by both incidences of collaboration and conflicts (Agarwal, 1997; McElroy, 1990). Household members evaluate the favorability of outcomes, and the treatment they experience from each other and then cooperate if the outcomes

are better than in a noncooperative arrangement. Education is one of the extra-household external parameters that women leverage to clinch job opportunities, acquire assets outside the household setting, and provide strong fallback positions. It exposes women to modern ideologies on career goals, financial independence, and information on rights, and equips them with the courage to confront unjust practices, hence minimizing their probability of experiencing domestic violence (Jejeebhoy, 1998; Kabeer, 2005). Jayachandran (2015) suggested that cultural norms in developing countries subjugate women to positions with a low propensity to influence household decisions and a high likelihood of experiencing domestic violence. Caution should be exercised when interpreting women's empowerment in both advanced and emerging countries because, in the latter, women making autonomous decisions is not synonymous with empowerment (Kishor, 1995).

There are scant studies on education and women's empowerment. A recent paper in Indonesia by Samarakoon and Parinduri (2015) found that education reduces fertility and enhances contraceptive use but does not improve women's decision-making authority within households. De Cao and La Mattina (2019), in their analysis of the impact of women's schooling on female circumcision in Nigeria, found no evidence that an increase in women's years of schooling alters their attitude toward the customary practice or reduces the chances of their daughters undergoing the cut. In Kenya, Ponge (2013) found that increase in women's participation in education does not result in gender equality in political parties' participation even though the absolute number of women fast-tracked to parties' decision-making organs improved. Omwami (2015) examined the intergenerational education achievements focusing only on rural women in Kenya using Demographic Health Surveys (DHS) 1989 and 2008. Her finding suggests that women who had accessed post-primary education were wealthier and had smaller-sized households. Singh et al. (2013) study on education and gender equality and their association with HIV testing among married women in Kenya, Zambia, and Zimbabwe found that educated women were more likely to be tested for HIV and that gender-based violence was positively associated with testing.

Our study contributes to the existing literature in threefold. Firstly, we utilize six waves of the nationally representative surveys to provide a comprehensive overview of women's empowerment given the small sample size and the lack of empirical studies on the topic in Kenya (Singh et al., 2013; Ponge, 2013; Omwami, 2015). Secondly, we investigate Kenya, a lower-middle-income country, which incorporates local contexts to add to the findings in similar scholarly works. Lastly, among several important implications, our findings are expected to help policymakers and planners to understand better the role of female education on women's empowerment in Kenya, which may translate into increased intra-household and societal power as the country continues to battle gender asymmetry.

2.2 *Literature on the pathways through which women's education affects their empowerment*

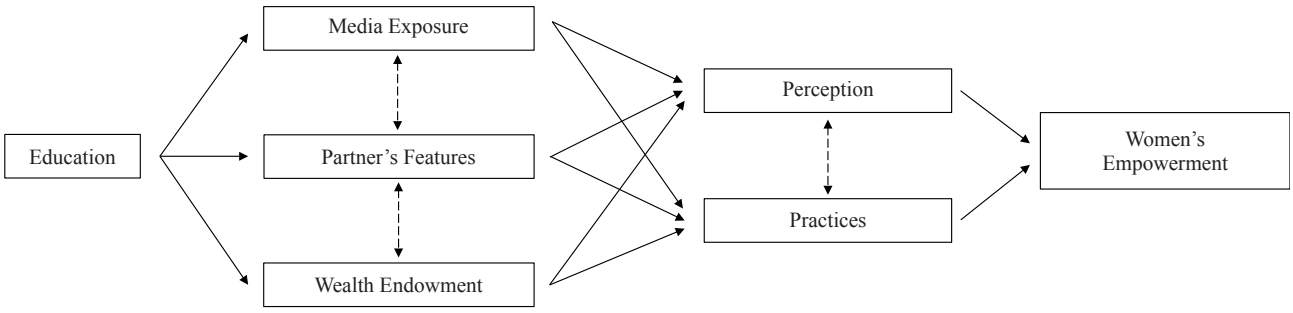

Figure 1. Conceptual framework of pathways through which women's education affects their empowerment

As illustrated in Figure 1, this study provides a conceptual framework through which education empowers women. The effects of education are multi-dimensional, and the flow goes through media exposure, partners' characteristics, and wealth endowment, which in turn may impact women's perception and practices, and eventually, women's empowerment. Firstly, education exposes women to a wide range of knowledge. Educated women can read, access more information sources, and convey their understanding to their surroundings (Duflo, 2012; Samarakoon & Parinduri,

2015). Second, for compatibility, an educated woman tends to look for a partner with at least the same level of education (Hahn et al., 2018; Siow, 2015). Thirdly, education enhances women's job opportunities (Aslam et al., 2008; Cameron et al., 2001; Chamlou et al., 2016). In conclusion, these three aspects shape their perception and practices on different measurements of women's empowerment.

3. Background: Education reforms and policies in the Kenyan context

3.1 *Overview of Kenyan education reforms*

Britain introduced regional public education in Kenya, Uganda, and Tanzania during the colonial era, which was characterized by racial fractionization and the marginalization of Africans (Nkinyangi, 1982). For instance, in Kenya, the primary education system for African students was divided into two phases: Upon studying from grades 1 to 4, the students sat for the Common Entrance Examination, and a handful who excelled proceeded to Grades 5 through 7. European and Asian students had compulsory primary education without such a test, which was eventually phased out in 1963 when Kenya gained its independence (Eshiwani, 1990; Somerset, 2009). A harmonized 7-4-2-3 public education system was introduced, where regardless of ethnicity, all students spent seven years in primary education, sat for the same final grade examination, and upon passing, attained a Certificate of Primary Education. Students who transitioned, spent four years in lower secondary education, two years in upper secondary education, and took the final year exam. Those who had passed attained the Kenya Certificate of Education and qualified for three years of tertiary education.

Kenya, like other former colonies, initiated education reforms after its independence in 1963 by promising free primary education and introducing fees waiver in three phases. In 1974, the Kenyan government implemented the first phase of a free primary education program by rescinding fees for Grades 1 to 4 and retaining ancillary fees, and building levies for the other years (Nkinyangi, 1982; Ohba, 2009; Somerset, 2009). This program was meant to break the cost barrier that hindered the enrolment of children from penurious backgrounds. The primary enrolment increased from 1.8 million in 1973 to 2.7 million in 1974, although these enrolment increments for Grades 1-4 were ephemeral because the parents had to pay fees for Grades 5 to 7, which led to increased cost-related dropouts (Somerset, 2009; Ohba, 2009).

In 1979, the government abolished building levies, leading to a sharp increase in enrolment from 2.99 million in 1978 to about 3.70 million in 1979 (Nkinyangi, 1982; Ohba, 2009; Somerset, 2009). Some of the shortcomings of the 7-4-2-3 system were that it was more academically focused than aligning with local labor market needs (Wanjohi, 2011). Moreover, policymakers favored a more technical, practical, and science-oriented education system that aligned with local development objectives (Eshiwani, 1990). All the task forces were commissioned to review the education system. Ominde Report (1964), National Committee on Education Objectives Policies (1976), and Makkay Report (1981) concluded that education reforms that are at par with the country's economic needs were necessary (Eshiwani, 1990). The first major education policy reform was implemented in 1985 when 7-4-2-3 was replaced by the 8-4-4 system, where students spent eight years in primary education, resulting in a one-year extension for the students who had not matriculated, four years in secondary education, and four years in tertiary education. Primary and secondary education examinations changed to the Kenya Certificate of Primary Education (KCPE) and Kenya Certificate of Secondary Education, respectively. In realigning with the structural adjustment reforms, the government of Kenya re-introduced primary school fees in 1988, which reduced student enrolment in subsequent years (Bedi et al., 2002).

In December 2002, the National Alliance of Rainbow Coalition presidential candidate Mwai Kibaki won the general elections and introduced a compulsory free primary education policy, scrapping all fees, which were 1,210 Ksh. (US$16) per household (World Bank, 2004) to broaden access to education and implemented it in 2003. This augmented the net enrolment rate from 59.55% in 2002 (UNESCO Institute of Statistics, 2020a) to 92.5% in 2018 (Ministry of Education, Science and Technology, 2019). In 2008, a similar tuition-free day secondary education (TFDSE) program was introduced in public schools. The essence of TFDSE was to increase the transition rate from primary to secondary to approximately 70% across the country (Ohba, 2009). The transition rates increased from 46.5% in 2001 to 59.9% in 2008 and 95% in 2019 (Ministry of Education, 2002; Ministry of Education, Science, and Technology, 2019). The government provided subsidies for Ksh. 10,265 (Kenya Shillings) (US$130) per student to cater for tuition fees for day and boarding secondary schools, while parents paid additional Ksh. 18,635 (US$236) per student as the boarding fee (Ministry of Education, Science, and Technology, 2015). Parents were also required to pay for the examination,

uniforms, lunch, caution money, and development expenditure. The net enrolment in secondary schools increased from 32.9% in 2000 to 47.8% in 2008 (UNESCO Institute of Statistics, 2020b) to 53.3% in 2018 (Ministry of Education, Science, and Technology, 2019).

The most recent education reform is the 2-6-6-3 competency-based curriculum (CBC) system introduced in 2017 to supplant the 8-4-4 system that served the country for 32 years. In the new system, students will spend two years at the pre-primary level, six years in primary education, three years in junior high school, three years in senior high school, and three years in tertiary education. The CBC aims to focus on the holistic development of learners by leveraging their abilities and unique talents where they can make meaningful economic contributions. In 2017, a pilot scheme was implemented across ten schools in each of the 47 counties in Kenya to assess the operationalization and adaptability of the curriculum in rural and urban settings, followed by the introduction of CBC to pioneers from pre-primary to Grade 3 cohorts in 2019 (Kenya Institute of Curriculum Development, 2018). In January 2020, the curriculum was rolled for Grade 4, while teacher training and curriculum for Grades 5 to 12 continued. The first cohort is expected to transition from Grade 7 to secondary school in 2023, and full implementation across all grades will be completed in 2028.

3.2 *Education reform in 1985*

Pre-reform structure

Primary education		Lower secondary		Upper secondary		Tertiary education	
Age	School year	Age	School year	Age	School year	Age	School year
6	grade 1	13	form 1	17	form 5	19	first year
7	grade 2	14	form 2	18	form 6	20	second year
8	grade 3	15	form 3			21	third year
9	grade 4	16	form 4				
10	grade 5						
11	grade 6						
12	grade 7						
CPE exam		CSE exam		College/university exam			

Post-reform structure

Primary education		Secondary education		Tertiary education	
Age	School year	Age	School year	Age	School year
6	std 1	14	form 1	18	first year
7	std 2	15	form 2	19	second year
8	std 3	16	form 3	20	third year
9	std 4	17	form 4	21	fourth year
10	std 5				
11	std 6				
12	std 7				
13	std 8				
KCPE exam		KCSE exam		College/university exam	

Figure 2. Education system in Kenya pre-reform and post-reform 1985 (without late enrollment and/or repetition)

This study specifically focuses on the first major education policy reform whose implementation in January 1985 extended the period of study that children spend at the primary education level from seven to eight years to attain the KCPE certificate. As indicated in Figure 2, this meant that students aged 12 in Grade 7 in 1984 proceeded to standard eight rather than graduating and joining secondary school. The academic calendar has three terms that commence in early January to end in late November. The official school age in Kenya was six years, and instances of late enrolment and high repetition rates were rampant pre- and post-reform (Nkinyangi, 1982). A student who normally progressed without late enrolment or any repetition matriculated at the age of 12 years before the reform and at 13 years post-reform. In comparison, the overall 16 years of schooling were constant under both systems. The reform had no clear cut for students who continued their study to the tertiary level, as under both systems, they needed to complete 16 years of schooling in total.

4. Data and identification strategy

4.1 *Data sources*

We employed six rounds of the KDHS. These survey rounds were undertaken in 1989, 1993, 1998, 2003, 2008, and 2014. The sampling was conducted using a two-step procedure. First, enumeration areas were extracted from census files. Then, households were picked from the household list from each enumeration area. The KDHS sub-dataset we utilize is the individual record for female respondents. This section included information on the background such as birth date, region, ethnicity, and educational attainment. The dataset also included a set of questions about women's empowerment and domestic violence. These data also contained information about the month and year of birth, so the probability of being exposed to the 1985 reform can be estimated. Additionally, we restricted the sample to female respondents born between 1950 and 1980. The restriction was to allow individuals to resolve their educational decisions completely.

Additionally, to measure the likelihood that a student proceeded into secondary school before the introduction of the new education system, we utilized the information from two sources. The first is Somerset (2007) where we employed the repetition rates and the age at which students entered Grade 1 in 1978 and 1979 from Somerset (2007). The second is from Ohba (2009) where we used the transition rates from primary school to secondary school.

4.2 *Assignment to educational cohort*

The structure system experienced by an individual depends on her educational cohort, that is, the year in which she entered secondary school. However, this information was not available in the dataset. Only respondents' age (in completed years) was observed during the survey. Together with high repetition rates and late enrolment in Kenya, this information leads to a noisy measure of an individual's enrolment in a secondary educational cohort, even when we can estimate her birth cohort based on the available data of month and birth year.

Using an individual's birth cohort, we could map an educational cohort using a typical approach in the literature (Angrist & Larry, 1999; Borkum, 2010; Chicoine, 2012). This approach uses repetition and transition rates to secondary school from Somerset (2009) to assign each birth cohort a probability distribution over educational cohorts and implements a probabilistic treatment assignment. Instead of a binary measure where each birth cohort experiences a certain regime with certainty, this approach gives the probability that each birth cohort experienced an 8-year regime.

Thus, we divided the cohort years into three periods. For a female born from 1950 to 1964, by the time the reform was implemented in 1985; these women were over 20 years old. At this age, it is unlikely for them to experience the new structure regime; hence, we assign 0 to this group as the probability of experiencing the 8-4-4 system. For the group born between 1965 and 1971, we name it the transitional group and assign a probability between 0 and 1 because of the high repetition and late enrolment rates in Kenya. The details of the calculations are explained later. In the last group, which is for a woman born between 1972 and 1980, we assign a probability of 1 to them because they are less than 14 years old at the time of the education reform and are the cohorts experiencing the new system.

$$Inst_c = \begin{cases} 1 & \text{if } 1972 \le c \\ Pr(\text{Treated}) & \text{if } 1965 \le c \le 1971 \\ 0 & \text{if } c \le 1964 \end{cases}$$

where $Inst_c$ is the instrument for a woman who belongs to birth cohort c, and c is the birth cohort computed based on a woman's month and birth year.

Although the required age to enroll in primary school is 6 years old, as mentioned above, there is a significant variation in the distribution of the age of entry, both within and across years, which is likely to worsen the measurement error in the treatment assignment. Therefore, we utilize the information on Grade 1 enrolment age distribution from Somerset (2007) to assign a conditional probability of enrolment in Grade 1 for an individual from age 6 to more than 10 years old.

Owing to the high repetition rate in Kenya at that time, an individual would likely complete their primary school for more than seven years according to the old regime. To account for this information, we employ repetition rates from the Ministry of Education reported in Somerset (2007) and the progression rates to secondary school from Ohba (2009) to assign a probability of repeating a single grade to a birth cohort. However, our probabilistic treatment assignment does not account for the dropout rate because of insufficient information at that time.

With these two conditional probabilities, the probability of the transitional group being exposed to the 8-year regime is calculated as follows:

$$Pr(\text{Treated}) = 1 - Pr(\text{Completed Primary School before 1985}) = 1 - Pr(\text{Control})$$

$$Pr(\text{Control}) = \sum_{k=(by+12)}^{1983} Pr(c \cap k)$$

$$= \sum_{A=6}^{1977-by} \sum_{r=0}^{1977-by-A} Pr(\text{Start School} = \text{A}|\text{c}) \times Pr(\text{Complete Primary}|\text{repeat} = \text{r})$$

where k is the educational cohort when a female finishes her primary school, by is a female's birth year, and A is the age she enrolls in grade one.

4.3 *Descriptive statistics*

From each of the six surveys, we extracted data from all women born between 1950 and 1980. We then pooled all six surveys and obtained a sample consisting of 23,005 women. We extract information regarding their educational attainment and their backgrounds such as urban/rural status, ethnicity, and religion.

Our main outcomes consist of age at first birth, gender attitude, sexual domestic violence, and financial decisions. The surveys reported responses to the question of whether the eldest daughter is circumcised. We create a binary index to capture the gender attitude, 1 if the eldest daughter is circumcised, and 0 otherwise. The KDHS also contained questions about domestic abuse and included questions involving the wife's perception of battering as the result of sexual refusal. We then create a binary variable, 1 if the woman says yes toward sexual domestic violence, and 0 otherwise. The surveys also consisted of data on women's decisions within households. We use the purchase of large households as an indicator of women's intra-household decision power and construct an index by assigning 0 point if the woman does not involve in the decision, 0.5 point if she has partial say in the process, and 1 point if she is the only decision-maker.

Table 1 presents descriptive statistics of the outcomes and control variables in this analysis. Panel A shows the mean and standard deviation of the diverse parameters of women's empowerment. The mean age at first birth was 19.44 years old. Approximately 8.9% of the eldest daughters in the sample experienced genital cutting. A total of 26.8% of

women were beaten if they refused to have sex with their husband. On average, 41.1% of women have some sayings when deciding on large household purchases. Panel B presents the descriptive statistics for the control variables. On average, 17.1% of women lived in urban areas during childhood. Regarding ethnicity, Kalenjin, Kamba, Kikuyu, Luhya, and Luo account for approximately 72.2% of the population, and Kikuyu is the largest group, accounting for approximately 22.7%.

Table 1. Descriptive statistics of key variables

	Mean	SD	Observations
Panel A: Outcomes			
Age at first birth	19.445	3.728	29,343
Genital cutting	0.089	0.285	11,781
Beating justified if wife refuses to have sex with husband	0.268	0.443	14,103
A person who usually decides on large household purchases	0.411	0.381	12,338
Panel B: Controls			
Childhood residence is urban	0.171	0.376	23,028
Ethnicity:			
Kalenjin	0.117	0.321	33,611
Kamba	0.119	0.323	33,611
Kikuyu	0.227	0.419	33,611
Kisii	0.069	0.253	33,611
Luhya	0.147	0.354	33,611
Luo	0.112	0.315	33,611
Meru/Embu	0.072	0.259	33,611
Mijikenda/Swahili	0.053	0.224	33,611
Somali	0.017	0.130	33,611
Other	0.067	0.251	33,611

Note: SD means standard deviation. Women were born between 1950 and 1980 in the sample.

4.4 *Identification*

Previous studies show that there is an association between women's educational attainment and empowerment. The baseline estimates rely on the OLS model. The regression model is:

$$y_{ic} = \alpha + \beta.Education_{ic} + \sum_{n=1}^{3} age_{ic}^{n} \cdot \gamma_n + \sum_{m=1}^{2} trend_c^m \cdot \delta_m + X_{ic}.\theta + \varepsilon_{ic}$$

where y_{ic} is the outcome for individual i from birth cohort c, $Education_{ic}$ are measurements of education, age_{ic} is the

women's age at the survey time, $trend_c$ is the time trend measured by birth year and its quarter, X_{ic} are individual-level control variables including region, urban status, and ethnicity, fixed effects for the quarter of birth and ε_{ic} is the error term.

To utilize the exogeneity of the new educational regime, we employ the instrument described above to predict changes in education. The model is then:

$$Education_{ic} = \alpha_K + \beta_K .Inst_c + \sum_{n=1}^{3} age_{ic}^{n} \cdot \gamma_{Kn} + \sum_{m=1}^{2} trend_c^m \cdot \delta_{Km} + X_{ic}.\theta_K + \varepsilon_{Kic}$$

The variables are similar to those explained in the OLS model.

To capture the direct effect of education change on women's empowerment, we use the following model:

$$y_{ic} = \alpha_L + \beta_L .Inst_c + \sum_{n=1}^{3} age_{ic}^{n} \cdot \gamma_{Ln} + \sum_{m=1}^{2} qtrend_c^m \cdot \delta_{Lm} + X_{ic}.\theta_L + \varepsilon_{Lic}$$

5. Results and discussions

5.1 *The effects of women's exposure to the 8-4-4 regime on their education and empowerment*

Table 2. The effect of women's exposure to the policy change on their education

	Years of schooling
Full sample	
Exposure to the policy	2.070***
	(0.204)
Number of observations	23002
Urban sample	
Exposure to the policy	2.109***
	(0.296)
Number of observations	5348
Rural sample	
Exposure to the policy	1.961***
	(0.217)
Number of observations	17654

Note: Women were born between 1950 and 1980 in the sample. All regression controls for a dummy for urban/rural status of childhood place of residence, quadratic time trend, cubic age, ethnicity, and fixed effects for the quarter of birth. Standard errors are reported in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 2 shows the impact of women's exposure to the new regime and their education. An increase in schooling by 2.07 years is estimated as a result of the policy change. We also observe an improvement in education in both urban and

rural areas with a stronger effect in urban ones. Specifically, women exposed to the policy have approximately 2.11 and 1.96 years of schooling increase in urban and rural respectively.

Table 3. Main results: The effect of women's exposure to the policy change on their empowerment

	Age at First Birth	FGM on the Eldest Daughter	Beating Justified if Wife Refuses to Have Sex with Husband	A Person Who Usually Decides on Large Household Purchases
Exposure to the policy	0.564***	-0.0351*	-0.0647*	0.0666**
	(0.177)	(0.0200)	(0.0345)	(0.0265)
Number of observations	18983	8449	9027	8410

Note: Women were born between 1950 and 1980 in the sample. All regression controls for a dummy for urban/rural status of childhood place of residence, quadratic time trend, cubic age, ethnicity, and fixed effects for the quarter of birth. Standard errors are shown in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 4. Different specifications

	Age at First Birth	FGM on the Eldest Daughter	Beating Justified if Wife Refuses to Have Sex with Husband	A Person Who Usually Decides on Large Household Purchases
Panel A: Control for religion				
Exposure to the policy	0.569***	-0.0352*	-0.0686**	0.0668**
	(0.176)	(0.0200)	(0.0342)	(0.0265)
Number of observations	18963	8441	9020	8403
Panel B: Control for husband's schooling				
Exposure to the policy	0.309*	-0.0358*	-0.0618	0.0470*
	(0.159)	(0.0209)	(0.0390)	(0.0265)
Number of observations	17070	7818	8016	7651
Panel C: Including all controls				
Exposure to the policy	0.301*	-0.0358*	-0.0629	0.0470*
	(0.158)	(0.0209)	(0.0387)	(0.0265)
Number of observations	17051	7810	8010	7645

Note: Women were born between 1950 and 1980 in the sample. All regression controls for a dummy for urban/rural status of childhood place of residence, quadratic time trend, cubic age, ethnicity, and fixed effects for the quarter of birth. Standard errors are shown in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 3 shows the results of the reduced form model. The estimates illustrate the effect of the educational system change on the measure of women's empowerment, age at first birth, gender attitude, sexual domestic violence, and intra-household decision-making, holding individual characteristics constant. The estimated effect of the educational change on age at first birth is positive and significant at the 1% level meaning that mothers affected by the reform delay their age to have the first child by 0.56 years. Women exposed to the policy approximately have a 3.5 percent reduction in genital cutting for the eldest daughter. In addition, violence measured by refusal to have sex with her husband reduces

by approximately 6.5%. The new regime also has a significantly positive effect on decisions regarding large household purchases. This increases the index by 0.067 points. We further test the correlation between being exposed to the 8-4-4 regime and having large household assets in Appendix Table A1. We find positive and statistically significant results, further supporting our estimated findings of the reform on women's decision-making in their households.

We conduct several robustness checks on the main findings in Table 3. First, we include different controls for the results in Table 4. The estimated results in Panel A of Table 4 are robust when controlling for religion. Specifically, being exposed to the new regime lengthens the age at first birth by 0.57 years, reduces genital cutting of the eldest daughter, and sexual domestic violence by 3.52% and 6.86%, respectively. Studying the new 8-4-4 system increases women's decisions on large household purchases by 6.68%. All figures are statistically significant. However, in Panel B of Table 4, once we account for the husband's education, the effect of being exposed to the policy change on the wife denying the husband conjugal rights is mitigated. As the woman's schooling influences her husband/partner's educational achievement, the impact of education on sexual domestic violence could potentially be transmitted through the education of her husband/partner. We include all controls in panel C of Table 4, and the results are similar to panel B when we include the husband/partner's education level. All the findings are statistically significant, except for sexual domestic violence.

Table 5. Various measures of family decision-making and its specification

	A Person Who Usually Decides on Large Household Purchases
Panel A: Controls from a reduced form	
Exposure to the policy	-0.115***
	(0.0262)
Number of observations	8410
Panel B: Control for religion	
Exposure to the policy	-0.115***
	(0.0262)
Number of observations	8403
Panel C: Control for husband's schooling	
Exposure to the policy	-0.110***
	(0.0271)
Number of observations	7651
Panel D: Including all controls	
Exposure to the policy	-0.110***
	(0.0271)
Number of observations	7645

Note: Women's birth cohorts are from 1950 to 1980 in the sample. All regression controls for a dummy for urban/rural status of childhood place of residence, cubic age, quadratic time trend, ethnicity, and fixed effects for the quarter of birth. Standard errors are shown in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Second, as indicated in Section 4, we recode the decision variables into the values of 0, 0.5, and 1 regarding the

degree to the woman involves in decision-making, having no say, partially say and fully say, respectively. Acosta et al. (2020) argue this measure might not consider different degrees of gender preference across and within regions. For instance, some women might be partially involved in the decision-making process, but the men are the final decision-makers, while others make decisions jointly with their husbands/partners. To cope with this issue, we recode our decision variables into binary indices: 1 if the decision-maker is the woman solely and 0 if otherwise. Panel A of Table 5 reports the results. We find a positive and statistically significant impact of studying under the new structure on women's decision-making. The findings are similar to those in Table 2. We also include different control variables, and the results in panels B, C, and D of Table 5 confirm our estimated impacts of being exposed to the new system on women's decision-making.

The findings of the robustness, therefore, strengthen the validity of the estimated results of being exposed to the new regime on women's empowerment.

5.2 *Placebo test*

One threat to our findings is that any change over the same period of our research in Kenya may have led to an improvement in women's empowerment. To assess this issue, we restrict our samples to women who might not be impacted by the policy change and conduct similar regressions. Table 6 presents the results:

Table 6. Placebo test

	Age at First Birth	FGM on the Eldest Daughter	Beating Justified if Wife Refuses to Have Sex with Husband	A Person Who Usually Decides on Large Household Purchases
Panel A: Women have at most six years of schooling				
Exposure to the policy	-0.197	-0.0612	-0.0156	0.000453
	(0.252)	(0.0371)	(0.0679)	(0.0438)
Number of observations	7862	7889	3599	3250
Panel B: Women have a college degree				
Exposure to the policy	0.00473	0.0700	-0.0157	0.0636
	(0.998)	(0.0531)	(0.0519)	(0.103)
Number of observations	354	367	148	399

Note: Women were born between 1950 and 1980 in the sample. All regression controls for a dummy for urban/rural status of childhood place of residence, quadratic time trend, cubic age, ethnicity, and fixed effects for the quarter of birth. Standard errors are shown in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

We first restrict our samples to two subsamples that women were most unlikely to be impacted by the educational system change. The first subsample consists of women who obtained at most six years of schooling. We made an assumption that given the fixed demand for education, the one year of prolonging the primary school would not affect these women. Panel A reports the results of this group. The finding is not robust even though the effect of the policy is significant, and its magnitude is large, given that the relevant characteristics are held constant. The estimated results become smaller and get close to 0.

The second subsample consisted of women who attended college. Under both systems, to obtain college degrees, a woman needed to spend 16 years of schooling, the education reform would be unlikely to affect these women. The results of the placebo test are shown in panel B. The estimated effect of the policy change on various parameters of women's empowerment for this subgroup is not statistically significant from 0.

These results confirm that no unobserved trend that impacts women's empowerment can affect the estimated results.

5.3 *Heterogeneous analysis*

Tests for heterogeneity effects of exposure to the education reform on women's empowerment based on their residence and religion. In Table 7, panels A and B investigate whether the impacts vary between women who live in rural and urban settings. The results suggest that under the new system, women's mean age at first birth in rural and urban settings both increases at 0.39 and 0.93 years, respectively, and are statistically significant at the 1% and 5% levels, respectively, and to a greater extent in urban women. The heterogeneity effects of education policy exposure on the genital cutting of the eldest daughter for rural women are negative at 4.6% and statistically significant at the 5% level. In contrast, urban women experienced near-zero change. Attitude toward justifying domestic violence declined but was only statistically significant among urban women at 11 percent. The ability to make decisions on large household purchases increased and was only statistically significant among rural women, whereas it was not different among urban women.

Table 7. Heterogenous analyses

	Age at First Birth	FGM on the Eldest Daughter	Beating Justified if Wife Refuses to Have Sex with Husband	A Person Who Usually Decides on Large Household Purchases
Panel A: Women living in rural areas				
Exposure to the policy	0.394***	-0.0464**	-0.0600	0.0911***
	(0.143)	(0.0224)	(0.0403)	(0.0280)
Number of observations	14803	6618	6191	5858
Panel B: Women living in urban areas				
Exposure to the policy	0.927**	0.0139	-0.110*	-0.00112
	(0.443)	(0.0284)	(0.0630)	(0.0567)
Number of observations	4180	1831	2836	2552
Panel C: Women with religion				
Exposure to the policy	0.542***	-0.0357*	-0.0613*	0.0601**
	(0.179)	(0.0203)	(0.0346)	(0.0273)
Number of observations	18440	8826	8214	8199
Panel D: Women without religion				
Exposure to the policy	1.552	0.0263	-0.334	0.345*
	(1.489)	(0.103)	(0.238)	(0.190)
Number of observations	523	242	194	189

Note: Women were born between 1950 and 1980 in the sample. All regression controls for a dummy for urban/rural status of childhood place of residence, quadratic time trend, cubic age, ethnicity, and fixed effects for the quarter of birth. Standard errors are shown in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Panels C and D of Table 7 examine the heterogeneous effects of exposure to the education policy on religious and non-religious women. Our estimation results show that under the new system, age at first birth among the women identifying with a religion positively increased by 0.54 years and is statistically significant at the 1% level, while there is inadequate evidence to support irreligious women. Furthermore, despite our estimates for FGM and domestic violence among women exposed to the 8-4-4 regime with religion being negative and statistically significant at the 10% level, there was insufficient evidence to support the irreligious women. There was evidence to support the involvement of both religious and irreligious women in large purchase decisions, with the former increasing the index by 0.06 points and being statistically significant at the 5% level and the latter rising at 0.345 points at the 10% level.

FGM is a prevalent practice in Kenya. Appendix Table A3 shows women exposed to a new educational regime and FGM based on their ethnicity. Of the recorded ethnic groups, only Kisii and Luhya report negative and statistically significant impacts of women exposed to the policy on FGM practice on their eldest daughters. According to the latest Kenya DHS (2014), 21% of the women in the survey reported that they were circumcised, which is a slight decline compared with 27% in 2008 and 32% in 2003 surveys. The practice is deeply entrenched in Somali (94%), Samburu (86%), and Kisii (84%) communities.

Additionally, women in rural areas have a prevalence of FGM of 26% compared with women in urban areas (14%). DHS (2014) also reported regional disparities, with 98% of women from North-Eastern being circumcised compared to 1% from the Western regions. In 2014, 51% of Muslim women were more likely to have been circumcised, and 36% reported that circumcision was a requirement by their religion than women affiliated with other religions. The FGM is motivated by cultural, social, and religious beliefs. It is considered a rite of passage that signals women's readiness for marriage and deters them from engaging in illicit sexual intercourse by lowering their sexual desires as teenage (WHO, 2014). Mpofu et al. (2017) found no evidence that FGM leads to sexual deterrence among women in Nigeria and Kenya. The Children's Act 2001 and Prohibition of the Female Genital Mutilation Act 2011 enacted by Kenya's parliament are parts of the overall strategy to protect girls under the age of 18 years and women from cultural practices that violate their rights such as the FGM. Our findings suggest that exposure to the education policy reduces the FGM of the eldest daughter of rural women by 4.64% at a statistical significance of 5% level, and we find no evidence for a reduction in the practice of urban women. This is because women living in urban areas have high education levels, as presented in Appendix Table A2, so they are less likely to expose their eldest daughters to the FGM. Our finding is in line with Ameyaw et al.'s (2020) study on Sierra Leone, which concludes that women with low levels of educational obtainment are likely to allow FGM practice on their daughters in the future.

5.4 *Channels through which education enhances women's empowerment*

We present some proof of the potential mechanisms of the influences of the new system regime. We investigate three main pathways through which policy change could potentially impact women's empowerment: (i) exposure to information, (ii) husbands'/partners' characteristics, and (iii) labor market outcomes.

Firstly, education exposes women to a broader range of knowledge. Educated women can read, access more information sources, and convey their understanding to their surroundings (Duflo, 2012; Samarakoon & Parinduri, 2015). Therefore, it enhances their ability to take charge of their behavior and interaction with others and grounds them with a solid basis for the involvement in intra-household decision-making (Friedman et al., 2016). In addition, educated women can have a better understanding and selection of information they are exposed to so that they can make rational decisions. For example, they are informed about the risks of some cultural norms, such as the FGM, to discourage their support of the practice on their daughters or people in their communities (Ameyaw et al., 2020; Dalal et al., 2010; Yount, 2002; Yount et al., 2020). Furthermore, exposure to information helps them know their rights and raise their voices against domestic violence when those boundaries are crossed (Mahmud et al., 2012). Results from panel A of Table 8 confirm the findings from the literature. We use three indicators to measure women's exposure to information: watching TV, reading newspapers, and listening to the radio. We assign two values for each measure: 1 indicating whether the woman has accessed the channels and 0 otherwise. Women under the new regime are approximately 15.3%, 8%, and 13.1% more likely to get exposure to TV, newspapers, and radio, respectively.

Second, a relatively high-educated woman prefers to marry a husband with the same or higher level of schooling (Hahn et al., 2018; Siow, 2015). In a marriage, when both are educated, they have a better understanding of the dangerous consequences of some cultural norms. When differences arise, they discuss and agree to disagree. Therefore,

the intimate partner violence rate is reduced. The results are reported in panel B of Table 8. Being exposed to the new education system does not impact the age difference between women and their husbands. However, it reduces the education gap by 0.068 years, and women are more likely to get married to husbands whose education levels were 0.962 years more than their counterparts.

Thirdly, previous research suggests that education improves women's labor market outcomes (Aslam et al., 2008; Cameron et al., 2001; Chamlou et al., 2016). More education and working time delay their age at first birth (Bratti & Cavalli, 2014; Ferré, 2009). In addition, engagement in the job market provides women with a sense of security, thus enhancing their bargaining power in the household decision-making (Antman, 2014; Attanasio & Lechene, 2002; Heath & Tan, 2020; Morozumi, 2012). A woman with better job prospects leverages her economic status to overcome some cultural norms, while a woman without income may be forced to stay in her marriage and accept any level of violence from her partner (Aizer, 2010; Hidrobo & Fernald, 2013). With income, she contributes to the household by increasing her intra-household bargaining power in decision-making (Attanasio & Lechene, 2002; Iyigun & Walsh, 2007). Therefore, education empowers women through the labor market outcome path. The results from panel C of Table 8 support the findings from previous studies. Women under the new educational structure increase their current working status by 7.3% and improve their chance of having a job in the last 12 months by 13.5%. Both estimation results are statistically significant at the 1% level.

Collectively, women exposed to the new system have enhanced their empowerment in terms of their age at first birth, FGM practice on their eldest daughters, sexual domestic violence, and intra-household decision-making power, as a result of the increased exposure to information, husbands/partners' characteristics, and improvements in labor market outcomes.

Table 8. Potential mechanisms

	Panel A: Exposure to Information	Panel B: Husband/Partner Characteristics	Panel C: Labor Involvement
	Watch TV	Age Difference	Currently Holding a Job
Exposure to the policy	0.153***	-0.592	0.0733***
	(0.0236)	(0.472)	(0.0230)
Number of observations	22910	11692	22965
	Read Newspaper	Education Difference	Working in the Last 12 Months
Exposure to the policy	0.0804***	-0.0676**	0.135***
	(0.0204)	(0.0323)	(0.0236)
Number of observations	22963	17980	16144
	Listen to Radio	Husband/Partner Education	
Exposure to the policy	0.131**	0.962***	
	(0.0561)	(0.196)	
Number of observations	3820	17832	

Note: Women were born between 1950 and 1980 in the sample. All regression controls for a dummy for urban/rural status of childhood place of residence, quadratic time trend, cubic age, ethnicity, and fixed effects for the quarter of birth. Standard errors are shown in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

6. Conclusions and policy implications

This study examined the effects of schooling on women's empowerment in Kenya using nationally representative KDHS data from the 1989, 1993, 1998, 2003, 2006, and 2014 waves. Education is championed as one of the avenues of empowering women, eradicating customs that violate their rights as anchored by SDG5 and bridging gender gaps. The study employed the new structuring educational system in 1985 as an instrument and reported the results using a reduced form owing to the high repetition rate and late enrolment at that time. The findings indicated that being exposed to the new education system had a positive influence on women's education and empowerment in various dimensions. Specifically, when exposed to the 8-4-4 regime, the women improved their education by 2.07 years, delayed their age at first birth by approximately 0.564 years, the FGM practice on their eldest daughters declined by 3.51%, sexual domestic violence decreased by 6.47%, and their decision-making index was enhanced by 0.067 points. The results were robust to several robustness checks and sample restrictions, specifically, the inclusion of religion and husband's schooling in the regression equation and restriction of the analysis to women unaffected by the regime.

We explored several mechanisms to explain these findings. First, education improves access to information. Women who experienced the new regime were approximately 15.3%, 8%, and 13.1% more likely to access TV, newspapers, and radio, respectively. Moreover, a better-educated woman is likely to get married to a better-educated husband. Women exposed to the 8-4-4 system improved their education level, thus reducing the education gap with their husbands by 0.068 years. In addition, they were predisposed to marry husbands whose education levels were 0.962 years more than their counterparts. Lastly, women under the new educational structure advanced their labor market outcomes with their current working status by 7.3% and ameliorated their chance of having a job in the last 12 months by 13.5%.

Our findings bolster previous studies which found that women's education empowers them to lengthen their age at first birth (Bratti & Cavalli, 2014), reduces the probability of subjecting their daughters to FGM (Ameyaw et al., 2020), reduces their subjection to domestic violence (Jejeebhoy, 1998; Kabeer, 2005), and exhibits high bargaining power in household decisions (Friedman et al., 2016; Le & Nguyen, 2021).

These findings have important policy implications. They suggest several approaches that may be necessary to empower women from educational policies owing to the relationship between education and empowerment. First, the current curriculum can incorporate vocational programs that can secure women's jobs and income. Additionally, education should not be limited to the skills necessary for their lives, but also other soft skills. For example, the risks of early pregnancies among school-age females and studies about their rights should be integrated into the formal curriculum and religious studies. Evidence from Nigeria points out that incorporating gender issues in educational curricula is necessary to improve national perspectives on gender parity and women's self-determination and autonomy (Ajasa & Salako, 2015). Furthermore, educational policies are more effective if there is support from the community level and community-based organizations. Findings from Mali, Nepal, and Nigeria show that engagement in community-based activities is effective in terms of knowledge expansion and dissemination to facilitate cultural norms change (Cislaghi et al., 2019). Likewise, the government can direct funding at the community level.

The heterogeneous results suggest that women's empowerment is determined not only by education but also by living residence and religion. Consequently, the most effective way to empower women may be to target programs and policies that promote rural and religious women directly, such as by improving ways of earning income. Furthermore, Abdi and Askew (2009) suggest that some religious leaders explicitly or implicitly support and promote risky cultural norms. Policies should aim to raise the awareness of influential religious leaders through educational programs.

This study is not without limitations. First, our measures of female schooling at the survey time might not reflect the actual educational attainment of the young cohorts because it is possible that some respondents may acquire more schooling after the survey period. Second, we fail to establish a causal relationship between women's education and empowerment due to the noisy measure of female schooling. Lastly, since our estimation is based on the reduced form which is referred to as the intention-to-treat, the results may be overestimated compared to a causality framework such as two-stage least squares analysis because the treatment effect among compliers is computed as the proportion of the intention-to-treat and the difference in the probability of receiving treatment.

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Conflict of interest

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Appendix

Table A1. Exposure to new system and large household appliances

	Motor	Fridge	Bicycle	Radio
Exposure to the policy	0.0186*	0.0187*	0.0483**	0.0695***
	(0.0105)	(0.0105)	(0.0203)	(0.0184)
Number of observations	15882	22671	22681	22687

Note: Authors calculated from KDHS 1989, 1993, 1998, 2003, 2008 and 2014.

Table A2. Proportion of education levels of women according to rural and urban residences

	Urban Residence	Rural Residence
No education (%)	970	4,329
	(10.74)	(17.59)
Primary level (%)	3,745	14,606
	(41.47)	(59.36)
Secondary level (%)	3,041	5,005
	(33.67)	(20.34)
Tertiary level (%)	1,275	667
	(14.12)	(2.71)
Total (%)	9,031	24,607
	(100)	(100)

Note: KDHS, 6 waves. Row percentages are provided in the parentheses.

Table A3. Additional heterogenous analyses

	FGM on the Eldest Daughter
Panel 1: Kalenjin group	
Exposure to the policy	-0.0374
	(0.0317)
Number of observations	1125
Panel 2: Kamba group	
Exposure to the policy	0.0167
	(0.0443)
Number of observations	859
Panel 3: Kikuyu group	
Exposure to the policy	0.0129
	(0.0229)
Number of observations	1648
Panel 4: Kisii group	
Exposure to the policy	-0.346***
	(0.101)
Number of observations	571
Panel 5: Luhya group	
Exposure to the policy	-0.00811*
	(0.00456)
Number of observations	1264
Panel 6: Luo group	
Exposure to the policy	-0.00705
	(0.00574)
Number of observations	919
Panel 7: Meru/Embu group	
Exposure to the policy	-0.105
	(0.0759)
Number of observations	481
Panel 8: Mijikenda/Swahili group	
Exposure to the policy	-0.0146
	(0.0217)
Number of observations	651
Panel 9: Somali group	
Exposure to the policy	-0.131
	(0.176)
Number of observations	322
Panel 10: Other groups	
Exposure to the policy	-0.0378
	(0.0916)
Number of observations	609

Note: Authors calculated from KDHS 1989, 1993, 1998, 2003, 2008 and 2014.