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Age at First Child
Does Education Delay Fertility Timing?

The Case of Kenya

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Abstract

Completing additional years of education necessarily entails spending more time in school. There is naturally a rather mechanical effect of schooling on fertility if women tend not to have children while continuing to attend high school or college, thus delaying the beginning of and shortening their reproductive life. This paper uses data from the Kenyan Demographic and Health Surveys of 1989, 1993, 1998, and 2003 to uncover the impact of staying one more year in school on teenage fertility. To get around the endogeneity issue between schooling and fertility preferences, the analysis uses the 1985 Kenyan education reform as an instrument for years of education. The authors find that adding one more year of education decreases by at least 10 percentage points the probability of giving birth when still a teenager. The probability of having one's first child before age 20, when having at least completed primary education, is about 65 percent; therefore, for this means a reduction of about 15 percent in teenage fertility rates for this group. One additional year of school curbs the probability of becoming a mother each year by 7.3 percent for women who have completed at least primary education, and 5.6 percent for women with at least a secondary degree. These results (robust to a wide array of specifications) are of crucial interest to policy and decision makers who set up health and educational policies. This paper shows that investing in education can have positive spillovers on health.

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Age at First Child: Does Education Delay Fertility Timing? The Case of Kenya

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"In countries where the female secondary education base is low, the expansion of female secondary education may be the best single policy lever for achieving substantial reductions in fertility." Subbarao and Raney (1995).

1. Introduction

The past 50 years have seen immense transformations in the educational and the reproductive expectations of young people in the developing world: educational levels are going up everywhere (UNESCO statistics), and fertility trends are downward slopping (early fertility and fertility in general). Numerous studies report strong associations between female education and early fertility behavior: teenage pregnancy, age at first birth, contraception use (see CBASSE (1999) for a review of the literature). This evidence has been used as an argument in favor of targeting educational expenditures towards girls. However, most of these studies are based on correlations between years of education and early fertility behavior, often after controlling for community, peers, household and individual characteristics. Part of the correlation between maternal education and early fertility behavior may hence reflect the influence of unobserved background variables correlated with education (in particular personal fertility preferences).

Yet, empirical works do not support the idea that such a simple causal process operates. This lack of evidence is mainly due to the endogeneity of the two decisions: schooling and fertility timing. While there are reasons to expect that a birth during the teen years will often lead to the termination of schooling (time incompatibility, issues of financial support, absence of daycare facilities, cultural factors), it is unclear whether the causality goes from early pregnancy to low levels of schooling or the other way round (endogeneity of choices). A few methodologies have been tried in order to address the possible reverse causality link between education and teenage fertility: comparison between sisters (Geronimus and Korenman (1992)) or between single and twin births (Grogger and Bronars (1993)) to avoid omitted variable bias; instrumentation of age at first birth by age at menarche (Ribar (1992)); miscarriage as an instrument for teenage mothers (Hotz et al. (2004)). The most conclusive studies have used variation in length of schooling, schooling laws (McCrary and Royer (2006), Leon (2004), Black et al. (2004)) or timing of school construction (Breirova and Duflo (2003), Osili and Long (2007)) and all conclude to a reduction in the probability of teenage childbearing due to an additional year of schooling (in the order of magnitude of a 4% reduction[2]).

Researchers and policy makers are interested in finding ways of reducing teenage pregnancies for early childbearing has been shown to have potentially adverse consequences on the mother, her child and the society as a whole. Early childbearing has been linked to higher rates of maternal and child morbidity and mortality, lower educational achievements, and lower family income. Larger completed family size is one of the long-term demographic effects of adolescent fertility because the timing of the first birth is usually an indicator of future fertility patterns (CBASSE (1987)).

One way of reducing teenage fertility is to directly improve girls' knowledge about family planning; another is to give them alternative opportunities via schooling (Dryfoos (1983), Subbarao and Raney (1995)). The majority of programs are of the first kind: they are aimed at enhancing young people's ability to avoid early childbearing and directly influence the process of

[2] This has to be related to an average probability of giving birth before age 20 of 17% in the selected countries (US and Norway).

decision making by adolescent girls at the time of choice. Interventions in the second category are intended to influence sexual decision making indirectly by developing and strengthening adolescents' motivation to avoid early childbearing. They are based on the assumption that broadening opportunities, especially through educational enhancement, will provide meaningful alternatives to childbearing.

The aim of this paper is to investigate the potential of the second strategy: does education reduce early fertility and if so, by how much? Investing in education is one of the most emphasized components of development: in Kenya, 22.9% of the State budget is allocated to education[3]. Education can contribute to favorable changes in demographic outcomes in several different ways. First, the "incarceration" effect: educational attendance reduces time available to engage in child bearing, thus postponing the decision to have one's first child. This could be particularly true in Sub-Saharan Africa, where national laws forbid pregnant teenagers from attending school in most countries (CBASSE (1993)). Second, the "knowledge" effect: better educated women have more knowledge about contraception and family planning. Third, the "autonomy" effect: women with higher education earn higher incomes, decide to have fewer kids of better quality, pair with men who have the same preferences for children as they do, have more power to be respected in their own fertility decisions (Jejeebhoy (1995)). In all three cases, if women tend not to have children while continuing to attend school, there should be a natural and rather mechanical effect of schooling on fertility, thus delaying the beginning and possibly shortening women's reproductive life in developing countries (Amin (1995), Jensen (2003)).

In developing countries, where teenage fertility rates are much higher than in industrialized countries (see Table 1), the debate about education and fertility timing has very real consequences. Sub-Saharan Africa still displays some of the highest levels of fertility in the world, including adolescent childbearing. In Kenya alone, the rate of girls aged 15-19 who were pregnant was 114‰ in 2003, compared to 10h in OECD countries. 39.4% of teenagers aged 15-19 have already given birth once (2003). Much of the high fertility can be attributed to young age at first sex, young age at first union, and young age at first birth (Mahy and Gupta (2002)). In addition, desired fertility in Kenya is much lower than current fertility (DHS (2003)).

We provide here new evidence on the role of increased schooling on early fertility, drawing on a quasi-experiment in Kenya. We exploit a radical change in the Kenyan educational system, implemented in 1985, that increased by one year the time necessary to complete primary school. This change in the curriculum affected all kids at most in their second to last year of primary school in 1985. Students subject to the Reform graduated from primary school after a minimum of 8 years (instead of 7) and secondary school after 4 years of schooling[4]. This discontinuity is used to instrument the number of years spent in school and circumvent the endogeneity of choice between schooling and childbearing.

Our paper shows that higher levels of education decrease by at least 10 percentage points the probability of giving birth when still a teenager (taking the most conservative results). Knowing that the probability of having one's first child before age 20 when having at least completed primary education is about 65%, this entails a reduction of about 15% of teenage fertility rates (for those having at least completed the KCPE). One additional year of school curbs the probability of becoming a mother each year by respectively 7.3 and 5.6% for women with at least a primary and at least a secondary degree.

[3] Source: UNESCO statistics.
[4] When they did not repeat a grade.

The remaining of the paper is organized as follows. Section 2 presents the literature review. Section 3 introduces the data used. Section 4 details the econometric strategy and summarizes the main empirical findings. Section 5 concludes.

2. Literature Review

2.1. Negative Impact of Teenage Childbearing

Scientific knowledge about the risks and consequences of adolescent childbearing has grown substantially over the past decades: a large body of research indicates that becoming a parent as a teenager leads to lower social and economic attainment for young mothers and their family and that it entails considerable health risks for herself and the child.

Numerous studies have reported that children born to teenage mothers experience greater health problems and mortality risks than do those of older mothers. Early pregnancies are associated with significantly worse prenatal health care and vaccination behavior, lower birth weights, earlier weaning, and, especially during the second year of life, higher mortality (see LeGrand and Mback´e (1993) for evidence on Eritrea, Westoff (1992), Zabin and Kiragu (1998) for evidence on SSA). Hobcraft (1992) presents data from 36 Demographic and Health Surveys (DHS) and World Fertility Surveys (WFS) showing that the average relative risk of death before age five is about 46% higher for children born to mothers under 18, and 13% higher for those born to mothers aged 18-19, compared with children of mothers aged 20-34. Young maternal age can increase children's health risks both for physiological and behavioral reasons. Teenage mothers may be physically less mature and less able to handle the demands of pregnancy, childbirth, and subsequent child care. Young mothers face greater risks of obstetric fistula, preeclampsia, hemorrhage, and pelvic bone immaturity increases the likelihood of cephalopelvic disproportion, which is associated with a higher incidence of premature birth, prolonged labor, and otherwise difficult childbirth (UNICEF (2001)). The behavior of teenage women may be ceteris paribus less conducive to good health in children. Young women lack experience and tend to be less psychologically mature and emotionally stable, leading to poorer maternal and child health care and infant feeding behaviors (Senderowitz (1995)). In most situations in SSA, however, family ties and especially the extensive assistance of older female relatives in child care may limit the impact of these factors.

Adolescent mothers have higher health risks and lower health outcomes. Teen pregnancies and deliveries often involve complications and, consequently, much greater risk of maternal mortality and morbidity, as compared to pregnancies of women in their twenties (WHO (2000), Ransom and Yinger (2002)). Pregnancy-related deaths are the leading cause of mortality for 15-19 year-old girls worldwide. Mothers in this age group face a 20 to 200% greater chance of dying in pregnancy than women aged 20 to 24. Those under age 15 are five times as likely to die as women in their twenties (WHO (2000)). In Zaria, Nigeria, maternal mortality among women younger than 16 is six times higher than for women aged 20-24, and similar findings have been reported from Cameroon and Ethiopia (Zabin and Kiragu (1998)). However, it is also possible that some of these outcomes may be due to unobserved factors related to both health and teen pregnancy: part of this heavy toll has more to do with poor socio-economic status and lack of prenatal and obstetric care than physical maturity alone (WHO (1989)).

Teenage childbearing is strongly associated with higher levels of completed fertility, closer spacing of births and higher proportions of unintended births. One of the factors that determine the level of fertility in a population is the age at first birth. Women who start their reproductive life early are typically exposed to the risk of pregnancy for a longer period, especially when there

is little or no contraceptive use. Although the differences in levels of completed fertility between early and later childbearing is declining, women who have their first child as teenagers still tend to have larger families, by about one child on average (see CBASSE (1987) for a review of the evidence).

In part because of their educational deficit and larger family size, adolescent mothers are less likely to find stable and remunerative employment than their peers who delay childbearing. The primary impact of teenage childbearing on wages is likely to operate through the two sources of human capital formation, though perhaps in opposite ways. Education is likely to be curtailed by pregnancy, especially if it occurs in high school. However, girls who have to support their child may enter the job market sooner and reach a higher level of experience before their counterparts. Four studies carried out in the Barbados, Chile, Guatemala and Mexico in the 1990s show that poor adolescent mothers seem to work more and earn less than other mothers (Buvinic (1998)). The most careful attempts to isolate a causal effect have found at most modest positive effects of delaying childbirth and in some cases find negative effects. Geronimus and Korenman (1992) compare outcomes for sisters and find little difference in outcomes between the sister who gave birth as a teenager and the sister who did not. Ribar (1992) uses age at menarche as an exogenous source of variation in age at first birth and finds no causal link between teenage childbearing and high school completion. Grogger and Bronars (1993) compare teenagers who gave birth to twins to those who gave birth to a single child and conclude to a negative impact of the extra child. Hotz et al. (2004), Ashcraft and Lang (2006) use miscarriage as an instrument for birth among girls who become pregnant as teens. They find that delaying childbearing reduces the probability that girls complete high school and adversely affects a number of other adult outcomes.

Early childbearing is associated with changes in family size (larger families) and family arrangements (fewer traditional nuclear families), and with the transmission of childbearing preferences across generations (Buvinic (1998)). Evidence from Latin American countries supports the idea that early childbearing is associated with higher total fertility and perpetuation of large families, curbing the process of demographic transition in rural areas. Becoming a parent as a teenager not only leads to lower social and economic attainment for the mother and her child, but it also has some repercussions on the society.

2.2. Links between Education and Fertility

Education and early fertility are known to be negatively correlated. On the one hand, early fertility often leads to termination of schooling because of time incompatibility, others' look of disapproval, law discriminating pregnant students. On the other hand, education can affect women's early fertility decisions through access to knowledge, information and new ideas. It enhances overall efficiency, market opportunities and social status. It also changes attitudes and behavior, bringing about openness to new ideas and experiences, an increasing independence from traditional authority, and a questioning of passivity.

A number of studies concur that many young women drop out of school as a result of pregnancy (see Gyepi-Garbrah (1985) for evidence on Sub-Saharan Africa). In Kenya, a study conducted in 1985 estimated that about 10 percent of female students dropped out of secondary school because they were pregnant (Division of Family Health/GTZ Support Unit (1988)). Some countries have relatively accommodating policies concerning the readmission of young women who have been pregnant or given birth. In Kenya, schoolgirls who become pregnant are required to discontinue their studies for at least a year (Ferguson et al. (1988)). Policies in many countries are much stricter: they decree that pregnant schoolgirls be expelled permanently (available

evidence on policies related to schoolgirl pregnancy in eight sub-Saharan countries including Botswana, Kenya, Liberia, Mali, Nigeria, Tanzania, Togo, Zambia). All eight favor some form of expulsion, in many cases without provision for reentry after giving birth. Whereas strict policies limit educational achievements, informal social pressures may be equally effective. As a young woman in Sierra Leone related, people often taunt an adolescent mother who tries to return to school, and use her past to shame her: "Others will taunt [you], saying *koi-ma*", literally "stomach-on".

Education and childbearing are usually time-incompatible: women wishing to stay longer in school have to delay their decision to have kids, women who have kids early must drop out of school. When enrolled in school, it is not desirable, nor is it feasible for students to have children as it is disruptive and generally young people lack the financial resources and the prospect of a stable income that would be ideal for marriage and forming a family. In SSA countries, time incompatibility is double by a legal incompatibility: girls who become pregnant or marry are asked to leave school as a matter of policy. Such policies create the potential for a direct link between age at leaving school and age at entry into marriage and childbearing.

Education improves women's knowledge about/use of contraception and family planning. Many studies (Ainsworth et al. (1998)) show that educated women are more likely to use contraceptive methods than low-educated counterparts. More educated women have been more exposed to contraception and are more familiarized with their role in fertility regulation. Their increased use of contraceptive is also indirectly affected by education: even if schooling does not always produce literacy, time in a classroom may improve literacy skills, giving women the ability to understand decontextualized language, which in turn alters behavior (Levine (1994)). Such language is used in health and family planning messages broadcast over the radio; it is also the means of discourse in clinics and pharmacies.

Education increases women's autonomy. Several recent studies hypothesize that education delays marriage and childbirth by enhancing the autonomy of women (Jejeebhoy (1995)), giving them more influence in marriage decisions and, through employment prior to marriage, greater control over resources. The literature suggests five separate but interdependent elements of autonomy that are influenced by education and are especially important for fertility decisions: knowledge autonomy, decision-making autonomy, physical autonomy and interaction with the outside world, emotional autonomy and economic and social autonomy and self-reliance. However, using the same logic, these gains in autonomy should also give girls a greater say with their parents in prolonging their schooling, thus increasing their exposure to those aspects of schooling that affect these demographic processes.

2.3. Endogeneity between Education and Fertility

Most papers mentioned above cannot infer causality from education to fertility behavior. Few of them determine whether early pregnancy curtails a woman's formal educational experience or whether her education has been terminated prior to childbearing. Most of them also fail to take into account the unobservable common factors that can determine early fertility behavior and educational choices.

2.3.1 Instrumenting schooling decision

When exploring the impact of education on early fertility, few recent papers have dealt with the reverse causality between education and early fertility by looking at quasi-experiment settings. Most of them used arbitrary changes in school laws (length of compulsory schooling, compulsory

age at entry or exit). Empirical evidence has mainly focused on US data, since the United States census is very detailed and has been available for several decades. Leon (2004) accounts for the endogeneity of schooling by instrumenting it with the changes in state compulsory laws as a source of exogenous variation. He concludes that 3 years of additional schooling result in one less child per woman. McCrary and Royer (2006) show that female education entails small and possibly heterogeneous improvements of women's fertility and infant health, using school entry policies as an instrument for education. They exploit the fact that in Texas and California, the year at which a child starts school is dependent on his exact day of birth: children aged five on December 1st (California) or September 1st (Texas) can start their first year of kindergarten while the others will have to delay their entrance by one more year. This sharp discontinuity allows the authors to compare the outcomes of children born just before the cutoff date and just after, children who will have different level of education throughout school enrollment. Over the sample of teenagers affected by the change in rule, education does not seem to have a significant impact on fertility. Moreover, age at first birth seems to be the same before and after in the Californian sample, a little higher for women born after September 1st in Texas (22.5 versus 22.6).

2.3.2 Unobservable common factors

The socioeconomic and cultural environment of a woman's childhood place of residence is expected to influence her general health and well-being, and contributes to the formation of beliefs, aspiration and practices that will be important during teenage and adult years (Caldwell and Caldwell (1987)). Mahy and Gupta (2002) investigate the trends and differentials in reproductive behavior among adolescents in Sub-Saharan Africa, drawing on data from successive DHS. The authors conclude that there was a slight decline in the probability of teenage childbearing, the age at first union and first child. The findings suggest that (female) adolescent sociodemographic characteristics, such as education, place of residence, exposure to mass media, had greater influence on early reproductive outcomes while the contextual variables had weaker influence. Secondary schooling had among the strongest and most consistent negative effect.

In the case of Kenya, cultural norms are strongly linked to one's belonging to an ethnic group, of which Kenya counts 7 major (covering 85% of the population): Embu, Kalenjin, Kamba, Kisii, Kiyuku, Luo and Luhya. Previous studies on fertility have revealed that desired family size is smaller among the Kamba, Kikuyu, Luhya compared to Luo, who use contraception to a lesser extent than other groups (Fapohunda and Poukouta (1997)). In terms of educational achievement, the Kikuyu are the best educated, followed by Kamba, both of which had early access to colonial education (Fapohunda and Poukouta (1997)). The smaller ethnic groups[5] but Taita/Tavate show much lower levels of education (see Table 1).

2.3.3 Through which channel does education affect early fertility?

W***hile it is clear that schools play an active role in the education and socialization, little progress has been made to date in identifying what aspects of education are transforming in ways that ultimately matter for the timing of marriage and childbearing***. One exception is the paper from Black et al. (2004). The paper looks at the consequences on fertility reduction of policies that increase educational attainment. From 1924 to 1974, compulsory schooling requirements in the United States varied by state: 20 of them changed at different times the minimum dropout age which varied from 14 to 18. In Norway, an educational reform was passed in 1959 to raise the minimum dropout age from 14 to 16 years. Municipalities were free to choose when they wanted to implement the new system but had to complete it by 1973. Using the

[5] "others", i.e. Masai, Meru, Mijikenda/Swahili, Somali, Turkana, Kuria.

variation in educational laws, the authors conclude that keeping girls in school until age 16 reduced the probability of having a child before 20 by 4.7% in the United States and 3.5% in Norway5[6]. Moreover, the authors conclude that the effect of education goes beyond a mere incarceration effect, suggesting that human capital accumulation due to extended education may impact teenage fertility choices: if the effects of the compulsory schooling laws occur solely due to the incarceration effect, then the laws should have no impact on behavior at ages above which the laws induce schooling. The authors estimate Probit models of the probability of having a first birth at age x, x in [15, 20], conditional on having no birth prior to that. Since the laws impact the probability of first birth at ages above which they bind, there is strong evidence that the incarceration effect is not the only effect.

The present study continues in the same vein as the above-mentioned papers, yet is different for two main reasons. First, we use data from a developing country: Kenya, where almost half of the population is below the age of 15, where teenage fertility rates (96‰) are known to be twice those of the United States (50‰), and almost ten times those of Norway (10‰)[7], and where the proportion of girls who become mothers before age 19 reaches 39.4% in 2003. The question of teenage fertility is there of very real consequences on demographic changes and the accumulation of human capital. Second, our data is extremely recent (the youngest cohorts that we take into account were born in 1980). This contrasts with Black et al. (2004) who use cohorts from 1910-1960 in the United States and 1947-1958 in Norway and Leon (2004) who uses cohorts from 1900-1950.

3. Data

3.1 The Kenyan Demographic and Health Surveys

All data used in this study come from the different rounds of Kenyan Demographic and Health Surveys (DHS). DHS are nationally representative household surveys with large sample sizes (usually between 5,000 and 30,000 households). DHS questionnaires provide data for a wide range of monitoring and impact evaluation indicators in the areas of population, health, and nutrition. To date, there exist 4 Kenyan DHS implemented in 1989, 1993, 1998 and 2003. The Kenyan DHS adopted a two-stage stratified sampling approach that selected households located within each primary sampling unit (PSU) or sampling clusters. The locations of the clusters geographically are identifiable within the district and province. In addition to geographical stratification of data by cluster and household, it is also possible to stratify these data by ethnicity. The fertility data were collected by asking all women of reproductive age (15-49 years) to provide complete birth histories of all children they had given birth to. Education information is collected simultaneously, and reports the number of years of education of each woman, the highest educational level attended, and completed.

We use data from all rounds of the Kenyan DHS, yielding information on 18,777 women aged 20-49 when the interview took place. For our specific analysis, we use 4 rounds of data, including only women who are at least 20 years old when the interview took place (to have complete teenage fertility history), and were born after 1955 and before 1980[8]. Because we use different rounds, and because women had different recall time, we included controls for both in

[6] The average proportion of girls in both samples who had their first pregnancy before the age of 20 is 17% in both samples (US and Norway).
[7] Sources: all statistics come from HNPStats (2006).
[8] Older (born before 1955) and younger (born after 1980) cohorts had too few observations and where thus removed from the analysis.

all of our regressions[9]. Family planning in Kenya underwent a few clear changes since the 1950s (see Table 3 and Figure 3). While the proportion of women who married before 19 or had their first child before 20 decreased substantially (respectively 64 to 46% and 72 to 58%), the proportion of girls who had their first sexual intercourse before 19 rose steadily. The large fall in teenage pregnancy rates is confirmed by the steady decline in the total number of children a women had by age 25: while the earlier cohorts had on average 3 children, the latest ones had 1.5. This drastic reduction (one half) reflects women's desire for less children: women born in the late 1950s wanted 12 children, women born in the late 1970s want less than 7. As expected, Kenyan women's education improved greatly over the second half of the twentieth century. The proportion of women with no education was divided by 4, most of whom started primary school without finishing. The proportion of primary school graduates increased from 31 to 39%, that of secondary graduates more than doubled (7 to 17%), while the proportion of women going to university went twofold from 3 to 7%. All other characteristics at the national level do not show any evolution between the 1964-1968 and 1969-1973 cohorts: neither the place of birth, nor the religious views or the ethnicity show any statistically significant difference. However, one should notice a shift of the population towards urban areas, as well as some shifts in the ethnic composition of women.

Ethnic boundaries in Kenya, to a very large extent, are codeterminous with political and administrative boundaries (Fapohunda and Poukouta (1997)). Since DHS questionnaires do not record the province of childhood, ethnic groups can serve as good proxies for regions: the Kalenjin reside in the Rift Valley, the Kikuyu in the Central region (but have also migrated to Nairobi and the Rift Valley). The Embu/Meru live in the North and East. The Luhya live in the Western province (but have also migrated to Nairobi or Mombasa). The Luo and Kisii live in Nyanza. The Kamba live in the East and close to Nairobi. In addition, each woman's childhood place of residence is recorded as: city, town, countryside or abroad. As people living in urban areas are exposed to a more diverse lifestyle and subject to weaker social control, we expect women who grew up in cities and towns to have lower levels of teenage pregnancy. On the other hand, rural areas are expected to have institutional and normative structures as the kinship and extended family that promote early marriage and childbearing.

3.2 Schooling System in Kenya

Shortly after independence from Britain, in 1964, the Ominde Commission was set up, and Kenya adopted its first educational system. The Ominde Commission, whose focus was on secondary education, saw schooling as a productive investment, not only at the individual level, but also for the society as a whole. Under self-government[10], different changes were made to the educational system inherited from the United Kingdom. The structure was changed and the 7-4-2-3-systen was adopted: 7 years of primary school, 4 years of lower secondary, 2 years of upper secondary and three years of university (see Figure 4). The most significant change was the abolition of school fees in 1971, up to the 4th year of primary school in the arid and semi-arid land (ASALs). In 1973, the decree was extended to most of the country up to the 6th year of primary school.

In 1985, Kenya increased the length of primary schooling by one year, thus postponing primary and secondary school degrees. In 1981, the Presidential Working Party on the Second

[9] Recall is calculated as the number of years between a woman's interview and the year she gave birth to her first child. Survey years (KDHS-89, KDHS-93, KDHS-98 and KDHS-03) are controlled for with survey fixed-effects.
[10] I.e. after Independence.

University was commissioned to look among other issues at the possibilities of reforming the entire education system. The committee recommended that the 7-4-2-3-system be changed to an 8-4-4-system (8 years of primary school, 4 years of secondary and 4 years of university)[11]. That new system was launched in January 1985. The switch affected those who were already in the 7th year as they had to stay one more year in primary school. As a result, the secondary schools had one class less for a whole year. Four years later, the universities had to contend with double intake of freshers (the 8-4-4 group and the last group from the old system)[12].

Students subject to the reform were exogenously constrained to stay one more year in primary school if they wanted to get their Kenya Certificate of Primary Education (KCPE). On average, students would graduate from primary school at age 14 instead of previously 13, and they would get their East-African School Certificate at the end of secondary school at age 18 instead of 17. Some children may have entered school later than at age 6, they may have dropped out and re-entered primary school thus graduating older. However, our dataset only reports information on the number of years spent in school and we'll assume that these correspond to continuous schooling since age 6. This means that the first cohort to be subject to the change in law was born in 1971. In the 1980s, 60% of Kenyan girls had completed at least the KCPE, so the Reform affected a large number of teenagers.

The sharp discontinuity in the number of years spent in school will be the core of our identification strategy. The left panel of Figure 5 shows the discontinuity in the number of years spent in school to complete primary (blue) and secondary schooling (green). We see clearly that, starting in 1971, students were compelled to stay one more year in primary school to get their end-of-curriculum degree. However, the discontinuity in the number of years spent in secondary school seems to occur before 1971, suggesting that older students may have delayed entry into secondary school and thus be subject to the reform even if they were born before 1971. One could argue that, due to the educational change, fewer students completed primary and secondary schooling, if they really had planned on leaving school after 7 or 11 years. The right panel of Figure 5 shows on the contrary that completion rates did not decrease in the years following the reform: enrollment rates underwent a steady rise in the number of students completing primary and secondary school.

Figure 6 shows a scatter plot of the proportion of girls who were pregnant with their first child by age 20. While teenage pregnancy and union rates decreased over 1955-1980 at a rather steady rate (left panel), teenage pregnancies of girls having at least completed secondary school went down from an average of 65% to 25%, most of the drop occurring for birth cohorts in the late 1960s. The discontinuity suggests a drop of about 20 percentage points. Those preliminary results are confirmed by Table 2: teenage fertility decreased dramatically in Kenya over the past decades. While only 27% of the 1956-60 cohort had not given birth by age 20, the figures jumped to 59% for the last cohort (1976-80). If we look at the two threshold cohorts around the threshold (1966-70 and 1971-75) in Table 2: fertility at age 19 bears the highest difference (4 percentage points), suggesting that this group reduces most its fertility between the two cohorts.

One should however be worried by self-selection into schooling levels if teenagers who decide to complete primary (or secondary) school are different before and after the reform. While we cannot check the potential differences in unobservable characteristics, a simple comparison before and after of students' observable characteristics (Table 4) shows no significant difference in the selection process.

[11] See Figure 4.
[12] Kenya Ministry of Education.

4. Econometric Strategy

4.1 Instrumental Variable

The goal of this present study is to uncover the impact of staying one more year in school on the probability of getting pregnant as a teenager (15-19). As noted earlier, it is difficult to establish causality between education and early fertility because of the endogeneity of the two variables. Education may be a proxy for unobservable variables, such as parental background, personal motivation, personal skills and ability, peer effects, local women's empowerment, which in turn may be decisive factors of fertility decisions. To avoid the endogeneity issue, we choose to use an Instrumental Variable technique (from now on I.V.). This approach relies on the assumption that the probability of having to stay one more year in school is correlated with experimenting the 8-4-4 curriculum ($reform_i$), while the latter only has an impact on fertility through education (exclusion restriction). Let:

$reform_i$ = 1 if *i* is born after 1971,
0 otherwise.

Then $reform_i$ should be positively correlated with the total number of years of education ($education_i$)[13]. The reform dummy is strictly exogenous: the 8-4-4 system was implemented in January 1985 on all children at most in 7th year of primary school (no cheating could happen around the threshold) and did not add health and reproductive classes to the old teaching load.
The revised program consisted of general subjects and technical disciplines (such as crafts and domestic science), laid emphasis on prevocational training at any level that could be used by young people as soon as they leave the education system. The general objectives of the new system were to teach people techniques, knowledge and skills that would be useful for economic growth (Rharade (1997)). Hence, the curriculum change only had an impact on fertility decisions through its effect on school length, allowing us to use $reform_i$ as an instrument for $education_i$. As noted before, some children may have entered school later than at age 6, they may have dropped out and re-entered primary school thus graduating older. However, our dataset only reports information on the number of years spent in school and we'll assume that these correspond to continuous schooling since age 6 and that the first cohort to be subject to the change in law was born in 1971. Since some children born before may be also affected by the reform, our estimates will be biased downwards and will thus be a conservative estimate of the impact of years of education on early fertility.

4.2 Probability of Teenage Childbearing

The main empirical specification becomes:

$$Pr(TB_i = 1) = \beta_0 + \beta_1\ education_i + \beta_2 X_i + \beta_3\ G_i + \varepsilon_i \text{ (Second stage) (1)}$$
$$education_i = \pi_0 + \pi_1\ reform_i + \pi_2 X_i + \pi_3\ G_i + \upsilon_i \text{ (First stage)}$$

where $Pr(TB_i = 1)$ is the probability of having one's first birth as a teenager (i.e. before age 20). X_i is a vector of individual-specific characteristics: ethnicity, religion, year of birth. G_i is a vector of geographic characteristics: place of birth (capital, city, town, rural area or abroad). We are bound to include very few control variables, because we have little information a posteriori on

[13] See the results of the first-stage in Table 5.

individual and community characteristics of a woman when she was a teenager. This is why X_i and G_i only include women time-invariant characteristics.

4.3 Findings

Table 5 shows the results of equation (1) for different subsamples (whole population, at least primary completed, at least secondary completed[14]).

The first important result to take from that table is that the reform has a robust positive impact on the number of years spent in school for girls completing at least primary school: the first-stage of the I.V. model is always highly significant and positive (0.3 for teenagers with at least a completed primary level of education and 0.6 for those with at least a completed secondary level of education). Looking at the O.L.S. estimates, we see (columns 1, 4 and 7) that education is negatively correlated with the probability of giving birth before age 19, confirming the results from the literature review.

Turning to I.V. models, the impact of education on early fertility is not significant if we take the whole sample (columns 2 and 3): this may be explained by the number of women who did not complete at least the KCPE (6,759 observations) and who were not affected by the curriculum change. However, the results become negative and significant if we focus on the sub-sample of teenagers with at least the KCPE (columns 5 and 6) for whom one more year of schooling entails a reduction of 18.8 percentage points in the probability of teenage childbearing (column 6). This figure remains very similar if we shrink the sample to the population of teenagers having completed secondary school (19.3pp). Since girls with at least a primary (secondary) school degree had a 64.6% (62.2%) probability of teenage childbearing before the Reform implementation, one more year of school led to an average reduction of 29.1% (31%). These results are considerably higher than those obtained by Black et al. (2004), who find that an increase in one more year of education entails a 5% reduction of teenage fertility in Norway and the US.

Ethnic affiliation seems to play an important role (this result will be confirmed in all subsequent specifications). One of the drawbacks of DHS data is that it does not contain information on income or consumption. K-DHS-03 does have a wealth index, but as it refers to present wealth, it does not give information about wealth status of women when they were teenagers. Since we do not have either information on a woman's siblings, we cannot have household fixed effects. However, we can argue that ethnic affiliation gives information about the degree of economic development of the place of residence when a teenager. Among ethnic tribes, the probability of having a first birth as a teenager is the following: (i) Masai are the less likely, then come (ii) Kamba and Kikuyu, (iii) Embu and Kalenjin, (iv) Luo and Kisii and finally (v) Luhya[15]. Kamba and Kikuyu leave in the Central region or Nairobi, which are from the least poor areas (headcount ratios of less than 40%[16]) Embu and Kalenjin are from the Rift Valley, where poverty rates average 47%. Luo and Kisii live in Nyanza, a province that has poverty rates ranging from 60 to 70%. Luhya reside in the Western province known to be a poverty hotspot: districts are uniformly desperately poor and no location has a poverty rate below 63%. Women originating from less poor regions have lower probabilities of early pregnancies. However, being born and raised in the countryside or in an urban area does not seem to play a significant role in explaining early

[14] The last group is a subset of the second which is a subset of the first.
[15] The reference group is the Somali ethnic group.
[16] All poverty rates are taken from Ndeng'e et al. (2003)'s estimations from the 1999 Kenya Census.

fertility. Only foreign raised women ("abroad") have lower chances of having their first birth while teenagers.

4.4 Robustness Checks

Alternative weighting scheme **-** When using all four rounds of the Kenyan DHS, we have observations from 4 rounds[17] from 1954 to 1969, observations from 3 rounds[18] for 1970 to 1973, observations from 2 rounds[19] for 1974 to 1978 and observations from the 2003 DHS for years 1979 and 1980. As a result, we are giving more weight to the oldest cohorts. If there is no difference in the effect of compulsory schooling laws on teenage childbearing over time, the results should be the same whether we weight each cohort equally or not. This, however, is testable. In Table 6, we present the results when we weight each cohort equally (thereby weighting each observation by the inverse of the weighted number of individuals in that cohort in our sample). While the results are consistent with those in Table 5, it does seem that, when less weight is placed on the earlier periods, the Reform is slightly more effective (all point estimates are slightly higher but not significantly different).

Cohorts around the threshold **-** So far, we used all cohorts from 1955 to 1980 in our regressions. However, we also saw in Figure 5 that some students already spent more time in school prior to the official implementation of the Reform. We explained this as the effect of grade repetition (girls born before 1971 who repeated a grade were subject to the Reform), later school start or pause between primary and secondary school. To avoid the problematic cohorts (1968 to 1971), we isolated the cohorts from 1955 to 1968 and 1971 to 1980 as comparison and treatment groups. Table 7 shows the results of equation (1) in that setting: girls who completed at least primary school are 12.9 percentage points less likely to become pregnant when they have one more year of education. Girls who have completed at least secondary school are 17.2 percentage points less likely to become pregnant. These are to compare with 18.8 and 19.3 percentage points. Although we would expect the new point estimates to be higher, those we obtained are not statistically significantly different from the point estimates of Table 5.

In all regressions, we included polynomial time-trends to control for the decrease over time of fertility and the increase in age at first birth. However, the youngest and oldest cohorts may not be relevant for the analysis: as we use a RDD, we hope to identify the effect of education around the threshold, i.e. on cohorts born close to 1971. Table 8 shows the same specification (equation (1)) for cohorts born between (1965-1968) and (1971-1974). Isolating cohorts around the Reform threshold, we get a first-stage point estimate of the impact of the Reform on education that is close to 1 for girls with at least a primary education degree (1.2). It magnitude (slightly higher than one) can be explained by the increase in years spent at school of almost 2 years of the population with at least a secondary degree: since the 1985 Reform was hastily put into place, universities had too little time to adapt to the increased number of incoming students, which may reflect why some repeated one year. The results of the second-stage are still positive and highly significant: girls who completed at least primary (respectively secondary) school are 6.6 (10) percentage points less likely to become pregnant when they have one more year of education. The smaller magnitude of the coefficients can be explained by the choice of a smaller window of observations and may indicate that the original specification does not capture well enough time-trends.

[17] KDHS-89, KDHS-93, KDHS-98 and KDHS-03.
[18] KDHS-93, KDHS-98 and KDHS-03.
[19] KDHS-98 and KDHS-03.

Fake thresholds **-** The Kenyan educational reform could also be an irrelevant instrument, capturing some unobservable factors correlated with time (although we include time polynomials in all specifications). To test if that is the case, we arbitrarily set two fake reform years: one before the reform in 1963 and one after the reform in 1975. Table 9 displays the estimation results of equation (1). While we see a strong negative correlation between education and early fertility in the O.L.S. specifications (columns 1 and 4)), columns 2 and 3 show that on the cohorts born between 1955 and 1968, an arbitrary reform affecting cohorts born after 1963 shows no effect of education on early fertility (for girls with at least a primary education degree). Neither does the fake reform affecting cohorts born after 1975 on the sample of girls born between 1971 and 1980 (columns 5 and 6).

Difference-in-differences check **-** Alternatively, we could use a difference-in-differences (DiD) design to measure the impact of staying one more year in school. We assumed that girls who have less than a primary school degree were not affected by the change of curriculum. Their fertility decision should therefore not change because of the 1985 decree. In a DiD framework, we could compare fertility decisions of the two groups: less than primary and at least primary complete, before and after the educational change, that is:

$$Pr(TB_i = 1) = \beta_0 + \beta_1\ educ_i + \beta_2\ post_i + \beta_3\ educ_i * post_i + \beta_4 X_i + \beta_5\ G_i + \varepsilon_i \quad (2)$$

where *post* is a dummy variable indicating whether schoolgirls had to stay 7 (and 13) years in school, or 8 (and 14). β_3 is the coefficient of interest. Table 10 shows the results of the DiD, on the whole sample, women born before 1968 or after 1971, and women born in (1965-1968) or (1971-1974). The Reform decreases by about 10 percentage points the probability of becoming a teen mother. These results are close to the I.V. specifications using a restricted sample of women born between (1965-1968) or (1971-1974), suggesting once more that the time effect is not sufficiently well captured by the polynomial specification in the earliest specification.

4.5 Age at First Birth

We now switch to the analysis of the impact of years of education on age at first birth. The dependent variable *t* is the number of years elapsed between average age at menarche in Kenya[20] and age at first pregnancy. *t* can be interpreted as a survival time from a childless state to a motherhood state, as soon as women become fertile. Throughout this interval, women may either enter into their first pregnancy or be right-censored at the time of the survey. In this case, women who never had a child until the time of the survey constitute censored cases.

We use a continuous right-censored Cox Proportional Hazard (Cox PH) model. Fully parametric models for single-spell duration data are relatively simple to estimate in the presence of censoring, but produce inconsistent parameter estimates if any part of the parametric model is mis-specified. The use of the Cox PH model allows us not to specify the hazard function, the relationship between the hazard rate and the duration risk of exposure.

$$\lambda(t|education,X,G,\beta) = \lambda_0 \exp(\beta_1\ education_i + \beta_2 X_i + \beta_3 G_i) \quad \text{(Second stage) (3)}$$
$$education_i = \pi_0 + \pi_1\ reform_i + \pi_2 X_i + \pi_3 G_i + \upsilon_i \quad \text{(First stage)}$$

where $\lambda(t|education,X,G,\beta)$ denotes the resultant hazard, given the values of the covariates *X* that we included in the former specifications (education, childhood place of residence, ethnicity, religion).

[20] 13 years old (WHO).

A plot of the Cox PH survival rates at different ages for all women and the 3 educational groups (less than primary, KCPE or some secondary, at least secondary complete) is given by Figure 7. All women incur a reduction in the probability of becoming a mother at all ages after the Reform is implemented. The Reform has no effect on women who drop out before the KCPE, little impact on women with the KCPE or some secondary education, but a large impact on women with at least a complete secondary education: the reduction in the "survival" rate reaches 35 percentage points (a reduction of almost one half) between the age of 19 and 21.

The results of equation (3) are presented in Table 11. Not surprisingly, the models with no instrumentation show larger reducing effects of education on survival rates (columns 1, 3, 5). In the I.V. regressions, when education increases by one year, the rate of switching to motherhood decreases by 7.3% on average for women with at least the KCPE, and 5.6% for women with at least a secondary degree.

5. Conclusion

"The increase in the education of women and girls contributes to greater empowerment of the women, to a postponement of the age of marriage, and to a reduction in the size of families."[21]

This study confirms that education has a strong influence on early reproductive outcomes, and that legislation aimed at improving educational outcomes may have spillover effects onto the fertility decisions of teenagers. This is of fundamental interest to actors of health, social and economic development: early childbearing is known to have a number of potentially adverse effects, including higher mother and child morbidity and mortality, truncated educational opportunities, and lower family income. As the timing of the first birth is often an indicator of future fertility patterns, reduced teenage fertility may also help reduce long-term fertility, a goal for most developing countries with high fertility rates.

Adolescent fertility in Kenya occupies a prime place in the design and implementation of reproductive health strategies, policies and programs. In an attempt to reduce fertility of this special group, the government, through the Ministry of Health and the National Council for Population and Development, has recently put in place an Adolescent Reproductive Health Policy to help meet the needs of this group. Our paper shows that higher levels of education decrease by at least 10 percentage points the probability of giving birth when still a teenager (taking the most conservative results). Knowing that the probability of having one's first child before age 20 when having at least completed primary education is about 65%, this entails a reduction of about 15% of teenage fertility rates (for those having at least completed the KCPE). One additional year of school curbs the probability of becoming a mother each year by respectively 7.3 and 5.6% for women with at least a primary and at least a secondary degree.

Due to the nature of the Kenyan 1985 Reform, it is however difficult to disentangle channels through which education reduced early fertility. We put forward three channels through which education could have an impact on fertility: time incompatibility, knowledge effect and increased autonomy. When we chose the 1985 Reform as an instrument, we ruled out the "knowledge" channel: women subject to the Reform did not benefit from increased contraception and fertility education. To carefully test the time incompatibility hypothesis we would have needed the age at which women left school, which we did not have. Increasing the number of years spent in school increased women's autonomy and power of decision: if such a process happened, women should

[21] United Nations, 1994.

also have been able to postpone marriage. Table 12 shows that the reform had an impact on marriage decision of women with at least KCPE (or secondary degree): an additional year of education reduces the probability of marriage before the age of 19 by 6.7 (or 19.3) percentage points.

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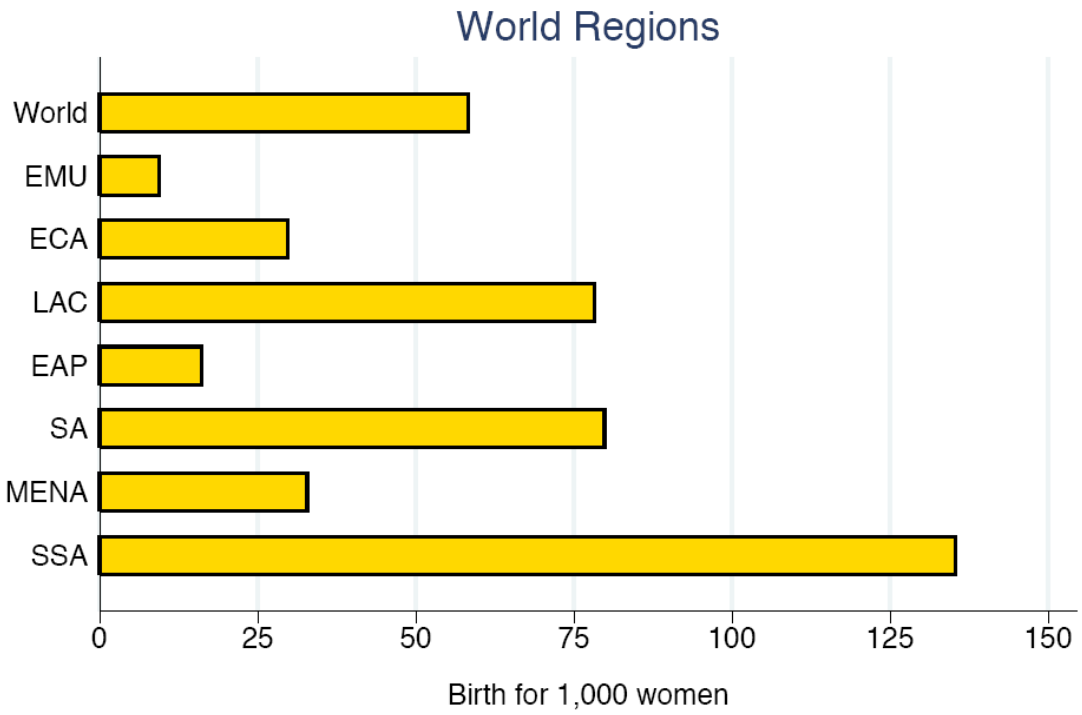
7. Appendix

7.1. Figures

Figure 1: Teenage (15–19) fertility rates by world regions – 2004



Source: HNPStats, 2006.

Figure 2: Percentage of teenagers who have begun childbearing

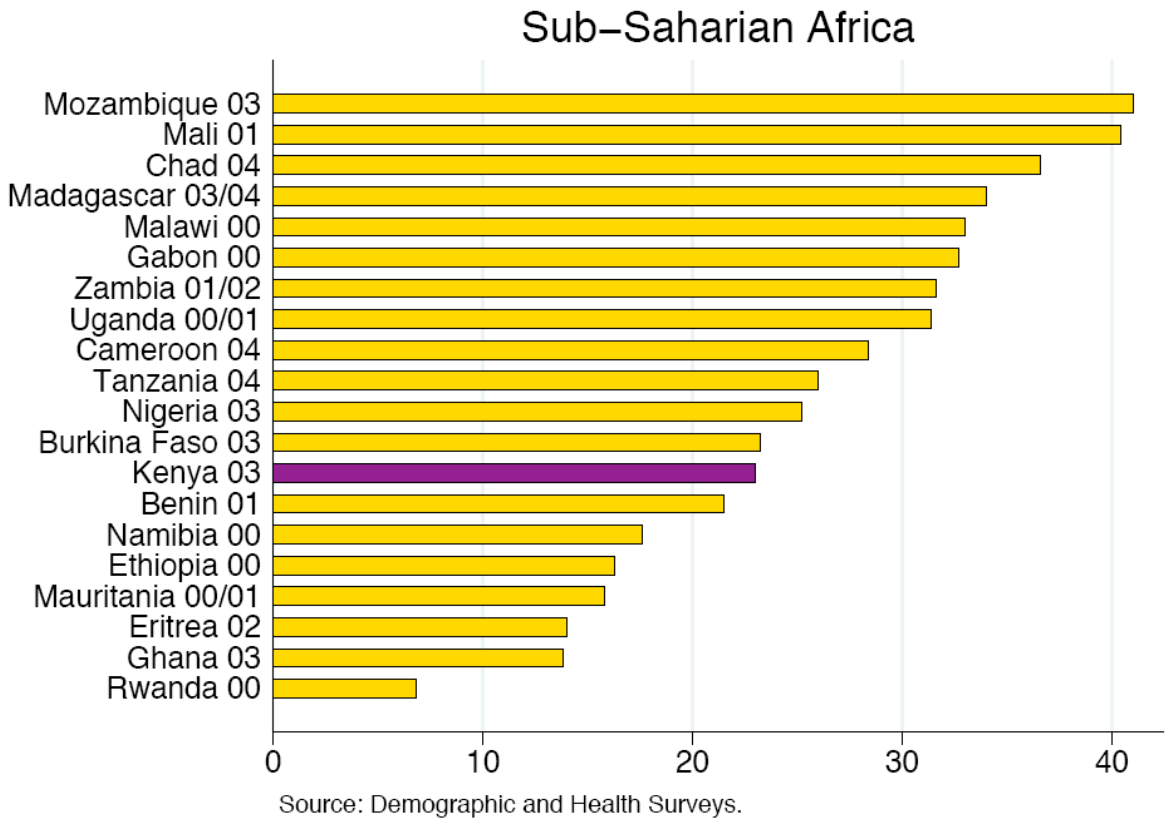


Figure 3: Evolution of fertility and schooling in Kenya

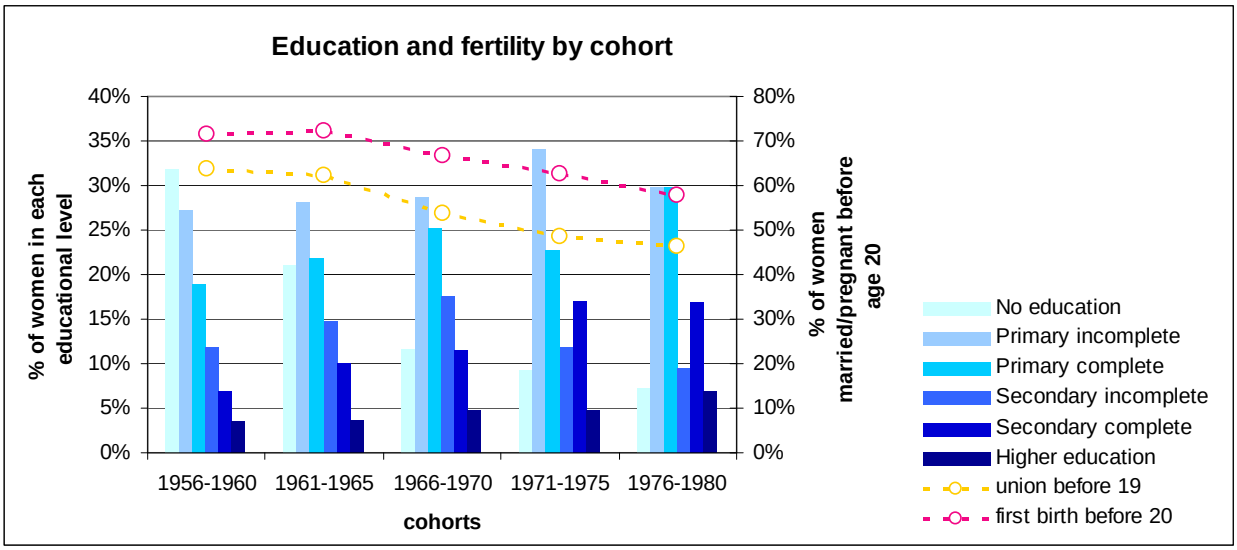


Figure 4: Schooling system in Kenya before and after the Reform

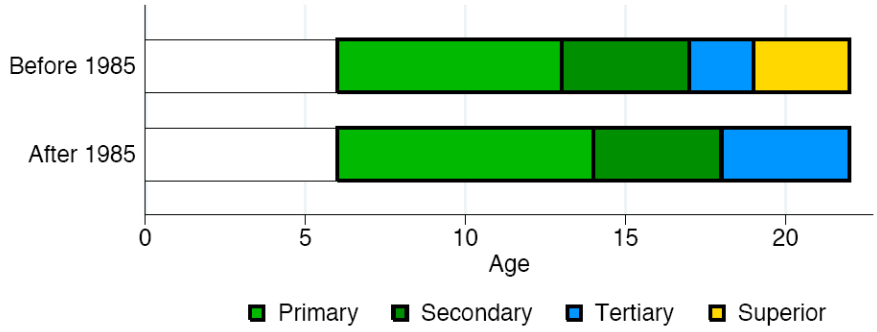
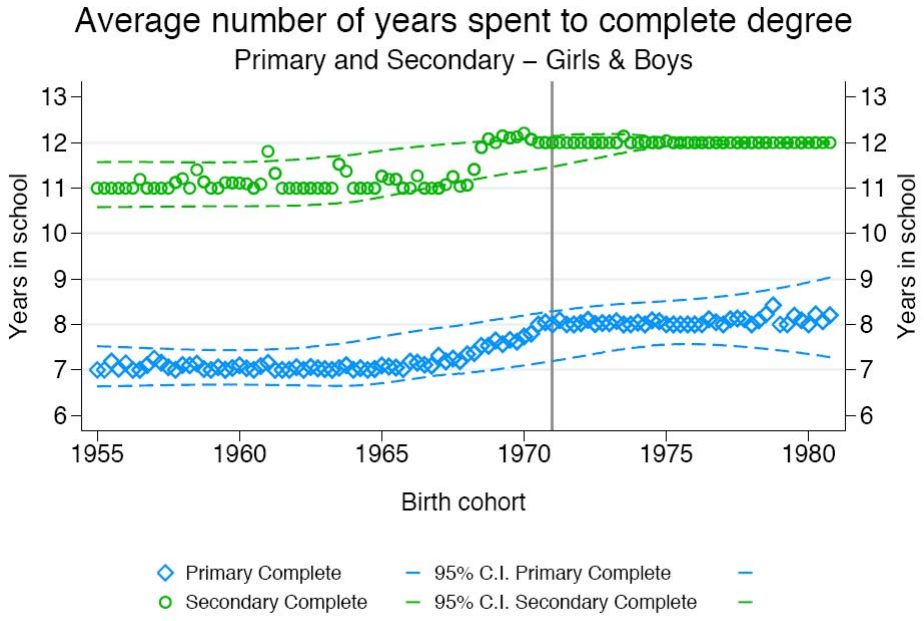
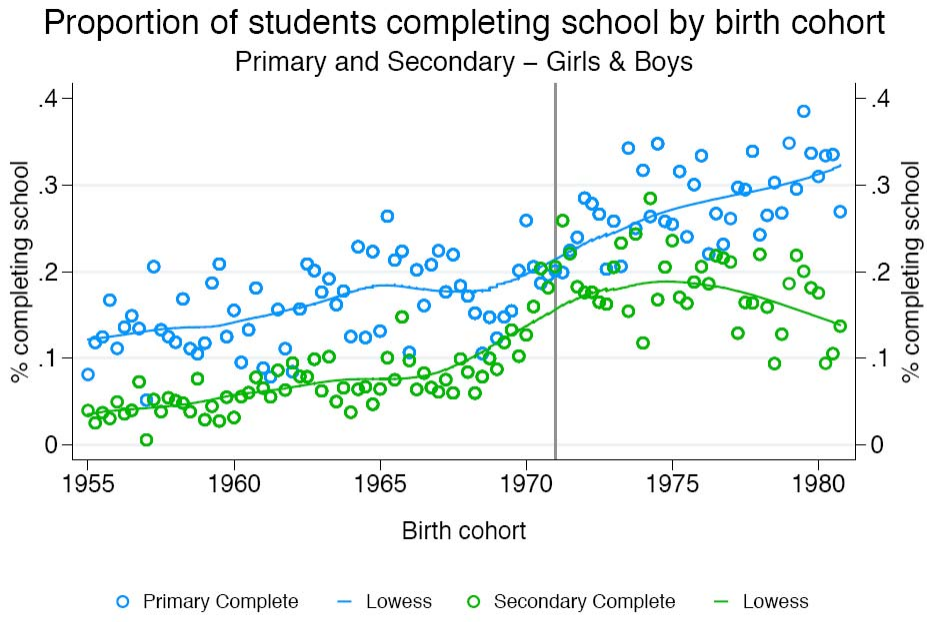


Figure 5: School curriculum discontinuity and completion continuity

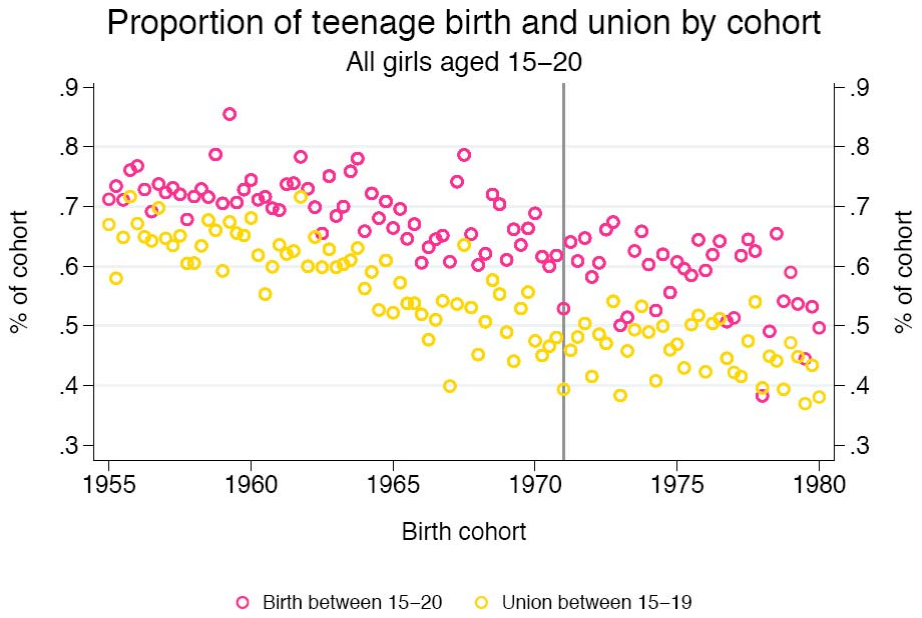


Note: the vertical line represents the first cohort subject to the 1985 reform.

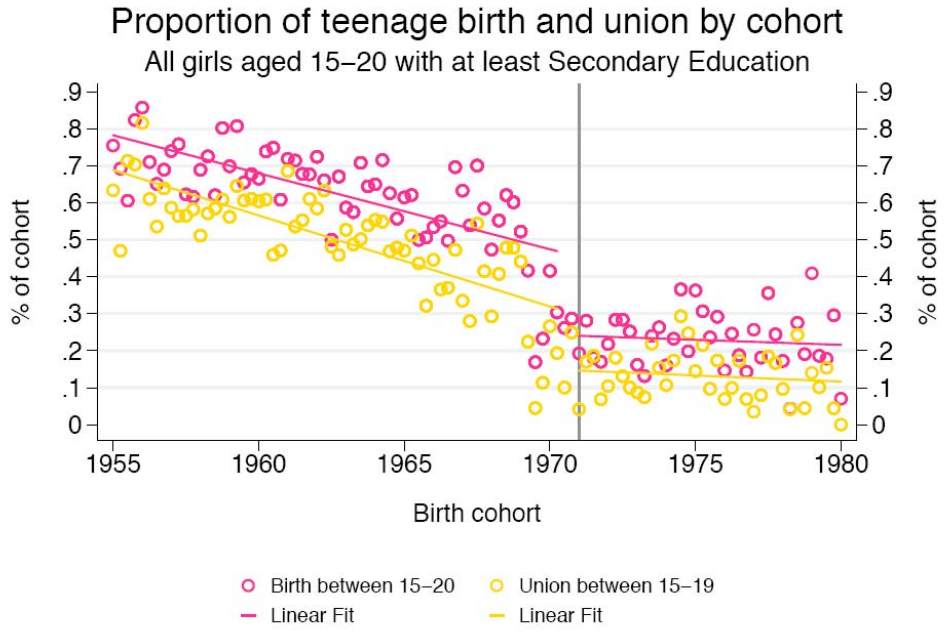


Note: the vertical line represents the first cohort subject to the 1985 reform.

Figure 6: Teenage births by cohort

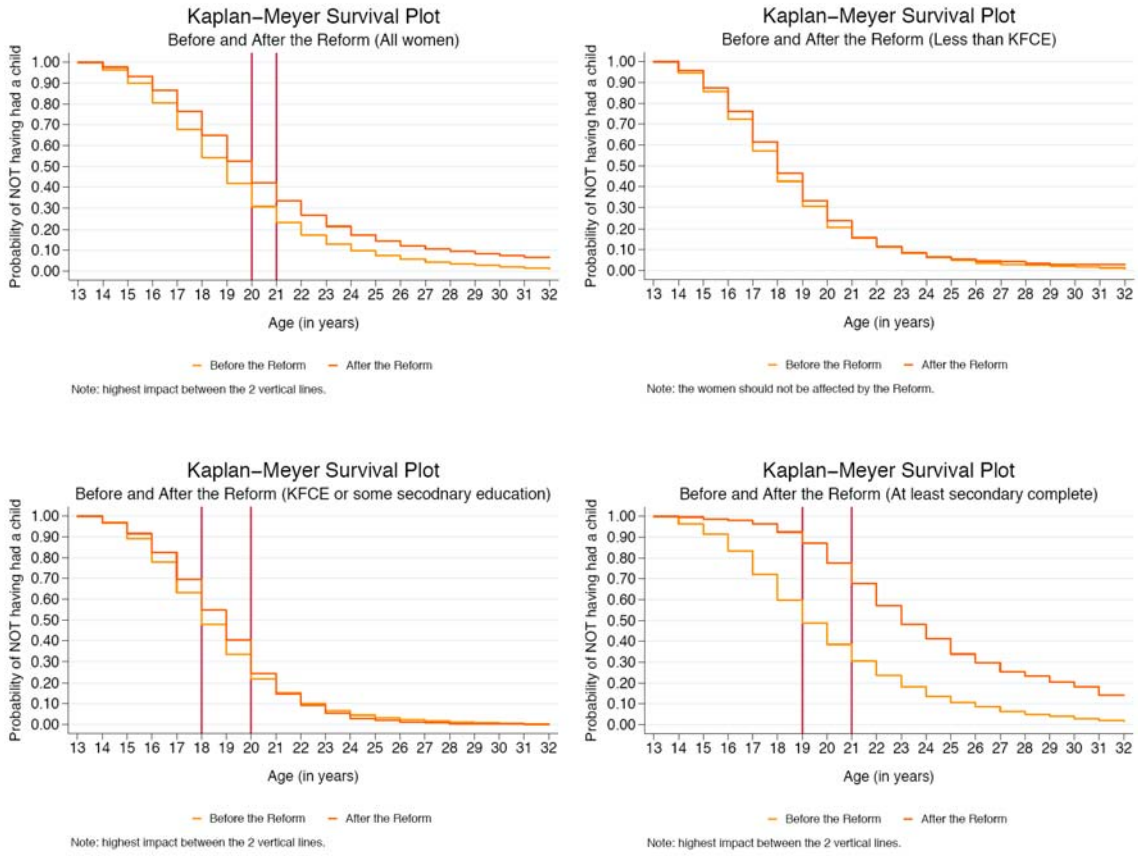


Note: the vertical line represents the first cohort subject to the 1985 reform.



Note: the vertical line represents the first cohort subject to the 1985 reform.

Figure 7: Survival Plots of not having had a child (by age)



7.2. Tables

Table 1: Characteristics by ethnicity

Ethnic group	Education (years)	Birth before 19	Union before 19
Embu	5.92	0.72	0.60
Kalenjin	7.02	0.67	0.48
Kamba	7.83	0.62	0.44
Kikuyu	8.01	0.60	0.47
Kisii	6.95	0.69	0.58
Luhya	6.62	0.75	0.68
Luo	6.53	0.72	0.60
Taita/Tavate	8.78	0.49	0.38
Other ethnicities	4.70	0.61	0.60
Other	7.68	0.48	0.49
Total	6.78	0.66	0.55

Table 2: Age at first birth and fertility by cohort

Birth Cohort	% who gave first birth at age						% who never gave birth	Number of obser-vations
	15	16	17	18	19	20		
1956-60	0.07	0.10	0.12	0.12	0.12	0.10	0.27	3269
1961-65	0.06	0.09	0.12	0.14	0.12	0.11	0.28	4402
1966-70	0.05	0.08	0.12	0.12	0.12	0.10	0.34	4790
1971-75	0.04	0.07	0.09	0.09	0.08	0.07	0.52	5542
1976-80	0.03	0.04	0.08	0.08	0.08	0.07	0.59	4333

Table 3: Descriptive statistics by 5-year cohort

	1956-1960	1961-1965	1966-1970	1971-1975	1976-1980
# of observations	2,920	5125.00	5,417	5069.00	5,639
union before 19	0.64	0.62	0.54	0.49	0.46
first sex before 19	0.68	0.72	0.71	0.73	0.73
first birth before 20	0.72	0.72	0.67	0.62	0.58
# of children before 25	-	3.00	1.92	1.40	1.51
ideal number of children	12.07	9.00	8.30	7.44	6.47
Education					
None	0.32	0.21	0.12	0.09	0.07
Primary incomplete	0.27	0.28	0.29	0.34	0.30
Primary complete	0.19	0.22	0.25	0.23	0.30
Secondary incomplete	0.12	0.15	0.18	0.12	0.09
Secondary complete	0.07	0.10	0.11	0.17	0.17
Higher	0.03	0.04	0.05	0.05	0.07
Born in					
Large city	0.03	0.03	0.03	0.04	0.08
City	0.04	0.04	0.05	0.05	0.02
Town	0.06	0.08	0.09	0.09	0.10
Countryside	0.85	0.84	0.82	0.80	0.79
Abroad	0.01	0.01	0.01	0.01	0.01
Religion					
Catholic	0.30	0.27	0.28	0.27	0.24
Protestant	0.59	0.64	0.64	0.63	0.66
Muslim	0.06	0.05	0.06	0.07	0.07
Ethnicity					
Embu	0.08	0.09	0.08	0.07	0.05
Kalenjin	0.12	0.12	0.12	0.12	0.12
Kamba	0.17	0.16	0.19	0.18	0.14
Kikuyu	0.13	0.13	0.13	0.15	0.19
Kisii	0.13	0.12	0.12	0.11	0.07
Luhya	0.13	0.13	0.14	0.12	0.15
Luo	0.06	0.08	0.07	0.08	0.09
Masai	0.06	0.05	0.04	0.05	0.03
Meru	0.03	0.03	0.02	0.04	0.06
Mijikenda/Swahili	0.04	0.03	0.04	0.03	0.04
Somali	0.02	0.02	0.03	0.03	0.03

Table 4: Observable characteristics before and after the reform

	No education			Less than Primary			Primary			Less than Secondary			Secondary			Higher		
	before	after	t	before	after	t	before	after	t	before	after	t	before	after	t	before	after	t
Nairobi	0.04	0.05		0.04	0.06		0.09	0.10		0.13	0.14		0.21	0.17		0.25	0.38	*
Central	0.04	0.01	*	0.10	0.11		0.20	0.19		0.17	0.16		0.23	0.17		0.14	0.14	
Coast	0.26	0.26		0.06	0.08		0.07	0.09		0.05	0.05		0.05	0.06		0.07	0.04	*
Eastern	0.13	0.11		0.16	0.18		0.18	0.20		0.17	0.14		0.13	0.18		0.15	0.10	
Nyanza	0.12	0.07		0.25	0.22		0.13	0.14		0.14	0.20		0.09	0.11		0.08	0.09	
Rift	0.33	0.42	*	0.26	0.24		0.21	0.17		0.21	0.18		0.22	0.20		0.21	0.18	
Western	0.09	0.09		0.14	0.12		0.11	0.12		0.13	0.13		0.06	0.10		0.10	0.08	
Capital	0.02	0.02		0.02	0.03		0.03	0.02		0.02	0.02		0.03	0.03		0.07	0.11	
City	0.02	0.03		0.03	0.06		0.04	0.04		0.06	0.10		0.08	0.08		0.07	0.05	
Town	0.04	0.09	*	0.10	0.08		0.06	0.08		0.13	0.11		0.12	0.12		0.16	0.23	*
Countryside	0.90	0.85		0.84	0.83		0.86	0.85		0.79	0.77		0.77	0.76		0.69	0.57	*
Abroad	0.01	0.01		0.01	0.00		0.00	0.01		0.01	0.00		0.01	0.01		0.01	0.02	
Embu	0.12	0.15		0.11	0.11		0.08	0.06		0.08	0.08		0.07	0.08		0.07	0.08	
Kalenjin	0.06	0.04		0.14	0.12		0.12	0.12		0.13	0.12		0.11	0.14		0.07	0.12	
Kamba	0.05	0.06		0.14	0.16		0.24	0.24		0.27	0.23		0.26	0.26		0.14	0.10	
Kikuyu	0.05	0.03		0.10	0.11		0.13	0.15		0.13	0.15		0.21	0.14		0.20	0.28	
Kisii	0.06	0.03		0.14	0.13		0.10	0.13		0.15	0.16		0.10	0.12		0.14	0.05	*
Luhya	0.11	0.05	*	0.19	0.14		0.13	0.10		0.10	0.15		0.09	0.11		0.06	0.13	*
Luo	0.06	0.09		0.07	0.08		0.06	0.07		0.05	0.05		0.03	0.04		0.04	0.05	
Other ethny	0.47	0.49		0.09	0.13		0.11	0.11		0.08	0.07		0.09	0.10		0.21	0.11	*
Taita/Tavate	0.00	0.01		0.00	0.00		0.01	0.00		0.00	0.00		0.02	0.00		0.01	0.00	
Other	0.02	0.05	*	0.01	0.01		0.01	0.00		0.00	0.00		0.02	0.01		0.05	0.07	

Table 5: O.L.S. and I.V. Regression Results - 1955-1980

Dependent variable: Pr(birth teen=1)									
	Whole sample			At least KCPE			At least secondary complete		
	O.L.S.	I.V.	I.V.	O.L.S.	I.V.	I.V.	O.L.S.	I.V.	I.V.
First-stage (all Second-stage RHS variables included, but not reported)									
Reform		-0.117	-0.101		0.356***	0.275**		0.684***	0.510***
		(0.12)	(0.11)		(0.12)	(0.12)		(0.20)	(0.20)
Second-stage									
Education	-0.041***	0.115	0.088	-0.056***	-0.156**	-0.188**	-0.038***	-0.158***	-0.193**
	(0.00)	(0.24)	(0.23)	(0.00)	(0.07)	(0.09)	(0.00)	(0.05)	(0.08)
Year	1.660***	-3.406	-2.419	1.750***	5.875**	7.014*	0.861	7.250**	8.929**
	(0.33)	(7.7)	(7.41)	(0.42)	(2.92)	(3.86)	(0.57)	(3.01)	(4.18)
$Year^2$	-0.000***	0.001	0.001	-0.000***	-0.001**	-0.002*	0.000	-0.002**	-0.002**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Muslim	0.016		0.224	0.04		-0.048	-0.01		-0.099
	(0.02)		-0.38	-0.03		(0.08)	(0.03)		(0.08)
City	-0.006		0.038	0.002		0.058	-0.071*		0.108
	(0.03)		(0.10)	(0.04)		(0.06)	(0.04)		(0.11)
Town	0.019		0.122	0.022		0.027	-0.046		0.035
	(0.03)		(0.19)	(0.03)		(0.04)	(0.04)		(0.07)
Countryside	0.022		0.293	0.004		-0.139	-0.046		-0.109*
	(0.02)		(0.49)	(0.03)		(0.11)	(0.03)		(0.06)
Abroad	-0.076		-0.028	-0.018		-0.021	-0.096		-0.102
	(0.05)		(0.13)	(0.06)		(0.09)	(0.07)		(0.13)
Embu	0.185***		0.022	0.144***		-0.001	0.077*		-0.131
	(0.02)		(0.29)	(0.03)		(0.11)	(0.04)		(0.12)
Kalenjin	0.179***		-0.107	0.144***		0.037	0.055		-0.063
	(0.02)		(0.51)	(0.03)		(0.09)	(0.04)		(0.09)
Kamba	0.164***		-0.216	0.135***		0.067	0.099**		0.073
	-0.02		(0.68)	(0.03)		(0.06)	(0.04)		(0.07)
Kikuyu	0.163***		-0.21	0.104***		-0.024	0.084**		-0.104
	(0.02)		(0.67)	(0.03)		(0.10)	(0.04)		(0.11)
Kisii	0.200***		-0.078	0.181***		0.065	0.129***		-0.001
	(0.02)		(0.50)	(0.03)		(0.09)	(0.04)		(0.09)
Luhya	0.248***		0.063	0.221***		0.038	0.156***		-0.043
	(0.02)		(0.33)	(0.03)		(0.14)	(0.04)		(0.11)
Luo	0.223***		0.055	0.179***		-0.009	0.088*		-0.103
	(0.03)		(0.03)	(0.03)		(0.14)	(0.04)		(0.12)
Masai	0.033		0.028	0.01		-0.232	-0.038		-0.421**
	(0.03)		(0.06)	(0.03)		(0.18)	(0.04)		(0.2)
Meru	0.037		0.144	0.018		-0.129	0.049		-0.133
	(0.03)		(0.33)	(0.04)		(0.11)	(0.05)		(0.12)
Mijikenda	0.065**		0.023	0.043		-0.241	0.045		-0.277
/ Swahili	(0.03)		(0.10)	(0.04)		(0.22)	(0.05)		(0.20)
Recall	-0.002*	0.006	0.004	0.004***	0.026	0.034	-0.014***	0.041*	0.058
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.02)	(0.00)	(0.02)	(0.04)
Survey FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

R^2	0.14	0.21	0.18	0.17	0.2	0.19	0.28	0.22	0.29
# obs.	18751	18751	18751	11992	11992	11992	6284	6284	6284

Significance level, *: p<0.10, **: p<0.05, ***: p<0.01.

KCPE = Kenya Certificate of Primary Education.

Table 6: O.L.S. and I.V. with alternative weighting scheme

	Dependent variable: Pr(birth teen=1)								
	Whole sample			At least KCPE			At least secondary complete		
	O.L.S.	I.V.	I.V.	O.L.S.	I.V.	I.V.	O.L.S.	I.V.	I.V.
First-stage (all Second-stage RHS variables included, but not reported)									
Reform		-0.108	-0.057		0.363***	0.294**		0.703***	0.543***
		(0.11)	(0.10)		(0.11)	(0.11)		(0.17)	-0.17
Second-stage									
Education	-0.043***	0.188	0.246	-0.059***	-0.180**	-0.206**	-0.038***	-0.163***	-0.194***
	(0.00)	(0.38)	(0.76)	(0.00)	(0.07)	(0.10)	(0.00)	(0.05)	(0.07)
Year	1.591***	-5.945	-7.742	1.515***	6.781**	7.817*	0.400	7.509**	9.023**
	(0.37)	(12.55)	(25.10)	(0.46)	(3.25)	(4.08)	(0.62)	(3.07)	(4.09)
$Year^2$	-0.000***	0.001	0.002	-0.000***	-0.002**	-0.002*	-0.000	-0.002**	-0.002**
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Muslim	0.021		0.564	0.042		-0.056	-0.024		-0.123
	(0.02)		(1.45)	(0.03)		(0.08)	(0.03)		(0.08)
City	-0.011		0.155	0.001		0.009	-0.041		0.069
	(0.03)		(0.43)	(0.04)		(0.05)	(0.04)		(0.08)
Town	0.023		0.307	0.025		-0.025	-0.012		0.009
	(0.03)		(0.74)	(0.03)		(0.06)	(0.04)		(0.06)
Countryside	0.024		0.692	0.001		-0.208	-0.013		-0.129
	(0.03)		(1.73)	(0.03)		(0.15)	(0.03)		(0.08)
Abroad	-0.032		0.147	0.010		0.011	-0.012		-0.041
	(0.06)		(0.51)	(0.07)		(0.11)	(0.08)		(0.14)
Embu	0.179***		-0.254	0.140***		-0.012	0.048		-0.139
	(0.03)		(1.11)	(0.03)		(0.11)	(0.04)		(0.11)
Kalenjin	0.195***		-0.491	0.161***		0.042	0.045		-0.065
	(0.02)		(1.79)	(0.03)		(0.09)	(0.04)		(0.08)
Kamba	0.169***		-0.699	0.147***		0.061	0.094**		0.065
	(0.02)		(2.24)	(0.03)		(0.08)	(0.04)		(0.07)
Kikuyu	0.153***		-0.739	0.100***		-0.035	0.065		-0.115
	(0.02)		(2.32)	(0.03)		(0.10)	(0.04)		(0.10)
Kisii	0.219***		-0.463	0.204***		0.078	0.126***		-0.003
	(0.02)		(1.78)	(0.03)		(0.10)	(0.04)		(0.09)
Luhya	0.261***		-0.218	0.232***		0.032	0.146***		-0.051
	(0.02)		(1.26)	(0.03)		(0.14)	(0.04)		(0.11)
Luo	0.249***		-0.182	0.205***		-0.018	0.090**		-0.1
	(0.03)		(1.13)	(0.04)		(0.15)	(0.05)		(0.11)
Masai	0.032		-0.040	0.030		-0.207	-0.031		-0.357**
	(0.03)		(0.24)	(0.04)		(0.17)	(0.05)		(0.17)
Meru	0.045		-0.444	0.022		-0.131	0.039		-0.125
	(0.03)		(1.29)	(0.04)		(0.12)	(0.05)		(0.11)
Mijikenda	0.069**		-0.032	0.056		-0.260	0.041		-0.276
/ Swahili	(0.03)		(0.30)	(0.04)		(0.23)	(0.05)		(0.19)
Recall	-0.001	-0.006	-0.005	0.005***	0.029*	0.036*	-0.013***	0.043*	0.057*
	(0.00)	(0.01)	(0.01)	(0.00)	(0.02)	(0.02)	(0.00)	(0.02)	(0.03)
Survey FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

R^2	0.13	0.20	0.18	0.17	0.20	0.20	0.27	0.23	0.28
# obs.	18751	18751	18751	11992	11992	11992	6284	6284	6284

Significance level, *: p<0.10, **: p<0.05, ***: p<0.01.

KCPE = Kenya Certificate of Primary Education.

Table 7: O.L.S. and I.V. Regression Results without cohorts between 1968 and 1971

	Dependent variable: Pr(birth teen=1)								
	Whole sample			At least KCPE			At least secondary complete		
	O.L.S.	I.V.	I.V.	O.L.S.	I.V.	I.V.	O.L.S.	I.V.	I.V.
First-stage (all Second-stage RHS variables included, but not reported)									
Reform		-0.042	-0.015		0.772***	0.670***		0.990***	0.803***
		(0.14)	(0.13)		(0.14)	(0.13)		(0.23)	(0.22)
Second-stage									
Education	-0.041***	0.641	0.014	-0.055***	-0.119***	-0.129***	-0.038***	-0.153***	-0.172***
	(0.00)	(3.49)	(0.01)	(0.00)	(0.03)	(0.04)	(0.00)	(0.04)	(0.05)
Year	1.645***	-19.607	(dropped)	1.707***	4.189***	4.472***	0.864	7.051***	7.849***
	(0.34)	(108.62)		(0.43)	(1.44)	(1.59)	(0.59)	(2.44)	(2.99)
$Year^2$	-0.000***	0.005	-0.000***	-0.000***	-0.001***	-0.001***	-0.000	-0.002***	-0.002***
	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Muslim	0.009		0.095***	0.029		-0.020	-0.002		-0.075
	(0.02)		(0.03)	(0.03)		(0.05)	(0.03)		(0.07)
City	-0.007		0.010	-0.009		0.027	-0.083*		0.063
	(0.03)		(0.04)	(0.04)		(0.04)	(0.05)		(0.09)
Town	0.013		0.056	0.008		0.012	-0.056		0.002
	(0.03)		(0.04)	(0.03)		(0.03)	(0.04)		(0.06)
Countryside	0.018		0.133***	-0.008		-0.087*	-0.059		-0.120**
	(0.03)		(0.04)	(0.03)		(0.05)	(0.04)		(0.05)
Abroad	-0.092		-0.067	-0.037		-0.024	-0.078		-0.077
	(0.06)		(0.07)	(0.07)		(0.08)	(0.07)		(0.13)
Embu	0.176***		0.112***	0.125***		0.037	0.071		-0.135
	(0.02)		(0.04)	(0.03)		(0.06)	(0.04)		(0.10)
Kalenjin	0.173***		0.055	0.134***		0.074	0.057		-0.061
	(0.02)		(0.04)	(0.03)		(0.05)	(0.04)		(0.08)
Kamba	0.160***		0.002	0.125***		0.085**	0.106**		0.068
	(0.02)		(0.05)	(0.03)		(0.04)	(0.04)		(0.06)
Kikuyu	0.156***		0.002	0.090***		0.014	0.090**		-0.095
	(0.02)		(0.05)	(0.03)		(0.05)	(0.04)		(0.09)
Kisii	0.192***		0.074*	0.166***		0.101**	0.133***		0.002
	(0.02)		(0.04)	(0.03)		(0.05)	(0.04)		(0.08)
Luhya	0.243***		0.168***	0.208***		0.102	0.161***		-0.031
	(0.02)		(0.04)	(0.03)		(0.07)	(0.04)		(0.10)
Luo	0.212***		0.137***	0.153***		0.047	0.082*		-0.104
	(0.03)		(0.04)	(0.04)		(0.07)	(0.05)		(0.10)
Masai	0.021		0.023	-0.014		-0.157*	-0.055		-0.421***
	(0.03)		(0.03)	(0.04)		(0.09)	(0.04)		(0.16)
Meru	0.038		-0.034	0.014		-0.069	0.045		-0.124
	(0.03)		(0.04)	(0.04)		(0.06)	(0.05)		(0.10)
Mijikenda	0.062*		0.040	0.029		-0.129	0.040		-0.248
/ Swahili	(0.03)		(0.04)	(0.04)		(0.10)	(0.06)		(0.16)
Recall	-0.002**	-0.012	-0.003**	0.003**	0.016**	0.020**	-0.016***	0.039**	0.048*
	(0.00)	(0.05)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.02)	(0.02)
Survey FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

R^2	0.15	0.17	0.16	0.16	0.16	0.17	0.23	0.18	0.19
# obs.	6550	6550	6550	4334	4334	4334	2184	2184	2184

Significance level, *: p<0.10, **: p<0.05, ***: p<0.01.

KCPE = Kenya Certificate of Primary Education.

Table 8: O.L.S. and I.V. Regression Results with only cohorts between (1965-1968) and (1971-1974)

	Dependent variable: Pr(birth teen=1)								
	Whole sample			At least KCPE			At least secondary complete		
	O.L.S.	I.V.	I.V.	O.L.S.	I.V.	I.V.	O.L.S.	I.V.	I.V.
First-stage (all Second-stage RHS variables included, but not reported)									
Reform		0.207	0.069		1.292***	1.192***		2.143***	1.850***
		(0.26)	(0.24)		(0.24)	(0.23)		(0.35)	(0.34)
Second-stage									
Education	-0.049***	-0.136	-0.236	-0.067***	-0.063*	-0.068*	-0.045***	-0.101***	-0.112***
	(0.00)	(0.22)	(0.73)	(0.00)	(0.03)	(0.04)	(0.00)	(0.03)	(0.03)
Year	5.052	-1.714	-6.856	4.268	3.653	4.295	-0.767	0.261	1.244
	(3.84)	(16.42)	(45.82)	(4.77)	(4.97)	(5.02)	(6.47)	(7.41)	(7.48)
$Year^2$	-0.001	0.000	0.002	-0.001	-0.001	-0.001	0.000	-0.000	0.000
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Muslim	-0.013		-0.346	-0.039		-0.040	-0.058		-0.122
	(0.04)		(1.30)	(0.06)		(0.06)	(0.08)		(0.1)
City	-0.059		-0.102	-0.067		-0.066	-0.143**		-0.05
	(0.05)		(0.20)	(0.05)		(0.06)	(0.07)		(0.09)
Town	-0.008		-0.037	-0.021		-0.021	-0.091		-0.017
	(0.04)		(0.14)	(0.05)		(0.05)	(0.06)		(0.08)
Countryside	-0.017		-0.369	-0.055		-0.055	-0.086		-0.087
	(0.04)		(1.35)	(0.04)		(0.05)	(0.06)		(0.07)
Abroad	-0.145*		-0.231	-0.053		-0.053	-0.168		-0.131
	(0.09)		(0.42)	(0.10)		(0.10)	(0.10)		(0.16)
Embu	0.192***		0.449	0.112**		0.111**	-0.007		-0.086
	(0.03)		(0.98)	(0.05)		(0.05)	(0.07)		(0.10)
Kalenjin	0.182***		0.600	0.134***		0.133**	0.060		-0.025
	(0.04)		(1.61)	(0.04)		(0.05)	(0.06)		(0.09)
Kamba	0.145***		0.641	0.093**		0.092*	0.048		-0.005
	(0.03)		(1.93)	(0.04)		(0.05)	(0.06)		(0.08)
Kikuyu	0.149***		0.638	0.092**		0.091*	0.093		-0.018
	(0.03)		(1.89)	(0.04)		(0.05)	(0.06)		(0.09)
Kisii	0.186***		0.595	0.143***		0.142***	0.117**		0.03
	(0.03)		(1.59)	(0.04)		(0.05)	(0.06)		(0.09)
Luhya	0.272***		0.518	0.235***		0.234***	0.189***		0.069
	(0.03)		(0.95)	(0.04)		(0.06)	(0.06)		(0.10)
Luo	0.205***		0.440	0.134**		0.133*	0.007		-0.065
	(0.04)		(0.92)	(0.06)		(0.07)	(0.08)		(0.09)
Masai	0.028		0.058	-0.004		-0.005	-0.119		-0.277**
	(0.04)		(0.18)	(0.06)		(0.07)	(0.08)		(0.13)
Meru	0.062		0.328	-0.012		-0.012	-0.099		-0.171*
	(0.04)		(1.03)	(0.06)		(0.06)	(0.06)		(0.10)
Mijikenda	0.077		0.160	0.028		0.027	0.078		-0.067
/Swahili	(0.05)		(0.35)	(0.07)		(0.09)	(0.09)		(0.13)
Recall	-0.001	-0.003	-0.000	0.002	0.000	0.002	-0.013***	0.008	0.013
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
SurveyFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

R^2	0.15	0.16	0.16	0.17	0.16	0.17	0.25	0.18	0.18
#obs.	6550	6550	6550	4334	4334	4334	2184	2184	2184

Significance level, *: p<0.10, **: p<0.05, ***: p<0.01.

KCPE = Kenya Certificate of Primary Education.

Table 9: Regression Results - Fake Thresholds

	Dependent variable: Pr(birth teen=1)					
	Threshold: 1963, sample: 1955-1968			Threshold: 1975, sample: 1971-1980		
	O.L.S.	I.V.	I.V.	O.L.S.	I.V.	I.V.
First-stage (all Second-stage RHS variables included, but not reported)						
Reform		0.151	0.061		-0.056	0.075
		(0.20)	(0.19)		(0.14)	(0.14)
Second-stage						
Education	-0.049***	-0.033	-0.003	-0.076***	-0.669	-0.771
	(0.00)	(0.20)	(0.53)	(0.00)	(0.93)	(1.16)
Year	1.824	1.904	1.479	-1.688	-12.296	-13.405
	(1.46)	(2.65)	(4.20)	(4.56)	(23.94)	(27.32)
$Year^2$	-0.000	-0.000	-0.000	0.000	0.003	0.003
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Muslim	0.007		0.045	0.048		-0.444
	(0.03)		(0.43)	(0.04)		(0.85)
City	-0.029		-0.019	-0.021		-0.639
	(0.04)		(0.12)	(0.05)		(1.07)
Town	-0.015		0.009	0.012		-0.495
	(0.04)		(0.28)	(0.04)		(0.88)
Countryside	-0.034		0.044	-0.023		-1.295
	(0.04)		(0.87)	(0.03)		(2.15)
Abroad	-0.093		-0.150	0.058		0.384
	(0.08)		(0.65)	(0.09)		(0.74)
Embu	0.183***		0.224	0.047		-0.132
	(0.04)		(0.46)	(0.05)		(0.34)
Kalenjin	0.174***		0.185	0.125***		-0.238
	(0.04)		(0.13)	(0.04)		(0.60)
Kamba	0.151***		0.141	0.089**		-0.368
	(0.04)		(0.13)	(0.04)		(0.76)
Kikuyu	0.139***		0.147	0.059		-0.286
	(0.04)		(0.10)	(0.04)		(0.58)
Kisii	0.185***		0.196	0.156***		-0.235
	(0.04)		(0.13)	(0.04)		(0.66)
Luhya	0.219***		0.259	0.196***		-0.394
	(0.04)		(0.45)	(0.04)		(0.99)
Luo	0.148***		0.184	0.173***		-0.618
	(0.05)		(0.41)	(0.05)		(1.33)
Masai	0.014		0.136	0.011		-0.472
	(0.04)		(1.37)	(0.05)		(0.82)
Meru	0.066		0.082	-0.014		-0.389
	(0.06)		(0.19)	(0.05)		(0.63)
Mijikenda	0.035		0.065	-0.031		-0.922
/Swahili	(0.05)		(0.33)	(0.07)		(1.50)
Recall	-0.032***	-0.030**	-0.024	-0.048***	-0.023	-0.016
	(0.01)	(0.01)	(0.09)	(0.02)	(0.09)	(0.10)
SurveyFE	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1615.163***	-1835.907	-1420.642	-1615.163***	12207.007	13298.831

	(370.76)	(2616.16)	(4101.33)	(370.76)	(23624.46)	-26970.97
R^2	0.14	0.12	0.05	0.17	0.13	0.04
#obs.	6916	6916	6916	3471	3471	3471

Significance level, *: p<0.10, **: p<0.05, ***: p<0.01.

The threshold for the first 3 columns is 1963 and the sample consists of all girls born between 1955 and 1968 with at least KCPE. The threshold for the last 3 columns is 1975 and the sample consists of all girls born between 1971 and 1980 with at least KCPE.

Table 10: Regression Results - Difference-in-differences

	Dependent variable: Pr(birth teen=1)			
	Whole sample	Whole sample	Birth: before 1968 after 1971	Birth: (1965-1968) (1971-1974)
Reform	0.043**	0.050***	0.044**	0.051
	(0.02)	(0.02)	(0.02)	(0.04)
Education	-0.211***	-0.207***	-0.199***	-0.220***
	(0.01)	(0.01)	(0.01)	(0.02)
Reform	-0.088***	-0.092***	-0.102***	-0.098***
* Education	(0.02)	(0.02)	(0.02)	(0.03)
Year	0.530	0.638	0.608	3.998
	(0.42)	(0.41)	(0.41)	(3.96)
$Year^2$	-0.000	-0.000*	-0.000	-0.001
	(0.00)	(0.00)	(0.00)	(0.00)
Recall	-0.034***	-0.027***	-0.031***	-0.043***
	(0.01)	(0.01)	(0.01)	(0.01)
Muslim		0.053***	0.044**	0.045
		(0.02)	(0.02)	(0.04)
City		0.004	0.002	-0.068
		(0.03)	(0.03)	(0.05)
Town		0.041	0.035	-0.019
		(0.03)	(0.03)	(0.05)
Countryside		0.074***	0.070**	0.026
		(0.03)	(0.03)	(0.04)
Abroad		-0.085	-0.100	-0.151
		(0.05)	(0.06)	(0.10)
Embu		0.158***	0.152***	0.148***
		(0.02)	(0.02)	(0.04)
Kalenjin		0.132***	0.129***	0.126***
		(0.02)	(0.03)	(0.04)
Kamba		0.112***	0.111***	0.093***
		(0.02)	(0.02)	(0.03)
Kikuyu		0.109***	0.105***	0.096***
		(0.02)	(0.02)	(0.04)
Kisii		0.158***	0.151***	0.131***
		(0.02)	(0.02)	(0.04)
Luhya		0.213***	0.211***	0.237***
		(0.02)	(0.02)	(0.03)
Luo		0.195***	0.183***	0.169***
		(0.03)	(0.03)	(0.04)
Masai		0.050*	0.045*	0.044
		(0.03)	(0.03)	(0.04)
Meru		0.013	0.017	0.021
		(0.03)	(0.03)	(0.05)
Mijikenda		0.054	0.049	0.055
/ Swahili		(0.04)	(0.04)	(0.05)
Survey FE	Yes	Yes	Yes	Yes

R^2	0.07	0.09	0.09	0.09
# obs.	18764	18764	17058	6557

Significance level, *: p<0.10, **: p<0.05, ***: p<0.01.

Table 11: Survival Analysis (probability of not having had a child) - 1955-1980, Cox PH Model

	Dependent variable: Age at first birth					
	Whole Sample		At least KCPE		At least Secondary	
	Cox PH	Cox PH, IV	Cox PH	Cox PH, IV	Cox PH	Cox PH, IV
First-stage (all Second-stage RHS variables included, but not reported)						
Reform		-0.100		0.278**		0.510***
		(0.13)		(0.12)		-0.16
Second-stage						
Education	-0.076***	-0.049**	-0.099***	-0.073**	-0.074***	-0.056*
	(0.00)	(0.02)	(0.00)	(0.03)	(0.01)	(0.03)
$Year^2$	-0.000***	-0.000***	-0.000***	-0.000***	-0.000**	-0.000*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Muslim	0.003	0.044	-0.001	0.052	-0.076	-0.025
	(0.05)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)
City	-0.017	0.034	0.059	0.051	0.052	0.022
	(0.07)	(0.06)	(0.07)	(0.07)	(0.08)	(0.08)
Town	0.036	0.042	-0.006	0.014	-0.061	-0.055
	(0.06)	(0.06)	(0.07)	(0.07)	(0.09)	(0.08)
Countryside	0.077	0.108	0.028	0.072	0.040	0.053
	(0.06)	(0.07)	(0.06)	(0.08)	(0.07)	(0.07)
Abroad	-0.200	-0.177*	-0.074	-0.085	-0.199	-0.184
	(0.12)	(0.11)	(0.11)	(0.12)	(0.16)	(0.15)
Embu	0.380***	0.304***	0.288***	0.296***	0.294***	0.304***
	(0.06)	(0.06)	(0.06)	(0.08)	(0.10)	(0.11)
Kalenjin	0.328***	0.245***	0.239***	0.283***	0.139	0.187*
	(0.06)	(0.08)	(0.06)	(0.07)	(0.10)	(0.10)
Kamba	0.297***	0.205**	0.238***	0.246***	0.238***	0.231**
	(0.06)	(0.09)	(0.05)	(0.07)	(0.09)	(0.10)
Kikuyu	0.309***	0.218**	0.189***	0.217***	0.216***	0.233**
	(0.06)	(0.09)	(0.06)	(0.07)	(0.08)	(0.10)
Kisii	0.375***	0.293***	0.327***	0.345***	0.325***	0.334***
	(0.06)	(0.07)	(0.06)	(0.07)	(0.09)	(0.10)
Luhya	0.485***	0.397***	0.368***	0.406***	0.284***	0.334***
	(0.06)	(0.06)	(0.06)	(0.08)	(0.09)	(0.10)
Luo	0.462***	0.371***	0.352***	0.367***	0.247**	0.253**
	(0.07)	(0.07)	(0.07)	(0.09)	(0.10)	(0.12)
Masai	0.080	0.095*	0.007	0.075	0.024	0.089
	(0.06)	(0.05)	(0.06)	(0.09)	(0.09)	(0.13)
Meru	0.070	0.045	0.039	0.081	0.107	0.141
	(0.06)	(0.07)	(0.07)	(0.08)	(0.10)	(0.11)
Mijikenda	0.073	0.051	-0.017	0.072	0.036	0.101
/Swahili	(0.07)	(0.06)	(0.09)	(0.10)	(0.12)	(0.13)
Recall	-0.081***	-0.077***	-0.116***	-0.107***	-0.107***	-0.100***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.04)
SurveyFE	Yes	Yes	Yes	Yes	Yes	Yes
#obs.	18139	18152	11752	11763	6127	6138

Significance level, *: p<0.10, **: p<0.05, ***: p<0.01.

Coefficients are reported, not hazard rates.

Table 12: Regression Results - Union - 1955-1980

	Dependent variable: Pr(union teen=1)								
	Whole sample			At least KCPE			At least secondary complete		
	O.L.S.	I.V.	I.V.	O.L.S.	I.V.	I.V.	O.L.S.	I.V.	I.V.
First-stage (all Second-stage RHS variables included, but not reported)									
Reform		-0.117	-0.101		0.356***	0.275**		0.684***	0.510***
		(0.12)	(0.11)		(0.12)	(0.12)		(0.20)	(0.20)
Second-stage									
Education	-0.049***	0.018	0.000	-0.043***	-0.067**	-0.067**	-0.038***	-0.158***	-0.193**
	(0.00)	(0.11)	(0.10)	(0.00)	(0.03)	(0.03)	(0.00)	(0.05)	(0.08)
Year	0.675*	-1.469	-0.810	0.480	1.419	1.515	0.861	7.250**	8.929**
	(0.37)	(3.42)	(3.05)	(0.57)	(1.54)	(1.50)	(0.57)	(3.01)	(4.18)
$Year^2$	-0.000*	0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.002**	-0.002**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Muslim	0.060***		0.139	0.033		0.022	-0.010		-0.099
	(0.02)		(0.16)	(0.03)		(0.03)	(0.03)		(0.08)
City	-0.020		0.006	-0.089**		-0.089**	-0.071*		0.108
	(0.03)		(0.06)	(0.04)		(0.04)	(0.04)		(0.11)
Town	-0.006		0.040	-0.101***		-0.108***	-0.046		0.035
	(0.03)		(0.10)	(0.04)		(0.04)	(0.04)		(0.07)
Countryside	-0.006		0.103	-0.080**		-0.107**	-0.046		-0.109*
	(0.02)		(0.22)	(0.03)		(0.05)	(0.03)		(0.06)
Abroad	-0.055		-0.038	-0.146***		-0.142**	-0.096		-0.102
	(0.06)		(0.07)	(0.05)		(0.06)	(0.07)		(0.13)
Embu	0.081***		0.024	0.002		-0.025	0.077*		-0.131
	(0.03)		(0.12)	(0.04)		(0.05)	(0.04)		(0.12)
Kalenjin	0.022		-0.085	-0.076**		-0.083**	0.055		-0.063
	(0.03)		(0.22)	(0.04)		(0.04)	(0.04)		(0.09)
Kamba	0.016		-0.126	-0.021		-0.019	0.099**		0.073
	(0.02)		(0.29)	(0.03)		(0.04)	(0.04)		(0.07)
Kikuyu	0.059**		-0.083	0.003		-0.009	0.084**		-0.104
	(0.02)		(0.29)	(0.03)		(0.04)	(0.04)		(0.11)
Kisii	0.119***		0.016	0.056		0.043	0.129***		-0.001
	(0.02)		(0.21)	(0.03)		(0.04)	(0.04)		(0.09)
Luhya	0.204***		0.134	0.150***		0.128***	0.156***		-0.043
	(0.02)		(0.14)	(0.03)		(0.04)	(0.04)		(0.11)
Luo	0.118***		0.052	-0.034		-0.051	0.088*		-0.103
	(0.03)		(0.14)	(0.04)		(0.05)	(0.04)		(0.12)
Masai	0.008		0.010	-0.052		-0.110	-0.038		-0.421**
	(0.03)		(0.03)	(0.04)		(0.09)	(0.04)		(0.20)
Meru	-0.000		-0.067	-0.018		-0.026	0.049		-0.133
	(0.03)		(0.14)	(0.04)		(0.04)	(0.05)		(0.12)
Mijikenda	0.054*		0.034	-0.001		-0.033	0.045		-0.277
/Swahili	(0.03)		(0.06)	(0.05)		(0.07)	(0.05)		(0.20)
Recall	-0.023***	-0.046**	-0.022**	-0.014	-0.037**	-0.023	-0.014***	0.041*	0.058
	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.00)	(0.02)	(0.04)
SurveyFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

R^2	0.18	0.16	0.16	0.30	0.22	0.24	0.25	0.18	0.18
#obs.	18751	18751	18751	6284	6284	6284	2184	2184	2184

Significance level, *: p<0.10, **: p<0.05, ***: p<0.01.

KCPE = Kenya Certificate of Primary Education.