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Victims of electoral violence and their children experience irreversible stunting: The long-term welfare effects of electoral violence

Roxana Gutiérrez-Romero♣

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Abstract: Despite the extensive literature on civil conflict, little is known about the medium- and long-term effects of electoral violence on young children and adolescents. This paper shows that electoral violence of low scale yet recursive nature has a detrimental effect on the height of children and adolescents of affected households. Our identification strategy uses the variation of electoral violence across time and space in Kenya during 1992–2013. We find that infants and adolescents exposed to electoral violence are shorter as adults if compared to similar people not exposed to violence during their growing age. We also find inter-generation effects as the children of the victims of electoral violence, particularly boys, also have reduced height-for-age. Higher food prices and changes in diet experienced during outbreaks of violence are important mechanisms. No impact is found on the educational attainment of school-aged pupils as electoral violence has been concentrated during the school holidays.

Keywords: electoral violence, household victimization, height-for-age, education, Kenya, Africa.

JEL-codes: D74, I1, J24, O55

♣ Queen Mary University of London, School of Business and Management, London, UK. r.gutierrez@qmul.ac.uk. I am grateful for the hospitality of St Antony's College and the Department of Economics at the University of Oxford where I spent my sabbatical leave while working on this article. I also thank the staff members of Infotrak Kenya, especially Raphael Mulwa and Jimmy Kiprono, for their assistance with the survey. This survey was funded by the UK Department for International Development. I also acknowledge financial support from the Spanish Ministry of Science and Innovation (ECO2013-46516-C4-1-R) and the Generalitat of Catalunya (2014 SGR 1279). I thank the organisers and participants of the Workshop Elections and Violence: New Research on Actors, Targets and Strategies for very helpful feedback, in particular to Sebastian van Baalen and Inken von Borzyskowski.

Introduction

During outbreaks of electoral violence, many families experience shortages of food, get forcefully displaced or are forced to stay in-doors for several weeks to prevent being victimised (Bekoe 2012). Unlike war or other forms of armed conflict, electoral violence tends to be low scale and short lived (Goldsmith 2015). Still, this type of political violence causes a wide range of immediate humanitarian and economic costs.¹ Households affected by the turmoil might be forced to take costly actions to smooth their consumption, such as engaging in risky activities to generate more income, selling off their assets, temporarily reducing food intake and even taking children out of school (Dupas and Robinson 2012; Verwimp, Justino, and Brück 2019). Despite the extensive literature on civil conflict, surprisingly little is known about the medium- and long-term consequences of electoral violence on young children and adolescents.

This paper is the first one to analyse the intergenerational long-term effects of electoral violence on human capital, measured by children's height and educational attainment. Our case study Kenya, like several other Sub-Saharan African countries, has experienced electoral violence in every single election since the reintroduction of multiparty elections in the early 1990s. Between 1991 and 1998, electoral violence claimed the lives of 2,000 people, and another 400,000 people got forcibly displaced (Human Rights Watch 2002, p.21). The country also experienced large-scale electoral violence right after the announcement of the results of the 2007 presidential election. In a matter of just three months, the violence claimed the lives of 1,200 people and displaced over a quarter of a million people (CIPEV 2008). The next election of 2013, widely reported as peaceful, still claimed the lives of 500 people (Human Rights Watch 2013).

The repetitive nature of the electoral violence in Kenya allows us to evaluate the long-term intergenerational effects of violence, particularly on those exposed to the violence during their early life, including in utero, during childhood and adolescence. To this end, we conducted a nationally representative survey in Kenya which included a wide range of

¹ Electoral violence is a pervasive and recurrent problem in many parts of the developing world, particularly in Africa where nearly 60% of elections have been marred by violence, a much higher figure than the global average standing at 19% (Blattman and Miguel 2010; Burchard 2015).

information on electoral victimisation, forced displacement and anthropometric information on adult voters and their children.

Kenya's electoral violence has largely been state-sponsored or state-condoned, as discussed in next section. Our intuition is that households affected by electoral violence suffer from substantial temporary and unexpected income and consumption shocks, forcing them to cut down on nutritious food and calorie intake, thereby affecting the long-term health of those in in gestation and growing age. Since malnutrition and stress are known to affect cognitive performance (Berkman et al. 2002), we also test whether electoral violence has had any long-term effect on educational attainment.

To quantify the effect of electoral violence, we compare the height of adults who back during their growing years (from gestation up to 16 years old) were living in households or villages affected by electoral violence, to that of similar people who were unaffected by the violence. We identify victims and non-victims of violence based on their year of birth and whether they reported that they, their households or villages experienced electoral violence, the location and election where the victimisation took place. As a robustness check, we also analyse respondents who were growing up in districts that experienced electoral violence during 2007–08. We identify these districts according to the casualties and injuries estimated by the independent Commission of Inquiry on Post-Election Violence (CIPEV 2008). We also control for a wide range of characteristics that might have affected respondents' height such as their birth cohort, sex, ethnicity, province of birth, and whether they were confined to bed due to illness for one month or more, whether their parents are of same ethnic group, and their parents' educational attainment and wealth index back when the respondents were of growing age. Since victims of electoral violence might have characteristics that might have increased their chances of both experiencing electoral violence and having shorter height, we also use coarsened matching, following the method proposed by Iacus, King, and Porro (2008). The coarsened matching results are also very similar to those obtained using the Epanechnikov kernel matching method proposed by Heckman, Ichimura, Smith, and Todd (1998), in terms of sign, magnitude and statistical significance.

This paper offers three key contributions. Previous literature on large-scale war or civil conflict has shown that exposure to conflict reduces the stature of young children (e.g. Akresh et al. 2012; Minoiu and Shemyakina 2014). Our first contribution is to show that

electoral violence, despite its low scale and intermittent nature, also has long-lasting effects on health. Young children and adolescents exposed to electoral violence are, decades after, shorter in height as adults than similar people not exposed to the violence during their growing years.

Second, we also contribute to the literature on child nutrition and stunting by analysing the intergenerational effects of electoral violence. We find that boys (aged 0–18) at the time of our survey, whose parents were affected by electoral violence during their growing years, are shorter in height than girls and boys whose parents were not affected by electoral violence. In other settings such as economic crisis or large-scale conflict girls' height has been more adversely affected than boys' (Baird, Beegle, and Friedman 2012). Our contrasting findings suggest that since boys have a considerably higher risk of malnutrition than girls in Kenya (as in the rest of Sub-Saharan Africa), a significant consumption shock to the households affects them more severely than girls (Wamani et al. 2007; Keino et al. 2014).

Third, our paper contributes to the literature that studies the long-term effects of civil conflict. We show that the specific type of electoral violence analysed has not had any impact on school-age pupils' educational attainment. These results contrast with recent studies that have analysed the effect of war on educational attainment in Africa and elsewhere (Akbulut-Yuksel 2014; Akresh et al. 2017). Our lack of significant results might be due to various reasons, such as Kenyan electoral violence being of low scale and concentrated during the school holidays, which might contribute to lessening its effects on attendance. Our findings do not rule out that electoral violence might have affected the performance of children exposed to electoral violence, an issue we do not explore, since our survey does not include information on retrospective school tests. Still, our paper shows that electoral violence leaves a long-term destructive legacy that disproportionately affects children's long-term height as adults, a good proxy for health during growing years, as well as that of their offspring. These results have clear implications for the prevention of electoral violence and response to humanitarian crises where families experience important food shortages for a considerable period.

The rest of the paper continues as follows. The next section describes the reasons behind the electoral violence in Kenya. After that, we discuss the literature on the effects of

electoral violence on health and education. We then show the data, discuss the identification strategy, present the results, robustness checks, followed by a discussion of the results.

Electoral Violence

Soon after independence from Great Britain in 1963, Kenya became a one-party system (initially *de facto* and later *de jure*) as the Kenya African National Union (KANU) party was pronounced as elected in all subsequent elections of 1969, 1974, 1979, 1983 and 1988. After much domestic and international pressure, Kenya held its first multiparty elections in 1992 and 1997, both were won by KANU amid unprecedented electoral violence. The violence was to a significant extent state sponsored. In an attempt to dampen the opposition's support, Daniel Arap Moi's incumbent government sought to retain power by exploiting land grievances that long predated the re-introduction of multiparty elections. Just ahead of the elections, Moi's coethnics in the Rift Valley were encouraged to claim back their ancestral land that Jomo Kenyatta, the first president of Kenya, had unfairly redistributed or 'stolen' decades earlier and given to nonindigenous people, mostly the Kikuyo, Kenyatta's coethnics.² The ethnically charged rhetoric was not an empty threat. State-trained militias unexpectedly launched a campaign evicting nonindigenous groups from the Rift. These militia members were given clear incentives, \$25 dollars per killing and up to \$125 per house burned to ashes (Mulli 1999). The impunity of state actions drove ordinary citizens to join in ethnic cleansing raids, killing, burning houses of nonindigenous groups and evicting them from their land, expecting it as a reward for their loyalty to Moi's regime. These raids affected the Rift and

² These grievances date back to the colonial rule when the British colonists seized about 20% of Kenya's land in prime agricultural spots in the Rift Valley, Western and Nyanza. When Kenya gained independence, Britain handed over about 50% of the land seized. The land, however, was not returned to the communities from which it had been taken. Instead, Kenyatta sold the land under the principle of "willing seller, willing buyer", ignoring customary collective land rights of communities (Human Rights Watch 2008). This new land-tenure gave opportunities for the state to manipulate land allocation and promise land rights for patronage purposes (Boone 2011).

borderland areas Nyanza and Western Provinces through 1992–1998. By 1997, ethnic cleansing erupted in the Coast province, as land grievances drove locals to kill and evict nonindigenous ethnic groups.³

Between 1991 and 1998, electoral violence claimed the lives of 2,000 people, and over 400,000 were forcibly displaced. The violence continued during the 2001 parliamentary by-elections and up to the run-up of the 2002 presidential election (Human Rights Watch 2002). However, the 2002 election turned out to be a genuine competition between parties and resulted in a peaceful change of government (Collier, Gutiérrez-Romero, and Kimenyi 2010). Promising to resolve the land disputes and introduce constitutional reforms, Mwai Kibaki beat KANU's presidential candidate, Uhuru Kenyatta. The following presidential election of 2007 was expected to pass off equally smoothly but, unexpectedly, despite the early count of the votes, Kibaki was announced as the winner of the 2007 election and sworn immediately into office. Within minutes of the announcement of Kibaki's reelection, gangs of youths began burning houses, killing, raping and looting local residents across the Rift, Nairobi, the Coast and Western provinces. By the time the main presidential candidates, Mwai Kibaki and Raila Odinga, signed a power-sharing agreement in February 2008, 1,200 people had been killed and over a quarter of a million people displaced.

Nearly 30% of households reported being directly affected by the electoral violence in terms of personal injury, displacement or economic loss (Dercon and Gutiérrez-Romero 2012). Market centres closed, particularly those near the epicentre of the violence, causing food shortages and inflation (Glauser 2008). For instance, Dupas and Robinson (2012) find that in Bumala, one of the districts severely affected by violence, the price of basic foods such as milk, sugar, cooking oil and other essentials increased by up to 30% in the weeks immediately after the electoral dispute. The inflation and decline in consumption of food persisted for months, even after the power agreement that ceased the violence. Firms located

³ Boone (2011) shows that all the areas where KANU's government had formerly established land settlement schemes or sold the land to non-indigenous groups decades earlier experienced electoral violence. As a revealing counterfactual, the electoral violence of the 1990s spared the lands located in the Trust territory, composed of 75% of Kenya's territory, where much of the land is held under customary rights by members of ethnic communities and where land rights were not politicised.

in the epicentre of the violence in the Rift and Western also reported an average of 50% of labour force missing during the period of violence, while no major effects were experienced by firms located in other regions (Macchiavello and Morjaria 2015). Although the next 2013 election avoided a major political crisis, it suffered again from some electoral violence, claiming the lives of 500 people (Human Rights Watch 2013). This recurrent use of violence during elections has been found to increase the acceptability of using violence in support of a just cause (Gutiérrez-Romero and LeBas 2020; Gutiérrez-Romero 2014).

Potential Effects of Electoral Violence

An extensive literature in medicine and social science shows that civil conflict can have long-lasting effects on children's height and education outcomes through various mechanisms (Akresh et al. 2012; Akbulut-Yuksel 2014; Minoiu and Shemyakina 2014; Balalian et al. 2017). For instance, to protect their children in the period of political upheaval, affected households might try to reduce consumption of nutritious foods for adult women and men, although food and other child investments might ultimately be affected, with likely long-term consequences (Ferreira and Schady 2009). The disruption to women's nutrition during pregnancy, for example, is known to affect the birth-weight of children (Alderman and Behrman 2006). Similarly, children who suffer malnutrition during early life often exhibit stunted growth during adulthood, showing that they do not necessarily catch up during adolescence (Bradley and Corwyn 2002).

Several studies have found that stunted growth during childhood is a good predictor of poorer cognitive performance and lower education outcomes as adults (Behrman and Rosenzweig 2004; Case and Paxson 2008).⁴ Schooling might also be disrupted due to teachers and pupils being absent, fearing victimisation while the conflict unravels (Miller, Murnane, and Willett 2008). Some children might need to drop out of school, either to help

⁴ For instance, found that the civil war in Zimbabwe reduced the child height-for-age z-score by 0.5 points, while the severe drought that followed during 1982–1984 reduced the z-score by 0.6 points (Alderman, Hoddinott, and Kinsey 2006). These stunted children remained stunted as adults, and with worse education outcomes.

households to cope with the consumption shock or due to forced displacement.⁵ Despite the extensive literature of how civil conflict affects welfare it is unclear whether electoral violence, typically of low scale and short-lived nature, could have any long-term impacts on children's height. It is also unclear whether electoral violence has any significant impact on educational attainment, especially considering the specificities of our case study. Moreover, electoral violence in Kenya tends to be low scale, and more importantly, typically occurs during the school holidays, which perhaps limits its impact on school attendance.

Based on our case study, and earlier literature, the corresponding hypotheses that we will test are:

Hypothesis 1: Electoral violence leads to food price increases and important changes in diet of members of affected households.

Hypothesis 2: Electoral violence leads to significant consumption shocks and as a result affects the height of people during growing age.

Hypothesis 3: Electoral violence, of low scale, short lived, and concentrated during the school holidays does not affect educational attainment.

Survey Data

To estimate the impact of electoral violence on height and educational attainment we conducted a nationally representative survey in Kenya in December 2013, nine months after the presidential election. The survey interviewed 1,210 adults of voting age across 80 out of the 290 constituencies in the country, stratifying the sample by province, urban and rural setting. Interviewers measured the height of all the adult respondents (aged 18 up to 60) as well as the respondents' biological children (ranging from newborn until 18 years old).⁶ All

⁵ Pupils might also experience stress, anxiety and depression as a result of direct victimisation, or witnessing violence in their communities, which can lead to post-traumatic stress, absenteeism and poor school performance (Fowler et al. 2009).

⁶ The height of babies and toddlers who were not walking yet were measured by the interviewers (with the help of the child's parents). Children were placed in a horizontal

adult respondents were asked questions related to their current health and socio-economic circumstances, as well as how they fared during their growing age. Adult respondents were also asked such information about their parents and their biological children. The broad characteristics of respondents are reported in Table 1.

Respondents were also asked whether they or their household had ever been affected by electoral violence, how they had been affected, and their area of residence during each of the last five elections of 1992, 1997, 2002, 2007 and 2013. As mentioned earlier, the country experienced electoral violence during all these elections, the election of 2007 being by far the most violent. Table 2 reports the birth cohorts of the generations that might have been exposed to electoral violence during their growing years.

Table 1. Main Characteristics of Sample (First-Generation).

position by laying them down on a flat surface, with their head and feet against a vertical surface, and gently pressing the children's knees for the legs to be straight.

	Mean	St. Dev.
Female	0.48	0.5
Age 18-26	0.31	0.46
Height for female respondents	161.15	11.75
Height for male respondents	167.61	13.28
Secondary or more for female respondents	0.73	0.44
Secondary or more for male respondents	0.8	0.4
Victim of electoral violence during growing age	0.19	0.4
Assent index	0.41	0.17
Monthly expenditure per capita in household (USD)	72.82	234.96
Employed	0.5	0.5
Married	0.5	0.5
Has children	0.45	0.5
Number of children	0.74	1.13
Agree with use of violence	0.17	0.37
Disagree with having elections	0.31	0.46
Lives in rural setting	0.58	0.49
Ethnicity		
Kikuyu	16.94	16.94
Luo	15.03	31.98
Luhya	14.70	46.68
Kamba	10.22	56.89
Meru	7.89	64.78
Kisii	7.48	72.26
Kalenjin	10.13	82.39
Maasai	1.66	84.05
Mijikenda	6.06	90.12
Taita	2.66	92.77
Somali	3.41	96.18
Pokot	0.25	96.43
Turkana	1.58	98.01
Teso	0.25	98.26
Embu	1.33	99.58
Other	0.42	100.00
Province		
Nairobi	7.19	7.19
Central	8.60	15.79
Eastern	16.20	31.98
Rift Valley	23.97	55.95
Nyanza	15.12	71.07
Western	12.73	83.80
North Eastern	3.22	87.02
Coast	12.98	100.00
When of growing age		
Was bedridden in bed for more than one month	0.10	0.31
Got malaria	0.56	0.50
Got polio	0.03	0.17
Father household asset index	0.39	0.17
Number of cows father owned	6.16	14.03
Father had secondary or more	0.45	0.50
Observations	1,210	

Table 2. Birth Cohorts Exposed to Electoral Violence.

Year of election		1992	1997	2002	2007-08	2013
Birth cohort at time of election	Aged 13 to 16	1976-1980	1981-1988	1986-1990	1991-1995	1997-2001
	7 to 12	1980-1983	1985-1991	1990-1996	1995-2001	2001-2007
	4 to 6	1983-1989	1991-1994	1996-1999	2001-2004	2007-2010
	in utero to 3	1989-1992	1994-1997	1999-2002	2004-2008	2010-2013

Our survey also reveals how respondents have been affected by electoral violence over the previous five multi-party elections (Table 3). In line with our expectations, the 2007 disputed election had the highest rate of victims of electoral violence in terms of personal impact, family members or village being affected. About 19% of respondents were exposed to electoral violence during their early life, including in utero, childhood or adolescence. By ‘exposed to electoral violence’ we mean that the respondents claimed that they were either

personally affected by the electoral violence, were living in a household that got forcibly displaced, experienced victimisation, suffered a reduction of income or consumption as a direct result of electoral violence, or were living in a village that frequently experienced electoral violence (according to respondents' own account).

Table 3. Exposure to Electoral Violence.

Year of election		1992	1997	2002	2007	2013
Have you ever been displaced, leaving your home or land in response to incidents of electoral violence?	Mean	0.010	0.004	0.007	0.053	0.007
	St Dev	0.099	0.064	0.081	0.224	0.081
Have any of your family members ever been affected in the outbreaks of electoral violence?	Mean	0.037	0.015	0.019	0.150	0.058
	St Dev	0.189	0.121	0.137	0.357	0.234
Did electoral violence occur frequently in your village in any of the following elections?	Mean	0.054	0.043	0.037	0.200	0.064
	St Dev	0.226	0.203	0.189	0.400	0.244
Have you personally ever been affected in the outbreaks of electoral violence in terms of: damage to personal property, destruction of home, being forced to leave your home, destruction or closure of a business, loss of a job, personal injury, or land disputes?	Mean	0.019	0.012	0.014	0.206	0.088
	St Dev	0.137	0.111	0.118	0.404	0.283

In Table A.1, we provide further details of adult respondents who were exposed to electoral violence during their growing years. On average, respondents who were affected by electoral violence during their growing years are shorter in height, by nearly two centimetres, than the non-victims of violence. Nonetheless, on average, these victims and non-victims of electoral violence have similar educational attainment, employment status, household expenditure per capita and wealth index at the time of the survey, as adults.⁷ Their parents also had similar educational attainment and wealth index when these respondents were of growing age.

Table A.2 provides the descriptive statistics of the respondents' biological children (ranging from newborns up 18 years old). To make meaningful comparisons of height across

⁷ The wealth index for respondents is based on whether their households own any of the 15 durable assets asked. The assets were: house, land, cattle, oven, fridge, washing machine, computer, phone, mobile phone, book, radio, television, bicycle, motorcycle, and car. Similarly, we constructed a wealth index for the respondents' parents based on the question: 'Did your father's household own any of the following durable assets, back when your father was your age?' We asked the same list of assets as before, omitting only owning a mobile phone.

children regardless of their age or sex, we use z-scores of height-for-age. Z-scores represent the number of standard deviations below or above a reference mean for children and adolescents of a given age and sex, and are a good indicator of growth retardation and malnourishment. The population used as a reference is the 2007 WHO Reference Charts.⁸ Children with a height-for-age z-score below -2 (more than two standard deviations from the mean of healthy children) are considered stunted and malnourished. According to the z-scores shown in Table A.1, boys are more likely to be stunted than girls.

Method

Our intuition is that households affected by electoral violence may suffer from important income and consumption shocks and, as a result, might struggle to provide adequate nutrition to its members, including those in gestation and growing age. These shocks, although temporary, can be substantial and leave long-term consequences among young people during their growing years. Thus, we expect that the height of children living in households affected by electoral violence might be of shorter stature than that of similar children living in unaffected households.

To test our intuition, we compare the height of adults that were living in households affected by electoral violence during their growing years (from gestation up to 16 years old) to that of similar adults that were unaffected by electoral violence. These adults, aged 18–60 at the time of our survey, were identified based on their year of birth and whether they self-reported to have been exposed to electoral violence either directly (themselves or their households) or indirectly (their village) during their growing years.⁹ To quantify the impact of electoral violence, we start by using a simple Ordinary Least Squares (OLS) regression, shown in equation (1).

$$height_{iay} = \beta \textit{Victim growing age}_{iy} + \delta X_{iay} + \alpha_{iy} + \phi_{ie} + \mu_{ia} + \varepsilon_i \quad (1)$$

where the dependent variable is the height of respondent i born in province a in year y . *Victim growing age* denotes whether the respondent or her/his household was affected by electoral violence during her/his growing years. The coefficient of interest, β , measures the impact of

⁸ The z-scores of height-for-age were calculated using the *zanthro* package in *stata*.

⁹ As a robustness test we identify victims of electoral violence based on the respondents' area of residency in each of the last five elections and their year of birth.

electoral violence. To lessen any potential bias, we control for the respondents' characteristics as well as those of their parents, denoted by vector X . This vector includes the respondents' sex, whether they were confined to bed for one month or more during their growing years, whether they suffered from malaria during their growing years, and whether they reside in a rural or urban area. In addition, we control for whether the respondents' parents are of the same ethnic group, their educational attainment, wealth index, and the number of cows owned during the respondents' growing years. We also include three fixed effects: respondent's birth cohort α_{iy} , ethnicity ϕ_{ie} , and province of birth μ_{ia} . These fixed effects capture common time trends and unobserved heterogeneity at the ethnicity and area levels, such as macro-economic shocks, ethnic group eating habits, average height, and local labour market conditions. The white-robust errors, ε , are clustered at the respondents' ethnicity and year of birth levels.

The benchmark specification used relies on the assumption that conditional on respondents' birth cohort, ethnicity, and province of birth fixed effects, observed socio-economic characteristics and those of their parents, episodes of electoral violence are uncorrelated with any substantial latent determinants of respondents' height or educational attainment. If this assumption is correct, we can regard the coefficient β as the impact of electoral violence on respondents' height (or educational attainment) transmitted through the various resulting income and consumption shocks experienced during the growing years. We also use this benchmark specification to assess three other important outcome variables: whether the respondents self-reported food price increased considerably during the episodes of electoral violence, whether the respondents' family was forced to change diet as a result, and respondents' educational attainment.

Electoral violence is clearly not randomly assigned. Thus, the ability to draw strict causal effects is limited from our benchmark specifications, despite the large range of controls used. As a robustness check, and stronger test, we estimate the average-treatment effect of electoral violence using coarsened matching.¹⁰ This method estimates causal effects

¹⁰ As a robustness test we also estimate the ATT effect using the Epanechnikov kernel matching method proposed by Heckman, Ichimura, Smith, and Todd (1998). We do so for all our outcomes, for our adult respondents, and that of their children (first and second generations). The kernel matching yields remarkably similar results to those of coarsened

in observational data by matching observations, in our case survey respondents exposed to electoral violence, that are as similar as possible to respondents not exposed to electoral violence. That is, this method prunes observations that have no close matches in the variables that could potentially be confounders of respondents being exposed to electoral violence or not. Coarsened matching method also reduces substantial imbalances in means, and the marginal and joint distribution of the data, while ensuring imbalances on one variable has no effect on the maximum imbalance of other variables.¹¹ We include in the matching procedure variables that are likely to be important confounders of experiencing electoral violence: respondents' ethnicity, sex, whether was sick when growing up, living in a rural area. In addition, we control for whether the respondents' parents are of the same ethnic group, their educational attainment and wealth index during the respondents' growing years.¹²

After matching, we use an OLS regression to estimate the average treatment effect (ATT) of electoral violence while controlling for any differences in the covariates across the treatment and control groups. As recommended by Blackwell, Iacus, King, and Porro (2009), we also weight this regression using the weights generated by the coarsened matching method to evaluate any potential remaining imbalance. We use white-robust errors, clustered at the respondents' ethnicity and year of birth levels.

matching and OLS regardless if using the full controls used in the OLS specifications or the more selective specification used in the coarsened matching. Given the similarity in results we do not present these other kernel matching results but are available upon request.

¹¹ When the sample size is reasonably big, unlike ours, this method can also match one-to-one observations in the treatment and control groups. This exact match however can produce very few matches because of the unlikeliness of finding two respondents with have identical values on all variables matched.

¹² Although we matched for all the most important confounders, we did not match using absolutely all the variables used in the OLS benchmark regressions because the size of the matched control and treated group are reduced significantly. This reduction is due to the difficulties of finding exact matches across multiple dimensions. Despite this important reduction in sample, the results remain robust to using different specifications or wider use of controls.

Results

Table 4 reports the effect of electoral violence using equation (1). Stunted growth is a primary manifestation of malnutrition. Malnutrition might be aggravated during episodes of electoral violence due to the disruption to agriculture production, difficulties in distribution, and the associated shortages of food and spikes in prices. We provide evidence of this mechanism. People who were victims of electoral violence during their growing years are 33% more likely to report that food prices in their area increased as a result of electoral violence than non-victims of violence. Similarly, victims of electoral violence are 43% more likely to report that because of the increase in food prices that followed the electoral violence, their parents were forced to change the household diet. Thus, we find supportive evidence for our first hypothesis.

Table 4. Respondents that during their Growing Years Experienced Violence.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All sub-sample					Removing areas that experienced extreme weather				
	Food price increased considerably	Forced to change diet as result	Height	Height	Education attainment	Food price increased considerably	Forced to change diet as result	Height	Height	Education attainment
Victim of electoral violence back during growing age	0.331*** (0.059)	0.431*** (0.140)	-2.508* (1.451)	-1.708 (2.112)	0.063 (0.110)	0.313*** (0.060)	0.361** (0.144)	-2.845* (1.459)	-1.421 (2.219)	0.040 (0.110)
Male	-0.040 (0.043)	-0.109 (0.113)	7.751*** (1.454)	8.129*** (1.552)	0.156* (0.089)	-0.040 (0.045)	-0.015 (0.106)	7.375*** (1.541)	8.008*** (1.608)	0.119 (0.092)
Victim of electoral violence back when of growing age x Male				-1.441 (2.629)					-2.574 (2.829)	
Was bedridden in bed for more than one month when of growing age	-0.053 (0.064)	-0.059 (0.169)	-2.160 (2.033)	-2.234 (2.015)	-0.100 (0.171)	-0.050 (0.066)	-0.119 (0.149)	-1.686 (2.095)	-1.804 (2.077)	-0.088 (0.173)
Got malaria when of growing age	0.043 (0.043)	0.039 (0.172)	3.187** (1.454)	3.190** (1.452)	-0.048 (0.098)	0.029 (0.044)	0.060 (0.176)	2.898* (1.494)	2.781* (1.491)	-0.101 (0.097)
Got polio when of growing age	0.040 (0.149)	0.006 (0.289)	5.531 (4.820)	5.720 (4.770)	0.174 (0.215)	0.042 (0.147)	0.144 (0.254)	5.391 (4.904)	5.724 (4.851)	0.202 (0.216)
Respondent currently lives in a rural area	-0.030 (0.039)	-0.275** (0.124)	1.323 (1.215)	1.345 (1.211)	-0.047 (0.098)	-0.047 (0.039)	-0.299** (0.129)	1.495 (1.245)	1.535 (1.241)	-0.056 (0.101)
Parents belong to same ethnic group	-0.015 (0.046)	-0.047 (0.116)	-1.277 (1.276)	-1.282 (1.281)	0.068 (0.097)	0.003 (0.048)	-0.077 (0.112)	-1.144 (1.267)	-1.125 (1.272)	0.051 (0.100)
Respondent's father had secondary or more	-0.004 (0.009)	-0.045 (0.028)	0.278 (0.277)	0.266 (0.283)	0.136*** (0.023)	-0.007 (0.009)	-0.049* (0.026)	0.206 (0.290)	0.178 (0.300)	0.128*** (0.023)
Number of cows father owned when respondent was of growing age	0.003*** (0.001)	0.002** (0.001)	0.009 (0.070)	0.008 (0.070)	-0.001 (0.002)	0.003*** (0.001)	0.002** (0.001)	-0.021 (0.082)	-0.024 (0.083)	-0.000 (0.002)
Father household asset index back when respondent was of growing age	-0.070 (0.129)	-0.022 (0.350)	9.563** (4.501)	9.489** (4.492)	1.968*** (0.298)	-0.085 (0.134)	-0.036 (0.352)	9.848** (4.602)	9.756** (4.589)	1.981*** (0.303)
Ethnicity fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province of birth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort of birth	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	366	84	352	352	428	348	79	337	337	409
R-squared	0.334	0.514	0.230	0.231	0.350	0.316	0.568	0.227	0.229	0.340

Note: In parentheses are the robust standard errors clustered at the respondents' ethnicity and year of birth levels. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Supporting our second hypothesis, we also find that electoral violence has a negative impact on the height of adults that were exposed to electoral violence during their growing

years (Table 4, column 3). These adults are, on average, 2.5 centimetres shorter than adults that were not exposed to electoral violence during their growing years. In column 4, we add the interaction between the variables *Victim of growing age_{iy}*Male_{iy}*. This interaction is statistically insignificant, suggesting that there are no differentiated effects on height between male and female victims of electoral violence.

In each of the last elections, a handful of districts experienced large negative agricultural production shocks due to droughts or excessive floods. These agricultural shocks occurred during 1991–1993, 1997–1998, 1999–2000, 2002, 2008–2009, and 2013, periods that overlapped with episodes of electoral violence.¹³ As a robustness check, we exclude from our analysis all our respondents that were living in areas that experienced severe negative agricultural production shocks due to extreme weather. We identify these areas based on the extensive study of (D'Alessandro et al. 2015) who have a detailed record of the districts that have experienced significant economic losses in agriculture as a result of extreme weather conditions since the late 1980s.¹⁴ Removing these districts, once again, we find that people who were exposed to electoral violence during their growing years are about

¹³ Food security in Kenya depends on its agriculture, composed mainly of smallholder farmers vulnerable to extreme weather conditions. Although extreme weather conditions and their impact on agriculture might drive inflation nationwide, food shortages and consumption shocks are likely to be more severe in districts affected by agricultural shocks. Residents in these districts might be less able to smooth income shortfalls caused by electoral violence by merely selling their agricultural produce. For instance, Yamano, Alderman, and Christiaensen (2005) find crop damage in rural areas in Ethiopia leads to a 0.17 centimetre reduction in the height of children 6–24 months old. These food-producing areas might also struggle to suddenly establish new trade networks with other production centres to try re-establishing food availability.

¹⁴ We remove from the analysis all people that during growing age were living in Narok in 1992, in Garissa in 1997, in Mombasa or Oi in 2002, in Kisumu, Eldoret, Dagoretti, or Mombasa in 2007, or in Mombasa in 2013.

2.8 cm shorter as adults than the non-victims of electoral violence (Table 4, columns 8 and 9).

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Moving on to test our third hypothesis, we find that electoral violence has no statistically significant effect on educational attainment of respondents affected by electoral violence during their growing years. This non-statistically significant effect is also robust to the exclusion of areas that experienced extreme weather (Table 4, columns 5 and 10).¹⁶

Districts that Experienced Electoral Violence during 2007–08

To assess the robustness of our findings, we identify victims of electoral violence instead based on the respondents' area of residency in each of the last five elections and their year of birth. We then estimate the effects of electoral violence on the now adult respondents that were both of growing age and living in districts affected by electoral violence during 2007–08.¹⁷ We focus on this specific episode for two reasons. First, it is by and large the most violent in Kenya's history in terms of the number of casualties and injuries. Second, the respondents that were growing at that time, and then interviewed as adults in our survey were in their teen years (12-13) therefore like to remember if their household suffered from any hardship or important food consumption during this episode of electoral violence.

To identify the districts affected by the 2007–08 electoral violence, we use the information collected by the Commission of Inquiry on Post-Election Violence (CIPEV 2008). According to this commission, 1,133 people lost their lives, and 3,561 people were injured during the electoral violence. Moreover, 28 out of 46 districts in the country suffered casualties, unlike previous episodes of violence where the violence had affected only a handful of districts mostly in and around Nairobi, the Rift Valley, and the coastal region.

¹⁵ As before, we do not find any differential impact in height between female and male victims of electoral violence.

¹⁶ We tried different specifications such as focusing on only primary, secondary, or higher education. Again, we found no evidence that those affected by electoral violence had worse educational attainment than non-victims thus we omit presenting these results but are available upon request.

¹⁷ Our survey captures only 39 respondents that were both of growing age at the time of the 2007 election and whose households were directly affected by the violence.

In line with our previous results, we also find that respondents living in districts affected by the 2007–08 electoral violence during their growing years are now 3.7 cm shorter than respondents living in districts unaffected by the violence (Table 5).¹⁸ Once again, we find no statistically significant differences in educational attainment between the victims (those exposed to electoral violence) and non-victims (column 5). These results remain consistent even removing the districts (Eldoret, Kisumu, and Dagoreti) that suffered from severe droughts during 2007–08 (Table 5, columns 6–10).

Table 5. Respondents Living in Districts that Experienced Electoral Violence.

	(1)	(2)	(3)		(4)	(5)	(6)–(10)				
	Food price increased considerably	Forced to change diet as result	All sub-sample		Height	Height	Education attainment	Food price increased considerably	Forced to change diet as result	Height	Height
Growing up in a district that experienced electoral violence	0.549*** (0.073)	0.405 (0.263)	-3.708* (1.944)	-1.384 (2.630)	-0.194 (0.226)	0.557*** (0.079)	0.645*** (0.236)	-5.278** (2.186)	-1.343 (3.140)	-0.183 (0.232)	
Male	-0.036 (0.046)	-0.003 (0.156)	8.001*** (1.436)	8.677*** (1.557)	0.083 (0.100)	-0.043 (0.045)	0.112 (0.154)	7.635*** (1.499)	8.603*** (1.556)	0.054 (0.099)	
Growing up in a district that experienced electoral violence x Male				-4.649 (3.449)					-8.221** (3.928)		
Was bedridden in bed for more than one month when of growing age	0.018 (0.067)	-0.103 (0.286)	-2.297 (2.245)	-2.444 (2.202)	0.052 (0.107)	0.023 (0.070)	-0.114 (0.172)	-1.711 (2.316)	-1.867 (2.277)	-0.105 (0.190)	
Got malaria when of growing age	0.058 (0.050)	0.067 (0.267)	3.773** (1.662)	3.849** (1.654)	-0.112 (0.187)	0.047 (0.049)	0.144 (0.258)	3.483** (1.700)	3.570** (1.682)	-0.018 (0.100)	
Got polio when of growing age	-0.057 (0.124)	-0.155 (0.194)	5.949 (5.967)	6.507 (5.952)	-0.006 (0.100)	-0.052 (0.121)	-0.153 (0.190)	6.085 (6.057)	7.048 (6.065)	0.339 (0.248)	
Respondent currently lives in a rural area	-0.002 (0.046)	-0.297 (0.207)	1.467 (1.277)	1.549 (1.279)	0.349 (0.250)	-0.020 (0.046)	-0.261 (0.167)	1.532 (1.295)	1.689 (1.295)	0.044 (0.107)	
Parents belong to same ethnic group	0.005 (0.053)	-0.084 (0.177)	-0.817 (1.448)	-0.751 (1.450)	0.087 (0.109)	0.029 (0.053)	-0.082 (0.170)	-0.328 (1.458)	-0.080 (1.442)	0.094 (0.110)	
Respondent's father had secondary or more	-0.002 (0.010)	-0.071 (0.050)	0.200 (0.280)	0.169 (0.286)	0.187*** (0.023)	-0.003 (0.010)	-0.071 (0.049)	0.155 (0.277)	0.074 (0.284)	0.184*** (0.024)	
Number of cows father owned when respondent was of growing age	0.003 (0.004)	-0.002 (0.022)	0.063 (0.071)	0.065 (0.073)	-0.003 (0.006)	0.002 (0.004)	0.023 (0.018)	0.058 (0.073)	0.054 (0.073)	-0.004 (0.006)	
Father household asset index back when respondent was of growing	0.050 (0.147)	-0.426 (0.634)	10.099** (4.600)	9.948** (4.667)	1.752*** (0.333)	0.077 (0.156)	-0.819 (0.526)	10.421** (4.710)	10.343** (4.766)	1.767*** (0.335)	
Ethnicity fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Province of birth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Cohort of birth	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	295	54	292	292	350	287	52	285	285	343	
R-squared	0.280	0.569	0.268	0.272	0.367	0.265	0.650	0.272	0.283	0.364	

Note: In parentheses are the robust standard errors clustered at the respondents' ethnicity and year of birth levels. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

¹⁸ Respondents growing up in districts affected by electoral violence are also considerably more likely to report an increase in food prices (Table 5, column 1). Similarly, there is a positive association between changing diet as a result of increase of prices and growing up in a district that experienced electoral violence, albeit this is not statistically significant, perhaps due to the small sample (Table 5, column 2). This finding might also suggest people living in districts engulfed in electoral violence might change their diet only if they experience a more direct form of victimisation.

Robustness Checks

First Placebo Test

To rule out the possibility that our results are driven by chance, pre-trends, or any potential confounder, we present two placebo tests. The first placebo test compares the outcomes of victims of violence of non-growing age versus that of non-victims of electoral violence that at the time of the violence were no longer of growing age. These victims were exposed to the electoral violence after they had stopped growing, between the ages of 18 and 60 years old. Hence, any shortage of food or change of diet should not affect their height when compared to people of similar characteristics not affected by electoral violence.

We find that these victims of electoral violence of non-growing age also reported increases in food prices and were forced to change their diet as a result (Table 6, columns 1 and 2). As expected, despite this consumption shock violence had no impact on the height or educational attainment of these victims of electoral violence that were no longer of growing age (columns 3–5).

Table 6. Placebo Tests: During Non-Growing Age Was Victim of Electoral Violence or Living in Districts that Experienced it.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Placebo A					Placebo B					
	Food price increased considerably	Forced to change diet as result	Height	Height	Education attainment	Food price increased considerably	Forced to change diet as result	Height	Height	Height	Education attainment
During non-growing age was victim of electoral violence	0.276*** (0.083)	0.279** (0.126)	-3.305 (2.488)	-4.187 (3.443)	-0.169 (0.161)						
During non-growing age was living at district that suffered electoral violence								-8.030 (5.821)			0.021 (0.059)
During non-growing age x intensity of electoral violence in district						0.068** (0.028)	0.047 (0.034)			0.122 (0.605)	0.302 (0.802)
Victim of electoral violence during non-growing age X Male				1.802 (5.436)							
Intensity of electoral violence x Male											-1.381 (0.319)
Male	-0.041 (0.074)	0.078 (0.097)	4.594* (2.464)	3.551 (4.362)	0.450*** (0.155)	-0.042 (0.075)	0.051 (0.095)	4.585* (2.549)	4.394* (2.535)	6.281** (2.920)	0.462*** (0.151)
Was bedridden in bed for more than one month when of growing age	-0.377*** (0.106)	-0.136 (0.130)	3.646 (4.494)	3.554 (4.529)	0.181 (0.239)	-0.389*** (0.097)	-0.124 (0.150)	3.624 (4.502)	3.564 (4.496)	3.715 (4.533)	0.221 (0.228)
Got malaria when of growing age	0.066 (0.072)	-0.100 (0.107)	-1.497 (2.405)	-1.507 (2.405)	0.303 (0.195)	0.106 (0.073)	-0.068 (0.109)	-2.402 (2.521)	-2.005 (2.488)	-2.063 (2.488)	0.277 (0.193)
Got polio when of growing age	0.024 (0.239)	0.617* (0.319)	7.167 (5.999)	7.073 (6.114)	0.181 (0.381)	0.034 (0.205)	0.679** (0.307)	6.119 (5.871)	6.447 (5.970)	6.150 (6.256)	0.025 (0.375)
Respondent currently lives in a rural area	0.220*** (0.084)	0.095 (0.120)	1.218 (2.711)	1.302 (2.707)	-0.167 (0.187)	0.173* (0.091)	0.061 (0.141)	2.193 (2.767)	1.199 (2.736)	1.467 (2.723)	-0.172 (0.187)
Parents belong to same ethnic group	-0.006 (0.017)	-0.001 (0.024)	-1.300** (0.628)	-1.325** (0.630)	0.338* (0.175)	-0.003 (0.016)	0.003 (0.026)	-1.414** (0.625)	-1.368** (0.629)	-1.491** (0.651)	0.339* (0.177)
Respondent's father had secondary or more	-0.004 (0.003)	0.006** (0.003)	0.055 (0.141)	0.056 (0.140)	0.131*** (0.044)	-0.004 (0.003)	0.006** (0.003)	0.076 (0.141)	0.078 (0.142)	0.067 (0.145)	0.139*** (0.044)
Number of cows father owned when respondent was of growing age	-0.113 (0.290)	0.040 (0.382)	27.652*** (9.565)	27.639*** (9.601)	0.002 (0.007)	-0.141 (0.288)	0.113 (0.382)	26.967*** (9.399)	26.930*** (9.631)	26.245*** (9.603)	0.003 (0.007)
Father household asset index back when respondent was of growing age	-0.028 (0.073)	-0.023 (0.096)	1.132 (2.669)	1.132 (2.689)	1.424** (0.573)	-0.001 (0.081)	-0.010 (0.094)	1.492 (2.595)	1.178 (2.689)	1.380 (2.676)	1.268** (0.566)
Ethnicity fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province of birth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort of birth	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	170	108	143	143	175	170	108	143	143	143	175
R-squared	0.381	0.403	0.210	0.211	0.431	0.355	0.357	0.211	0.198	0.205	0.424

Note: In parentheses are the robust standard errors clustered at the respondents' ethnicity and year of birth levels. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Second Placebo Test

As a second placebo test, we compare people that were living in districts that experienced electoral violence in 2007–08 during their non-growing years to those living in districts that did not experience electoral violence during their non-growing years. As expected, these people exposed to electoral violence suffered no impact on their height or educational attainment despite of reporting increases in food prices (Table 6, columns 6-11). Moreover, the height of people exposed to electoral violence during their non-growing years is not affected by the intensity of conflict (casualties plus injuries) that their district experienced either (Table 6, columns 9–10).

Coarsened Matching

We next estimate the ATT of electoral violence using coarsened matching. The pre- and post-matching balancing statistics are shown in Table A.3. The matching reduced the imbalance across all covariates, which was not large to start with. Table 7 shows the ATT effects. As before, we find that victims of electoral violence during their growing age had an important consumption shock (in terms of self-reported impact of food price and diet). In line with our earlier findings, the ATT on the victims of electoral violence that were affected during growing age show a reduction in height of 2.8 centimetres but no impact on their educational attainment. These results are robust if we focus instead on those respondents living in districts that experienced electoral violence during 2007–08 during their growing years, and if we remove the areas affected by extreme weather.

Table 7. Average Treatment Effects of Respondents Affected by Electoral Violence during Growing Age.

	Treated	Control	ATT food price	ATT changed diet	ATT height	ATT education attainment
<i>Victim of electoral violence during growing age</i>						
All matched sub-sample	220	137	0.454*** (0.052)	0.690*** (0.090)	-2.865* (1.532)	0.081 (0.140)
Removing areas that suffered extreme weather	210	122	0.440*** (0.056)	0.666*** (0.103)	-3.313** (1.638)	0.058 (0.148)
<i>Living in districts that experienced electoral violence during their growing age</i>						
All matched sub-sample	97	55	0.355*** (0.098)	0.533** (0.202)	-3.872* (2.040)	0.129 (0.200)
Removing areas that suffered extreme weather	81	44	0.298** (0.114)	0.531** (0.214)	-4.340** (2.145)	0.096 (0.237)

Note: In parentheses are the robust standard errors clustered at the respondents' ethnicity and year of birth levels. ***p < 0.01, **p < 0.05, *p < 0.1.

Again, using coarsened matching we also estimate the ATT of the two earlier placebo tests. In line with earlier results, we find that those affected by electoral violence during their non-growing age have no impact on their height or educational attainment if compared to those that did not experience electoral violence during their non-growing years (Table 8).

Table 8. Placebo Tests: Average Treatment Effect of Respondents that during Non-Growing Age Were Affected by Electoral Violence.

	Treated	Control	ATT height	ATT education attainment
Placebo A	57	75	-5.131	-0.063
Victim of electoral violence during non-growing age				
All matched sub-sample			(3.187)	(0.241)
			-5.131	-0.122
Removing areas that suffered extreme weather	57	75	(3.187)	(0.257)
Placebo B			-2.133	-0.199
Living in districts that experienced electoral violence during non-growing age				
All matched sub-sample	56	48	(6.290)	(0.356)
			-5.274	-0.287
Removing areas that suffered extreme weather	50	43	(6.490)	(0.361)

Note: In parentheses are the robust standard errors clustered at the respondents' ethnicity and year of birth levels. ***p < 0.01, **p < 0.05, *p < 0.1.

Second-Generation Impacts

As an alternative test of the detrimental effect of electoral violence, we examine whether electoral violence has had a second-generation impact. That is, whether electoral violence has also affected the stature of the children of the respondents who were affected by electoral violence during their growing years. To do so, we compare the z-scores of height-for-age of the children of victims of electoral violence to those of the children of non-victims of electoral violence. We estimate the impact of electoral violence on children's height by comparing the outcomes of the children of our survey respondents who claimed to have been affected directly by the electoral violence versus the children of survey respondents who stated that they were not affected by electoral violence. To do so, we estimate the OLS regression shown in equation (2).

$$childheight_{cay} = \beta Parent\ was\ victim_{i,y} + \eta C_c + \alpha_{cy} + \phi_{ce} + \mu_{ca} + \varepsilon_c \quad (2)$$

where *childheight* denotes the z-scores of height-for-age of the respondent's child *c* born in the province *a* in year *y*. The z-scores are sex-independent, which permits the evaluation of children's growth status by pulling together sex and various age groups ranging from birth up until 18 years old. *Parent was victim_i* denotes whether the child's parent *i* (mother or father) was affected by electoral violence during her/his growing years in the province *a*. Thus, the coefficient of interest β measures the impact of electoral violence on the height of the victim's child. To lessen a potential self-selection bias, we control for vector *C* that includes the children's sex, whether they were confined to bed for one month or more, and whether they resided in a rural or urban area. In this vector, we also include the characteristics of the children's parents, such as the mother or father's height (depending on who was interviewed)¹⁹, cohort of birth, educational attainment, employment status, whether both parents are of the same ethnic group, household wealth index, and the number of cows owned. All the other terms on the right-hand side refer to child's birth cohort α_{cy} , ethnicity ϕ_{ce} , and province of birth μ_{ca} . These fixed effects capture common time trends and unobserved heterogeneity at the ethnicity and area levels, such as macro-economic shocks, ethnic group eating habits, average height, and local labour market conditions. The white-robust errors, ε , are clustered at the child's ethnicity, year of birth, and household levels to take into account the fact that most families have more than one child.

Children's Height

We find no statistically significant differences in the z-scores of height-for-age of the children of victims and non-victims of electoral violence (Table 9, columns 1 and 2). However, electoral violence is associated with a statistically significant reduction in height-for-age z scores for boys (-2.67 units) compared to that of the girls (Table 9 column 3), as shown by the interaction *Children of victim electoral violence_{iy}*Boys_{iy}*. That is, this interaction shows that sons of victims of electoral violence are more stunted as a result than daughters.

¹⁹ We control for parent's height as stunted parents may have higher probability of having children with low height-for-age z-scores

Our findings are consistent with other studies in Kenya²⁰ and two large meta-analyses from Sub-Saharan Africa that have found that boys in the region are more likely to be stunted than girls, even in contexts with no civil conflict (Wamani et al. 2007; Kenyan Ministry of Health 2011; Keino et al. 2014). To date, the reason (medical or socio-economic) behind the gender differential in the stunting observed in the region remains unclear (Vonaesch et al. 2017). Although there are certainly gender differentials that indicate that households may adapt consumption behaviours to protect sons at the expense of daughters, there is no strong evidence of preferential treatment for sons in the region (Friedman and Schady 2009). With the retrospective data available, we cannot test whether there is any gender differential in household expenditure driving our results. However, a potential explanation for our findings is the differential in calories needed, and the associated costs, between boys and girls. Until the age of eight, boys and girls have similar calorie needs. However, the caloric requirement of boys increases more sharply than that of girls during adolescence, reaching the same level of calories as adults, or even higher, especially if very active (Public Health England 2018).

Table 9. Height and Educational Attainment of Children of Victims of Electoral Violence that Were Affected During Growing Age.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)		(11)		
	Aged 0-18				Height-for-age score				Aged 0-14				Educational attainment				School-aged 6-14						
	All sub-sample				Removing areas that experienced extreme weather				All sub-sample				Removing areas that experienced extreme weather				All sub-sample				Removing areas that experienced extreme weather		
Child of victim of electoral violence back when of growing age	0.404	-0.610	0.174	0.143	-0.651	0.086	-0.041	0.119	0.374	0.497	0.611												
	(0.327)	(0.644)	(0.695)	(0.765)	(0.689)	(0.729)	(0.827)	(0.522)	(0.623)	(0.700)	(0.722)												
Child of victim of electoral violence back when of growing age X Male			-2.677***	-2.532***			-2.690***																
			(0.812)	(0.854)			(0.914)																
Male child	0.309	-0.088	0.435	0.433	0.025	0.501	0.509	-0.166	-0.637	-0.585	-0.609												
	(0.288)	(0.337)	(0.355)	(0.364)	(0.339)	(0.352)	(0.360)	(0.445)	(0.385)	(0.422)	(0.424)												
Child has been bedridden in bed for more than one month		-0.459	-0.071	-0.091	-0.530	-0.122	-0.110																
		(0.636)	(0.624)	(0.624)	(0.659)	(0.637)	(0.642)																
Number of cows own by child's household		-0.036	0.038	0.057	-0.122	-0.036	-0.045																
		(0.152)	(0.152)	(0.163)	(0.148)	(0.151)	(0.171)																
Child parent is currently employed		-0.784*	-0.695*	-0.662	-0.741*	-0.639	-0.683																
		(0.437)	(0.417)	(0.478)	(0.428)	(0.418)	(0.477)																
Child's parent has secondary or more		0.071	0.123	0.140	0.033	0.093	0.097																
		(0.116)	(0.111)	(0.120)	(0.112)	(0.109)	(0.119)																
Household asset index of child's household		1.900	0.969	0.867	2.377	1.478	1.505																
		(1.862)	(1.795)	(1.825)	(1.873)	(1.798)	(1.871)																
Height of child's parent		0.028	0.030	0.026	0.039	0.040	0.038																
		(0.026)	(0.025)	(0.026)	(0.027)	(0.026)	(0.028)																
Currently residing in a rural area		0.141	0.064	0.075	0.139	0.050	0.116																
		(0.442)	(0.413)	(0.458)	(0.438)	(0.417)	(0.454)																
Ethnicity fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Province of birth fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Parent's cohort of birth	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Child's cohort of birth	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	134	111	111	108	108	108	105	174	132	132	131												
R-squared	0.019	0.310	0.381	0.361	0.332	0.399	0.378	0.001	0.629	0.629	0.629												

²⁰ Stunting levels (below two standard deviations of z-scores) are higher among boys (30%) than girls (22%) (Kenya National Bureau of Statistics 2015, p.187).

Note: In parentheses are the robust standard errors clustered at the child's ethnicity, year of birth level and household levels. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

As a robustness check, we test for potential heterogeneity in the effect of violence by children's age. We analyse boys and girls from birth up to 14 years old as they have very similar calorie needs, and thus similar costs to households. Again, we find that boy victims of electoral violence have reduced z-scores compared to girls living in households affected by electoral violence (Table 9, columns 5–7). These findings are robust if we remove the districts that experienced extreme weather.

Children's Educational Attainment

We also assess the impact of electoral violence on children's educational attainment of the children of victims of electoral violence to that of the children of non-victims. We focus on school-aged children (ages 6–18). This sample restriction is in line with the related literature, which suggests that removing children younger than the age for starting school from the sample helps to reduce any potential selectivity of children remaining at home (Akresh et al. 2017).

We find no evidence that the children of victims of electoral violence have worse educational attainment than the children of non-victims. For instance, Table 9, columns 8–11, shows that this is the case if analysing the children aged 6–18 whose parents experienced electoral violence during their growing years, and also if removing those living in areas that experienced extreme weather. We also find no statistically significant effect between the educational attainment of the sons and daughters of victims of electoral violence either (columns 10–11). As a robustness check, in Table 10, we estimate the impact of electoral violence on the children of the people that were living in districts affected by electoral violence when of growing age. We find again that the sons of victims of electoral violence are shorter than the daughters. Similarly, we find no impact on educational attainment on the children of victims of electoral violence.

Table 10. Height and Educational Attainment of Children.

	(1) (2) (3)			(4) (5) (6)			(7) (8) (9)			(10) (11)		
	Aged 0-18			Aged 0-14			All sub-sample		Removing areas that experienced extreme weather		Removing areas that experienced extreme weather	
	All sub-sample	Removing areas that experienced extreme weather	Removing areas that experienced extreme weather	All sub-sample	Removing areas that experienced extreme weather	Removing areas that experienced extreme weather	All sub-sample	Removing areas that experienced extreme weather	All sub-sample	Removing areas that experienced extreme weather	All sub-sample	Removing areas that experienced extreme weather
Child of adult that was living in district affected by electoral violence back when of growing age	0.994*	0.564	1.495	1.394	-0.044	0.941	1.074	-1.776	-1.610	-1.103	-1.292	
	(0.552)	(1.062)	(0.975)	(0.861)	(1.128)	(1.000)	(0.902)	(1.085)	(1.134)	(1.273)	(1.393)	
Child of adult that was living in district affected by electoral violence back when of growing age x Male child		-2.454**	-3.547***			-2.529**	-3.573***		-1.032	-1.062		
		(1.194)	(1.261)			(1.093)	(1.213)		(1.514)	(1.529)		
Male child	0.287	-0.027	0.179	0.221	0.064	0.280	0.294	-0.172	-0.672*	-0.646*	-0.644*	
	(0.288)	(0.334)	(0.343)	(0.356)	(0.338)	(0.351)	(0.361)	(0.441)	(0.373)	(0.386)	(0.387)	
Child has been bedridden in bed for more than one month		-0.515	-0.395	-0.332	-0.619	-0.486	-0.391		0.830	0.826	0.747	
		(0.702)	(0.694)	(0.680)	(0.751)	(0.737)	(0.725)		(1.002)	(1.009)	(1.009)	
Number of cows own by child's household		0.015	-0.008	0.015	-0.075	-0.101	-0.068		1.181**	1.183**	-0.181***	
		(0.141)	(0.144)	(0.144)	(0.143)	(0.145)	(0.152)		(0.067)	(0.068)	(0.068)	
Child parent is currently employed		-0.544	-0.533	-0.494	-0.568	-0.562	-0.545		0.480	0.472	0.485	
		(0.386)	(0.385)	(0.393)	(0.390)	(0.387)	(0.398)		(0.445)	(0.445)	(0.444)	
Child's parent has secondary or more		0.057	0.082	0.104	0.016	0.041	0.061		0.032	0.036	0.058	
		(0.114)	(0.112)	(0.117)	(0.112)	(0.111)	(0.119)		(0.142)	(0.142)	(0.145)	
Household asset index of child's household		1.966	2.269	2.128	2.308	2.607	2.461		1.599	1.584	1.271	
		(1.855)	(1.865)	(1.878)	(1.847)	(1.850)	(1.882)		(1.606)	(1.609)	(1.676)	
Height of child's parent		0.026	0.023	0.020	0.039	0.036	0.031		0.021	0.021	0.023	
		(0.026)	(0.026)	(0.026)	(0.027)	(0.027)	(0.028)		(0.025)	(0.025)	(0.025)	
Currently residing in a rural area		0.030	-0.004	-0.056	0.052	0.025	0.002		-0.767	-0.773	-0.869*	
		(0.458)	(0.452)	(0.453)	(0.459)	(0.451)	(0.460)		(0.495)	(0.498)	(0.524)	
Ethnicity fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	
Province of birth fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	
Parent's cohort of birth	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	
Child's cohort of birth	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	
Observations	134	111	111	108	108	108	105	174	132	132	131	
R-squared	0.027	0.302	0.335	0.342	0.322	0.356	0.351	0.009	0.632	0.633	0.633	

Note: In parentheses are the robust standard errors clustered at the child's ethnicity, year of birth level and household levels. ***p < 0.01, **p < 0.05, *p < 0.1.

Coarsened Matching

We also use coarsened matching to match children of victims and non-victims of electoral violence.²¹ We match using children's ethnicity, sex, whether was sick when growing up, living in a rural area, age cohort. In addition, we control for parents' wealth index and height. The pre- and post-matching balancing statistics are shown in Table A.4.²²

²¹ We do not present the ATT of the children of those respondents that were living in districts affected by the electoral violence 2007–08 during growing age. For this group the matched was sample not big enough to make inferences. However, it is worth noticing that the results suggest same magnitude, sign and significance to those of OLS.

²² Once matching, we estimate the average-treatment effect of electoral violence on children's height and educational attainment using an OLS regression where we control for any differences in the covariates across the treatment and control groups. As before, we also weight this regression using the weights generated by the coarsened matching method to

We then estimate the ATT on children's height for children aged 0–14 and aged 0–18. First, we assess the impact of electoral violence on the height of children (boys and girls) of victims of electoral violence. Second, we compare the impact on boys and girls by adding the interaction *Child of a victim of electoral violence x Boy*. For each sub-group, we run two specifications, including and removing districts that experienced extreme weather. As Table 11 shows, across all sub-groups analysed, the ATT is statistically significant for boys. These results suggest that the consumption and income shocks triggered by electoral violence are more detrimental to boys' height than girls'.

Again, in line with our earlier findings we find no impact on the educational attainment of the children of the respondents affected by electoral violence during their growing years. In sum, the first- and second-generation findings suggest that electoral violence in Kenya has neither affected the educational attainment of adults exposed to the violence during their growing years nor that of their children. There are several potential reasons for these findings. Our paper, unlike several other studies, focuses on a low-scale and short-spanned conflict, thus perhaps helping to reduce its potential impact on educational attainment. Moreover, the Kenyan elections of 1992, 1997, 2002, and 2007 were all conducted during the December school holidays.²³ The timing of these elections might have prevented a significant disruption in the provision of education in terms of opening hours or teacher absenteeism, as well as in the potential absenteeism of pupils in response to the violence.²⁴ Although several households were displaced to camps for months (if not longer), a large percentage of these families were unable to return to their previous homes, being forced to settle elsewhere where they might find alternative education arrangements. Moreover, despite Kenya's abolition of primary schooling fees, Kenya holds the ninth place worldwide of nations with the highest number of children of primary-age being out of school partly due to an insufficient number of schools and the still high indirect school costs that might affect a

evaluate any potential remaining imbalance. We use white-robust errors, clustered at the child's ethnicity, year of birth, and household levels.

²³ Only the election of 2013 was conducted in March. This recent election did not affect our analysed adult respondents during their growing age.

²⁴ The academic year of both primary and secondary schools starts in January and ends in November, with three periods of holidays in April, August, and December.

significant number of households, and not only those affected by electoral violence (UNESCO 2012).

Table 11. Average Treatment Effect on Height-for-Age Z Score of Children of Victims of Electoral Violence Affected during Growing Age.

	Treated	Control	ATT height-for-age score children aged 0-18	ATT height-for-age score children aged 0-14	ATT education attainment school-aged children 6-18
Children of victim of electoral violence during growing age					
Boys and girls	108	61	0.428 (0.521)	0.512 (0.537)	-0.590 (0.595)
Treated*boys			-2.774*** (0.729)	-2.891*** (0.792)	-0.459 (1.054)
Excluding those living in areas that suffered extreme weather					
Boys and girls	109	59	0.346 (0.540)	0.346 (0.540)	-0.471 (0.720)
Treated*boys			-2.598*** (0.747)	-2.598*** (0.747)	-1.389 (1.329)

Note: In parentheses are the robust standard errors clustered at the child's ethnicity, year of birth level and household levels. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Conclusion

This paper has shown that children and adolescents exposed to the electoral violence decades after, once adults, are shorter in height than similar people who did not experienced electoral violence during their growing years. Boys in particular whose parents have been affected by electoral violence are shorter in height than girls and boys whose parents have not been affected by violence.

We identified the effect of the electoral violence by exploiting the variation of violence across time and space during the 1991–2013 period, controlling for a wide range of characteristics that could have affected height. As robustness checks we also used coarsened matching. Also, in a series of placebo tests, we showed that people exposed to electoral violence during the time when they no longer develop physically (e.g. non-growing years, aged 18–60) have the same height as similar adults not affected by the violence. These placebo tests then rule out potential self-selection issues, or pre-trend differences in height driving the results.

What then explains the divergence in height among those who were exposed to electoral violence during growing age? We found that those living in areas engulfed in electoral violence are more likely to report that their areas experienced food shortages and inflation, which forced them to temporarily change their diet, highlighting the mechanisms

affecting height outcomes. Despite the likely temporary malnutrition and consumption shocks driving our results, we found no impact on the educational attainment of boys or girls whose parents were victims of electoral violence. Nor did we find any effect on educational attainment among the adults who during their growing years were affected by electoral violence. These findings suggest that the specific type of low-scale and short-spanned violence analysed has not had any long-lasting effects on educational attainment, perhaps as the bulk of the electoral violence has typically occurred during school holidays, potentially limiting the disruption to the attendance of both pupils and teachers.

We acknowledge that a limitation of our analysis is not to have access to test scores to assess a potential effect of electoral violence on cognitive performance. Our findings do not rule out either that a higher incidence of electoral violence could affect the educational attainment of young children, as other studies have found for major scale armed conflicts (e.g. Akresh et al. 2012; Akbulut-Yuksel 2014). However, overall, our results revealed that electoral violence places a disproportionate burden of malnutrition and poor health outcomes on the most vulnerable groups: newborns, children, adolescents, and over time their future offspring.

What can be done? Public policy certainly plays some role. Preventing electoral violence is an obvious start. As other studies have highlighted, it is also essential to design better humanitarian responses to conflict and address the underlying causes of stunting (Carroll et al. 2017; Onyango et al. 2019). Given the cyclical nature of electoral violence emergency nutrition programmes are critical in areas where there is a well-known high risk of food shortages due to violence. Apart from the underlying determinants to stunting such as disease and poverty, our paper also revealed that electoral violence has contributed further to the already high stunting levels observed among young children in Kenya, as in many other similar developing countries. Long-term interventions should include strategies to address the noticeable differences in stunting risk found between boys and girls.

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Appendix

Table A.1. Victims and Non-Victims of Violence (First-Generation).

	Experienced electoral violence during <i>growing age</i>			Did not experience electoral violence during <i>growing age</i>		
	Obs.	Mean	St. Dev.	Obs.	Mean	St. Dev.
Current condition as adult						
Height for female respondents	77	159.97	9.43	228	161.96	11.54
Height for male respondents	88	167.08	11.95	239	168.91	12.07
Secondary or more for female respondents	107	0.79	0.41	292	0.79	0.41
Secondary or more for male respondents	121	0.86	0.35	302	0.80	0.40
Assent index	235	0.41	0.17	605	0.40	0.18
Monthly expenditure per capita in household (USD)	152	66.21	171.37	391	77.68	223.49
Employed	235	0.47	0.5	605	0.50	0.50
Married	235	0.38	0.49	605	0.41	0.49
Has children	235	0.33	0.47	605	0.40	0.49
Number of children	235	0.49	0.91	605	0.58	0.95
Agree with use of violence	235	0.26	0.44	605	0.16	0.36
Disagree with having elections	235	0.32	0.47	605	0.29	0.45
Lives in rural setting	235	0.56	0.5	605	0.55	0.50
When of <i>growing age</i>						
Was bedridden in bed for more than one month	235	0.13	0.33	605	0.08	0.27
Got malaria	235	0.6	0.49	605	0.55	0.5
Got polio	235	0.04	0.2	605	0.02	0.15
Father had secondary or more	174	0.57	0.5	500	0.49	0.5
Number of cows father owned	154	7.53	22.03	370	4.5	7.59
Father household asset index	235	0.4	0.17	605	0.4	0.18

Table A.2. Children of Victims and Non-Victims of Electoral Violence.

	Children of those who experienced electoral violence during their <i>growing age</i>			Children of those who did not experience electoral violence during their <i>growing age</i>		
	Obs.	Mean	St. Dev.	Obs.	Mean	St. Dev.
Height-for-age z score of girls	23	-0.55	1.6	51	-1.53	1.47
Height-for-age z score of boys	13	-1.42	1.67	48	-0.87	1.74
Male	98	0.44	0.5	316	0.54	0.5
Was bedridden in bed for more than one month	98	0.12	0.33	318	0.06	0.23
Age by year of education						
No formal education	6	1.00	1.10	23	1.70	1.55
Nursery	30	3.20	2.41	72	3.11	2.34
ST1	9	6.11	1.54	20	5.90	1.25
ST2	4	7.25	0.96	19	7.74	2.28
ST3	2	7.00	1.41	27	9.22	2.61
ST4	5	10.80	4.09	16	8.63	2.70
ST5	3	9.67	2.08	12	11.17	1.27
ST6	9	11.33	1.80	12	11.17	2.79
ST7	2	13.00	1.41	12	9.42	5.38
ST8	4	12.50	2.52	7	13.71	1.38
Secondary	4	15.50	1.73	11	14.27	2.90
No information provided	20	4.95	4.94	85	4.58	3.94
Characteristics of child's parent (our adult respondents)						
Number of cows household owns currently	92	1.05	1.73	281	1.29	3.14
Parent employment status	98	0.46	0.5	318	0.5	0.5
Parent has secondary or more	93	4.66	1.69	310	4.49	1.79
Parents' household asset index	98	0.4	0.17	318	0.41	0.18
Reside in rural area	98	0.65	0.48	318	0.59	0.49

Table A.3. Children of Victims and Non-Victims of Electoral Violence.

	Before matching							After matching						
	L1	mean	min	25%	50%	75%	max	L1	mean	min	25%	50%	75%	max
Was bedridden in bed for more than one month when of growing age	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Respondent's father had secondary or more	0.12	0.55	0.00	1.00	1.00	1.00	0.00	0.00	-0.03	0.00	0.00	0.00	.	.
Father household asset index back when respondent was of growing age	0.11	0.01	0.00	0.00	0.00	-0.08	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Parents belong to same ethnic group	0.04	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Respondent currently lives in a rural area	0.02	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Respondent's sex	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Respondent's ethnicity	0.05	-0.49	0.00	0.00	0.00	0.00	-81.00	0.24	0.44	0.00	0.00	-1.00	1.00	0.00
Controls	605													
Treated	235													
Total observations	840													
Matched controls								137						
Matched treatment								220						

Note: L1 shows the overall imbalance statistic as proposed by Iacus, King, and Porro (2008).

Table A.4. Children of Victims and Non-Victims of Electoral Violence.

	Before matching							After matching						
	L1	mean	min	25%	50%	75%	max	L1	mean	min	25%	50%	75%	max
Child's cohort	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.06	0.07	0.00	0.00	0.00	0.00	0.00
Child's sex	0.12	-0.12	0.00	0.00	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Household asset index of child's household	0.15	-0.01	0.00	0.00	0.00	0.00	-0.13	0.06	-0.01	0.00	0.00	0.00	0.00	-0.07
Height of child's parent	0.12	-1.95	3.00	0.00	-2.00	-1.00	-12.00	0.12	0.22	0.00	-1.00	0.00	2.00	.
Currently residing in a rural area	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethnicity	0.15	0.13	0.00	1.00	2.00	1.00	-83.00	0.07	0.40	0.00	1.00	2.00	1.00	-1.00
Controls	318													
Treated	98													
Total observations	416													
Matched controls								111						
Matched treatment								63						

Note: L1 shows the overall imbalance statistic as proposed by Iacus, King, and Porro (2008).